RUNAWAY BUREAUCRACIES OR CONGRESSIONAL CONTROL?: WATER POLLUTION POLICIES IN THE AMERICAN STATES

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ABSTRACT

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Over the last several decades, there has been persistent scholarly controversy concerning Congress's influence on administrative decision-making. Scholars in the 1970's argued that the bureaucracy was out of control and not subject to ongoing Congressional influence, while in more recent years scholars using principal-agent theories have argued that Congressional control over administrative decision-making is common. This work suggests that both of these arguments have neglected the importance of ongoing statutory influence on policymaking at the federal and state levels, and – in so doing – have failed to emphasize an important source of Congressional influence on US domestic policy. This work assesses ongoing statutory influence on administrative decision-making in US water pollution control policy. It assesses federal and state compliance with Congress's statutory instructions, and focuses on policymaking at the state level where the rubber actually meets the road in water pollution control and many other areas of American domestic policy.

Drawing evidence from historical and cross-sectional analyses of the water pollution policymaking process, the argument here is that Congress guides administrative policymaking, ex ante, through the statutory directions it provides for policy implementation – even in policy areas like water pollution control that rely heavily on intergovernmental administration. However, this guiding function is imperfect, as substantive policy outputs may stray from Congress's statutory directions as a result of factors that come into play during the implementation process. These factors include the nature and variability of directions provided by political leaders at the federal level, state level policy influences, and variable levels of federal oversight. The analyses here also point out that the relative strength of these

influences at the state level varies depending on the policy output being considered, and these outputs are affected in fundamental ways by statutory design. Congress, it is suggested here, has substantial long-term influence on bureaucratic policy outputs, and statutory design is a fundamental mechanism through which this influence is realized. This conclusion, in turn, suggests a need for increased attention to Congressional policy design in water pollution control and other policy areas.

B. Guy Peters, Dissertation Advisor

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Any project of this magnitude requires more thanks than can be expressed in a short preface. I will nevertheless try to thank those whose support has enabled me to complete this work. Without the support of the individuals mentioned below (and a number of others who are not), this work would never have come to completion.

Because I have had the opportunity to work in the field of US environmental policy prior to the initiation of this research, I have enjoyed the benefits of the insight and assistance of many environmental policy professionals. I have drawn from the expertise of those individuals rather liberally during the course of this work. Associates from my professional work have also identified individuals who I had not met previously, but who gave generously of their time in an effort to help guide this work. Out of respect for their professional positions, and because they are too numerous to mention individually, I have chosen to refer to the contributions of most of these professional associates on the basis of anonymity at this point in time. With sufficient time and proper permission, I hope to have the opportunity to credit them properly at some point in the future. My hope is that this failure of attribution is compensated for by the collection, use, and analysis of publicly available data in this work.

I have also benefited from the guidance of faculty and fellow students with whom I have worked at the University of Pittsburgh, the University of Wisconsin – Madison, and Beloit College. I will mention several faculty in particular who have influenced my thinking about the ways in which our world works, and from whom I have gained a great deal – probably in ways they do not know in many cases. These individuals include Dr. Donald Summers, Dr. Marlynn May, Dr. Harry Davis, Dr. Warner Mills, Dr. Milton Feder, Dr. Menno Froese, and Professor Tom McBride at Beloit College. They also include Dr. William Gormley, Dr. Dennis Dresang, Dr. Robin Marra, Dr. John Steinhart, and Dr. Jordahl at the University of Wisconsin – Madison. At the University of Pittsburgh, I was able to bring a portion of what I had learned through my previous academic and professional experiences to fruition through contacts with both faculty and graduate students alike. Particularly supportive in this regard have been Dr. Jon Hurwitz, Dr. Ray Owen, Dr. Giandomenico Majone, Dr. David Barker, Dr. Albrecht Funk, Dr. Mitchell

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Throughout the research process, my Dissertation Committee has provided the wisdom, criticism, and encouragement that is necessary for completion of a project of this kind. Dr. William Keefe, a Professor Emeritus at the University of Pittsburgh, was the individual who took sufficient interest in me to keep my graduate work going during the earlier years of my study at the University of Pittsburgh. Dr. Chistopher Carman gave generously of his time to guide and criticize my quantitative and analytical work in useful and constructive ways. Dr. Evan Ringquist of the School of Public and Environmental Affairs at Indiana University – an old friend from UW-Madison – provided numerous and constructive criticisms of my quantitative work, while also steering me effectively with his strong grasp of the American environmental policy literature. Dr. Susan Hansen steered me toward key pieces of the state politics literature while also providing numerous specific comments and suggestions that led to valuable additions to the manuscript. Dr. Alberta Sbragia provided endless encouragement and a continuing supply of key big picture insights that helped me continue my work and maintain enthusiasm about social scientific endeavors even when all my work seemed quite daunting. And finally, Dr. B. Guy Peters, my dissertation chair, provided an endless and alternating supply of wisdom, criticism, and encouragement in exactly the right proportions. As a result of his experience, I was often steered away from problems that he saw coming long before I did. This work would never have been completed without him.

While this committee brought many different perspectives to my work, I always felt that the clash of perspectives served to strengthen the work. I feel very fortunate to have had a wise and supportive committee that enabled a constructive tension across social scientific perspectives. This, in itself, was an important social scientific lesson for me, and I was fortunate to have learned it from some of the best. Through their examples, I have learned that differing perspectives and methodologies from intelligent scholars – rather than blind obedience to a single set of philosophical and methodological preferences – are the true engines of social scientific progress.

Most importantly, I must also thank my friends and family, for they are the ones who truly enabled this work to happen. Throughout the course of this research, I heard numerous words of encouragement from close friends and associates, and for this support I am quite grateful. I also received continuing encouragement in a variety of ways from my brothers and their families (Dave, Sue, Hannah, Sarah, Mark, Darcy, and Zoe), and similar words of encouragement were also voiced by my in-laws in the Klappauf family. My parents, Louis and Lynda Hoornbeek, provided the foundations upon which this work could grow, as well as critical support and encouragement at key times. I am eternally grateful to them for all of their guidance and assistance. And finally, my wife, Laurie Klappauf, and my children, Allison and Daniel, helped in more ways than they can ever know. My wife, Laurie, even helped with several key tasks that enabled me to finish this work a bit earlier than would have been otherwise possible. Without the love and support of my family, their continuing forbearance, and their sacrifices, there would be no dissertation. In the end, family is what matters, and I dedicate this work to my family.

While I have received great support from many individuals, this work is of my creation, and I therefore must claim responsibility for any deficiencies that remain in it. My hope, however, is that it is of sufficient quality to contribute toward future recommendations and improvements for environmental policymaking processes in the United States and perhaps eventually other multi-level political systems as well.

And finally, the views and analyses presented in this work are my own, and do not necessarily reflect the views of my current or past employers.

1. INTRODUCTION

Has the "runaway" American bureaucracy envisioned by Theodore Lowi (1979) in the 1970's given way to a wide-ranging responsiveness in American public policy-making at the federal and state levels? Recent analyses would have us believe so (see Wood & Waterman, 1994; Erikson, et. al., 1993, for example). Assessments of environmental policymaking have gone even further, suggesting that we now live in an era of both Congressional micro-management (Rosenbaum, 2002) and decentralized civic environmentalism (John, 1994). This research delves into these apparent contradictions using an approach that is different from the ones used by Lowi and many of the more recent analyses suggesting that we now live in an era of wide-ranging policy responsiveness.

As with Lowi's work, this research focuses on the role of Congress as embodied in its statutory directions, but – in contrast to Lowi – it focuses on the manner in which these directions are actually implemented. In so doing, this work recognizes the fundamental role of the states in implementing American domestic policy, and also addresses two questions that are central to public administration as a field of study and to overhead theories of democratic accountability that are based on top-down direction of the bureaucracy by elected officials. The first and most fundamental question asked is, "what is the relationship between the statutory structures enacted by Congress and public policy outputs produced by implementing organizations at the state and federal levels"? Or, to put this question more directly in the context of recent scholarly debates, are public administrators at the state and federal levels "running away" from Congress's directions or are they being subjected to ongoing, ex ante, Congressional control? A second and related question addressed in this work centers on the reasons why state policies may stray from Congress's directions. Are state policy deviations from Congressional direction(s) traceable to differing problems and preferences as many advocating water pollution policy devolution suggest, or are they the result of other factors? The analyses presented in this work shed light on both of these questions.

The overarching argument made here is that Congress guides administrative policymaking, ex ante, through the statutory directions it provides for policy implementation – even in relatively decentralized policy areas like water pollution control. However, this guiding function is imperfect, as substantive policy outputs at both the state and federal levels may stray from Congress's statutory directions as a result of factors that come into play during the implementation process after a statute has been enacted. These factors include the nature and variability of directions provided by political leaders at the federal level, state level policy influences, and variable levels of federal oversight. The analyses also point out clearly that the relative strength of these influences at the state level varies depending on the policy output being considered, and these outputs are affected in fundamental ways by the statutory design enacted by Congress. Congress, it is suggested here, has substantial long-term influence on bureaucratic policy outputs, and statutory design is a fundamental mechanism through which this influence is realized.

Furthermore, while some studies of the ex ante statutory influence of Congress over administrative policymaking have focused primarily on the policy processes established in statute (McCubbins, Noll, & Weingast, 1987 and 1989), this analysis looks at Congressional intent and direction primarily in terms of statutory policy content – focusing specifically on the types of policy instruments authorized and the audiences and behaviors to which they are applied. It asks, what does Congress want to do, and how does it want federal and state agencies to go about doing it? It then seeks to assess whether that intent – as defined by the language of the statute – is pursued and/or met by subsequent administrative policymaking efforts in the federal executive branch, and among the states. Consequently, in this work, Congressional control is defined in terms of policy outputs that reflect clear efforts to implement Congress's statutory directions over time, while runaway bureaucracy is characterized by a failure to do so. Notably, in this context, the primary focus is on the nature of governments' actions, rather than the impacts or outcomes flowing from these actions.

The analyses here contribute to a dialogue that is of central importance to American policymaking. Domestic policies in the United States derive their strength and legitimacy from

Congressional sanction, and public administrators owe their authority to act to the statutes they administer. The most legitimate and defensible efforts at Congressional influence are therefore statutory. At the same time, however, the effectiveness of Congressionally enacted statutes is often determined during implementation processes that occur at the state level, after basic policy frameworks are established in Washington. Congress's efforts to guide these implementation processes through statute are characterized by goals and objectives that establish basic directions for federal policies. They are also guided by the authorization of policy instruments that define the tools to be used, and by specified audiences and behaviors toward which these policy instruments are directed. These statutory directions are the most fundamental building blocks of Congressional influence, and yet they have taken a back seat in many recent scholarly analyses to "managerial" measures of Congressional preference that are associated with particular Congressional Committees and/or oversight efforts on the part of numerous Congressional Committees.

In taking a statutory approach, this work recognizes the inevitable and sometimes under-emphasized role of public administration as the means through which Congress's directions are (or are not) realized. It draws from the literature on policy implementation the insight that administrative agencies must integrate "top down" statutory directions from Congress with other considerations relating to the nature and variability of directions from national level political principals – limited resources, technical complexity, poorly constructed statutory provisions, and competing demands from both executive and legislative decision-makers stand out in this regard. After national program administrators cope with these issues in the construction of federal policy, policy implementation agents at the state level must also integrate additional considerations relating to state level influences and federal oversight that tend to operate in more decentralized fashion.

This work also draws from the literature on federalism and state policymaking the insight that intergovernmental relationships take differing forms, and these forms are likely to affect policy outputs. From this same body of literature, it also draws the insight that numerous factors influence state policies, and the relative strength of these influences may vary depending on the policy output under consideration.

In taking account of all of these varying theoretical perspectives – those relating to Congressional influence on policymaking, policy implementation, and federalism and state politics, this work goes further than many previous analyses in tying state policy outputs to Congress's statutory directions.

In so doing, this work moves beyond the "managerial" biases that have characterized much of the current literature on ex ante Congressional control. Prominent among these biases has been a tendency to focus on policy outputs that are changeable in relatively short periods of time and are therefore readily subject to top-down forms of managerial manipulation. This work seeks to overcome these biases by investigating Congressional influence on federal and state policymaking in the context of water pollution policy --- an area that is typical in its reliance on federal-state partnerships for policy implementation and theoretically valuable because it has been used to illustrate both runaway bureaucracy (Lowi, 1979) and Congressional control (Wood and Waterman, 1994). Unlike a number of previous studies, however, this research looks specifically at water pollution policy outputs that are likely to be relatively resistant to ongoing managerial manipulations in order to gain an understanding of how Congress's statutory directions affect policy outputs that require significant amounts of time and ongoing efforts for implementation. These include procedural measures of compliance and substantive measures of state policy aggressiveness in both non-point and point source water pollution control.

The choice of water pollution control as a focus of inquiry is appropriate not only because it is typical and theoretically important, but also because the control of water pollution is important in its own right. Clean water is fundamental to both human life and ecological health, and yet it is widely recognized that our current water pollution programs have not fulfilled the ambitious expectations established for them (EPA, 2000A). At the same time, current policy debates in the area of water pollution control often seem stagnant, as states rights advocates spout dogma relating to the value of policy devolution and environmental advocates push forward in almost blind fashion toward ever more stringent command and control forms of regulation – a push that is currently taking the form of pressure for more extensive controls on the total maximum daily loads (TMDLs) of pollutants entering into specific water bodies.

Underlying both of these views, however, are assumptions about appropriate federal-state relationships that are rarely subjected to empirical scrutiny. In one of the more in-depth analyses of federal and state roles in environmental policy, Richard B. Stewart emphasizes unhealthy competition among the states, spillover effects across state borders, a moral imperative to ensure minimum levels of environmental protection, and disparities in effective representation at the state level as key justifications for a strong federal role in environmental protection (Stewart, 1977). The analyses in this work focus on the two latter of these rationales for federal water pollution control policy by seeking to determine the extent to which state policies adhere to strong statutory directions from Congress, and by assessing the extent to which state deviations from Congress's directions are traceable to indicators of broad policy responsiveness at the state level – responsiveness to both broad based state preferences and variable problem situations in the states. The relative strength of these state level influences, in turn, affects judgments regarding the proper balance of federal and state authorities in U.S. water pollution policy.

Consequently, this work delves deeper than many current analyses of Congressional influence on administrative policymaking by investigating the actual implementation of the surface water related components of the Federal Water Pollution Control Act (FWPCA). It compares policy outputs under the FWPCA's supportive provisions for controlling diffuse (non-point) sources of water pollution with policy outputs under its highly directive preemptive provisions for controlling concentrated water pollution sources (point sources). In so doing, the analyses conducted here offer insights relevant to not only scholarly debates about Congressional influence over administrative decision-making, but also potential future statutory changes in the FWPCA. For, in the end, future judgments relating to the appropriate balance between federal and state authorities in particular policy areas are made by Congress, and are institutionalized in statute.

Thus, a central part of the argument made here is that Congress's statutory directions provide the appropriate starting point for understanding Congressional influence over administrative policymaking at the federal and state levels. Congress structures statutes in a variety of ways. Statutory goals can be ambitious or modest, multi-faceted or singular in purpose, or vague or clear. The particular policy tools that agencies are authorized to use in accomplishing statutory goals also vary. They may include directive policy instruments such as mandatory federal regulation through various forms of Congressional preemption, or supportive policy instruments like information provision, technical assistance, and/or financial subsidies of differing kinds. And the scope of policy applicability also varies, as targeted audiences and behaviors differ across statutory provisions. Congressionally enacted policies may, for example, apply to states or citizens; or to some kinds of activities and not to others. The point here is that Congress decides these issues through the legislative process and structures statutory authorities in ways that adhere to their decisions. And, as was noted above, a focal point of this analysis is to investigate the manner in which varying Congressional directions, as expressed in statutory structure, affect subsequent policymaking in the federal administrative realm and at the state level.

The analyses here are presented in three major Parts. Part I describes the foundations upon which the analyses in this work are based. It consists of chapters providing overviews of relevant scholarly literature, water pollution problems in the United States (US), and American water pollution policymaking institutions, actors, and history. The last chapter in this Part provides an outline of the hypotheses, data, and methods underlying this work. Part II presents a historical analysis consisting of three chapters that assess changes in statutory direction during the supportive (1948-1971), directive (1972-1986), and experimental (1987-present) eras of water pollution control in the US. These chapters investigate the extent to which federal and state policy outputs were consistent with these Congressionally established directions, based on a review of existing policy documents and studies found in the secondary literature on water pollution control.

And finally, the chapters in Part III analyze contemporary state non-point and point source water pollution policies, their compliance with basic procedures established by Congress in statute, the nature and extent of their variation in relation to Congress's ambitious water quality goals, and their responsiveness to varying kinds of state and federal policy influences. This part consists of five chapters, with one reviewing Congress's specific statutory directions in non-point and point source water pollution control, and two chapters devoted to investigating and explaining state variations in these two areas, respectively. The concluding chapter of the dissertation then reviews the evidence presented in this work as a whole, and focuses on Congress's statutory influence through policy implementation and the likely sources of policy drift under both supportive and preemptive federal policy designs. It also outlines the implications of this work for the scholarly literature, and suggests some areas for further research. It then closes the dissertation with some suggestions for Congress's consideration, as it re-assesses federal and state roles in US water pollution policy in the 21st century.

The following paragraphs provide more detailed descriptions of the individual chapters presented in this work. ***Chapter 2***, the first chapter in **Part I**, reviews the scholarly literature on congressional "control," and seeks to tie it to the scholarly literatures on policy implementation, and federalism and state policymaking. While these three literatures view American domestic policy from different vantage points, they are – in the end – addressing the same phenomena. As Denise Scheberle points out, "federalism is not only a constitutional principle …. it strikes at the very core" of the implementation of environmental policy in the United States (Scheberle, 1997, p. 16). And, environmental policy has also been a primary target of scholarly interest relating to Congressional control of administrative decision-making. The end result is a general picture of the state of current knowledge relating to key questions addressed in this work that draws from several substantial bodies of literature in political science and public policy.

Chapter 3 provides basic background on water pollution control in the United States. It outlines the importance of water pollution control in the grand scheme of life in the US, and discusses the extent and nature of current water pollution problems. In so doing, it provides an overview of the kinds of water pollutants that contaminate the nation's waters, the major sources of those pollutants, and the kinds of treatment and control options that can be employed to combat the various kinds of water pollution problems that confront us. It also points out a number of the ways in which those problems vary according to geography and political jurisdiction. The analyses provided make it clear that water pollution in this country remains a major problem, even as they also acknowledge that significant progress has been made in combating water pollution in the US over the last several decades.

Chapter 4 offers an overview of major environmental policymaking institutions and actors in the United States, and their varying concerns and interests in water pollution and its control. It also traces the development of federal water pollution policy during the 20th century, and illuminates the changing nature of Congressionally mandated policies by suggesting that there have been three major eras of American water pollution policy in the post World War II period – the supportive era (1948-1971), the preemptive era (1972-1986), and the experimental era (1987 to the present). In so doing, this chapter provides a historical foundation for the analyses that follow in Parts II and III of this work.

Chapter 5 (the last chapter in Part I) overviews the hypotheses, data and methodological approaches used in the analysis. It specifies the three hypotheses that guide this research, based on theoretical expectations derived from institutionally oriented literature in political science. In each case, the hypotheses evaluated assume that institutional arrangements established in law foster predictable forms of subsequent policymaking behavior. These three hypotheses are as follows:

> Substantive statutory direction from Congress structures the extent and nature of federal I nvolvement in surface water pollution control policymaking and implementation;
>
> The extent and nature of federal policy direction affects state surface water pollution policy outputs;
>
> State surface water pollution policy outputs are more likely to be responsive to broad based state level influences when federal involvement is minimal than when it is extensive.

Viewed as a triad, these hypotheses suggest that there are systematic relationships between Congress's statutory directions and subsequent federal and state policy outputs. They also suggest that state policymaking institutions operate, largely as they were designed, to foster participation that enables policies that are responsive to broad based state needs, preferences, practices, and electoral results.

Chapter 5 also reviews the data and information that are used in evaluating these three hypotheses, as well as the methodological strategies that are employed. The data and information used are drawn from a wide range of sources, including:

- discussions with state and federal water pollution professionals;

- federal government data bases;
- reports from the federal government and associations of state officials;
- previous scholarly research, and;
- standard data sources, such as the Statistical Abstract of the United States and the Congressional Quarterly Almanac

While the methods used are basically comparative, quantitative analyses and information are used to support these comparisons. In the historical analyses, we compare statutory directions with subsequent federal and state policy outputs, and then summarize the results in terms of the proportion of Congress's statutory directions that are implemented in substantive fashion by the federal government and a significant number of states. In the contemporary analyses, we compare state policy outputs both with Congress's ambitious policy directions and among the states. We also compare policymaking processes under supportive and preemptive federal policy designs, employing quantitative data to describe the outputs produced, and then using some of these data to evaluate the likely sources of state policy variations. The sources of variation, in turn, also reflect sources of slippage and shirking from Congress's directions that are operative during policy implementation. The chapter also points out that the conclusions reached in this work are based on a preponderance of evidence rather than any single analytical test.

The chapters in **Part II** are organized chronologically. ***Chapter 6*** introduces the historical analyses to be conducted, and focuses on changes in Congressional direction and federal and state policymaking during the supportive era between 1948 and 1971. ***Chapter 7*** outlines major statutory changes made by Congress during the preemptive era between 1972 and 1986, and the extent to which federal and state policy outputs adhered to them. This era was the most ambitious one for US water pollution policy, and it produced the partial preemptive policy structures and massive supportive policy efforts that appear to have been responsible for substantial portions of the progress made in combating water pollution in the US to date. And finally, ***Chapter 8*** outlines the major policy changes and outputs during the current era of policy experimentation, and also summarizes the results of the historical analyses as a whole.

In general, the historical analyses in Part II show that American water pollution policy has generally become more active over time – at least until the 1980's when the current experimental era emerged. They also suggest that federal and state water pollution policy outputs have often been consistent with Congress's statutory directions, even if the policy impacts and outcomes flowing from them have not fulfilled Congress's ambitious expectations. And, in the cases where federal agencies failed to produce policy outputs directed by Congress in reasonable amounts of time, these failures appear to have resulted from unworkable statutory directions, technical complexity, conflicting directions from political principals (executive branch officials, etc.), and/or the need to prioritize multiple Congressional demands in a context of limited resources. State agency efforts to produce Congressionally directed outputs faced additional challenges because of their reliance on successful federal agency implementation, and the need to adapt national policies to state and local circumstances. Consequently, even when many or most states responded to comply with changes in federal policy, other states were reluctant and/or unable to follow through in the manner Congress directed. Thus, even relatively high rates of state compliance appear to be associated with at least some instances of state level recalcitrance and/or non-compliance.

The chapters in **Part III** look in detail at variations in contemporary state water pollution policies, and focus specifically on Congressional direction and policy outputs relating to non-point and point source water pollution. In so doing, these chapters provide a sense of the range of ways in which the states have reacted to Congress's ambitious water quality goals, and the results are generally consistent with the results of the historical analyses conducted in Part II. They show that the states follow Congress's directions in substantive fashion by implementing procedures that are consistent with differing statutory mandates – even if their goal-oriented policy outputs vary widely among the states and frequently run afoul of statutory deadlines.

The chapters in this Part also assess the nature of state policymaking under two very different forms of Congressional mandate – one that is essentially *supportive* in character (non-point sources) and one that reflects clear efforts on the part of Congress to establish *directive* control through preemptive federal-state policy structures (point source requirements). ***Chapter 9***, the first chapter in Part III, reviews these two sets of mandates and EPA's responses to them. The remaining four chapters of this part then assess and analyze state responses to Congress's FWPCA mandates in non-point and point source water pollution control.

Chapter 10 assesses state responses to Congress's mandates for non-point source water pollution control. While it finds general compliance with Congress's procedural mandates in Section 319 of the 1987 Water Quality Act (WQA), it also finds highly variable responses to Congress's clear desire for active state non point source water pollution control programs. More specifically, the analysis finds substantial variations in: (1) state efforts to foster consideration of non point source pollution concerns in state and local decision-making; (2) the strength of enforceable authorities applicable to non point water pollution sources, and; (3) non-point source water pollution control expenditures over and above required federal grant match amounts. Viewed as a whole, these results suggest wide variations in overall state NPS policy activism, as measured by a unified NPS policy activism scale that is developed in this chapter. These large state variations in NPS policy activism also suggest significant variations in the extent of state compliance with Congress's mandate for ambitious state programs.

Chapter 11 seeks to identify major sources of variation in NPS policy activism, using the overall scale of activism developed in chapter 10 as the dependent variable. Through a series of regression analyses testing the effects of variables drawn from responsive, group-based, and capacity based models of the state policymaking process, the analyses find that a relatively large portion of the variation in state NPS policy activism is explained by a combination of variables drawn from these three major state policymaking theories. Overall, the existence of a moralistic political culture, substantial environmental group strength, and capacity based variables associated with wealth and the organizational form of the state implementing agency appear to explain much of the variation in state policy activism. At the same time, however, control variables reflecting coastal state status and the amount land owned by the federal government also appear to be good predictors of NPS policy activism. These latter results suggest that the federal Coastal Zone Amendments and Reauthorization Act's (CZARA) emphasis on building strong NPS programs is realized – to at least some degree – in practice, while high rates of federal land ownership appear to depress state NPS policy activism as one might expect.

In addition, a series of more specific analyses seeking to explain the various components included in the NPS policy activism scale re-enforce the importance of a moralistic culture, strong environmental groups, wealth, and coastal state status in fostering variations in the component elements of NPS policy activism, while they also suggest that Democratic Party control of state policymaking institutions may play an important role in fostering the development of enforceable authorities applicable to non-point sources. Overall, therefore, this chapter suggests that major state policymaking theories do a reasonably good job of explaining state policy variations under supportive policy structures, but – importantly – it also suggests that group and capacity-based theories appear to have more important *direct* impacts on state NPS policy activism than responsiveness theories. This result should give rise to at least some pause by those groups and individuals who advocate unbridled policy devolution. For, it suggests that variable state capacities and group strengths are important variables affecting state water pollution policy outputs that should be taken into account in structuring federal policies.

In ***Chapter 12***, the discussion turns to state responses to Congress's preemptive mandates in the FWPCA's National Pollutant Discharger Elimination System (NPDES). Here, we find widespread – although still not complete – compliance with Congress's recommendation that states seek and obtain authority to administer the NPDES program within their jurisdictions, as forty-four of fifty states now have NPDES related permitting authorities. We also see that these states have issued thousands and thousands of NPDES permits, thus reflecting major state efforts to respond to Congress's statutory directions in this area. However, we also find that a number of states have failed to receive authority to administer the full range of federal permitting authorities available, and continuing backlogs of permits in need of issuance remain in most states. Thus, the analyses here suggest that state procedural compliance with statutory directions established by Congress is not quite as complete as the levels of compliance found in the non-point source cases – probably because the requirements themselves are so much more numerous.

The analyses in this chapter also find large variations in the restrictiveness of controls on toxicity and conventional pollutants in state issued NPDES permits (and a tendency for the restrictiveness of EPA issued permits to vary as well). Consequently, it appears clear from this analysis that even uniform federal controls administered through preemptive policy designs are subject to substantial variations in state implementation. For, in this analysis, we find very wide variations in the levels of state compliance with Congress's statutory wish to eliminate point source wastewater discharges through ever more stringent NPDES permits. These results, it would seem, should give pause to those who push unceasingly for ever more intrusive federal command and control policies because they suggest that existing preemptive policy structures do not produce anything like consistent efforts to impose restrictive NPDES permit requirements.

The analyses in ***chapter 13*** seek to identify major sources of variations in state point source permit restrictiveness that are identified in Chapter 12. Through a series of regression analyses testing differing explanations for variations in state permit restrictiveness relating to toxic and conventional pollutants, we find that state policymaking theories do not do a particularly good job of explaining state variations in NPDES permit stringency – at least in comparison to the job they appear to do in explaining NPS policy activism. We do, however, find that one measure of federal program oversight – the temporal proximity of state authorization – has relatively clear and identifiable effects on the restrictiveness of both toxic and conventional pollutants in NPDES permits, as states that have received their NPDES authorizations more *recently* tend to have more stringent permit limits than states that received their NPDES authorizations many years ago. Importantly, however, we do find *some* evidence supporting the notion that NPDES permitting processes respond to the level need for strong pollution controls in the state. For, the estimated severity of water pollution problems in the state appears to increase the prevalence of restrictive limits on conventional pollutants imposed on major municipal wastewater dischargers, even though it does not appear to have this effect with regard to controls on toxicity. We also find some evidence that strong major municipal lobbies in the state may reduce the restrictiveness of conventional pollutant limits in major municipal permits – a finding that appears to be consistent with "capture" related theories as applied to larger municipal dischargers.

Based on these results, it seems apparent that the politics of water pollution policymaking at the state level are quite different in the case of preemptive federal involvement in controlling point source discharges than they are in the case of the supportive federal involvement used in non-point source water pollution control. In the non-point source case, we find strong evidence of the influence of state level factors generally, and some evidence of the influence of broad based state practices and preferences. By contrast, under the preemptive policy design used for point sources, we find clear evidence of the impact of federal oversight and more limited evidence of the influence of state level factors. The conventional pollutant measure is an important exception though, as the analyses relating to it suggest that state permit writers are translating widespread water quality problems into more restrictive permit limits. However, the results also suggest that these same permit writers may be influenced by strong lobbies of large municipal dischargers – in spite of the numerous procedural protections required in the federal NPDES policy framework. These differences in state policymaking processes under the two forms of federal policy design are re-enforced by the fact that there is no correlation between NPS policy activism and state permit restrictiveness for conventional pollutants, even as there is also a statistically significant *negative* correlation between NPS policy activism and measures of toxic pollutant permit restrictiveness. When viewed as a whole, the states with active NPS programs, it appears, are not moving aggressively to control toxicity in pollutant discharges, and vice versa.

Overall, therefore, as we look at these contemporary analyses in Part III, we find widespread compliance with Congress's procedural directions, as states have clearly responded to the assessment, management, and grant participation requirements in the non-point source case and – in slightly lesser proportion – to the permitting provisions in the point source case as well. We also find widespread variations in policy aggressiveness in both cases, as NPS policy activism and NPDES permit restrictiveness both vary considerably among the states. And finally, it is also apparent that state non-point and point source policymaking processes differ substantially from one another. For, with only a couple of notable exceptions (New Jersey and Florida), the states with active non-point source water pollution programs do not appear to be the states that issue the most restrictive NPDES permits. Thus, the analyses presented in Part III are consistent with the suggestion that state policy outputs and the policy dynamics that underlie them differ substantially, depending on the nature of Congress's statutory direction.

Chapter 14 concludes the dissertation by summarizing the evidence gathered in relation to the three hypotheses guiding this work, discussing its implications for the scholarly literature and future research, and offering some insights to assist those who may work on future re-authorization(s) of the FWPCA. The analyses here provide at least some evidence supporting all three of the hypotheses investigated, although the evidence relating to the third hypothesis pertaining to the effects of differing levels of federal intervention on state policy responsiveness is decidedly mixed. With regard to the first hypothesis, evidence drawn from both the historical and contemporary analyses suggests that federal agencies respond to Congress's statutory directions in most cases. However, it also suggests that these responses are not guaranteed, and may be disrupted by differences of opinion among political principals, complex technical issues, poorly constructed statutes, and inadequate resources.

The evidence presented here in relation to the second hypothesis suggests that states often react to Congress's directions by implementing basic procedures consistent with statutory mandates, even though the aggressiveness of their efforts in pursuit of statutory goals varies tremendously. The evidence presented here further suggests that Congress has provided both supportive and preemptive statutory directions for state implementation of federal water pollution control policies, and that the states have often implemented procedural components of these policies that are generally consistent with those directions in each case. It also points out clearly, however, that the extent of goal-oriented compliance varies tremendously among the states. In non-point source water pollution, state programs are built around the federal 319 grant program, and vary tremendously in the extent of their efforts to pursue federally established water quality goals. In point source water pollution, most states have now sought and received NPDES permitting authority, and are issuing permits to large numbers of dischargers even though the likelihood of restrictive permit limits on toxicity and conventional pollutants appears to vary greatly by state.

The evidence with regard to the third hypothesis relating to the impact of various levels of federal involvement on responsiveness to broad state level policy influences is mixed, and varies depending on the indicator of broad based policy influence used. On one hand, the analyses here suggest that state *preferences* appear as though they carry greater influence under supportive policy structures than under more intrusive preemptive federal policy structures. For, under the supportive policy structures used for non point sources, public opinion on the environment is positively correlated with state NPS policy activism even though its effects disappear after state variations in wealth and environmental group strength are taken into account. Thus, while wealth and environmental group strength appear to have stronger direct effects on NPS policy activism the public preferences, the evidence presented here is consistent with the concept that state preferences may have significant indirect effects. In addition, while political culture does not reflect state opinion on the environment directly, it does generally reflect *preferred state practices*. It also appears to be systematically related to NPS policy activism, even after controls for variable state capacities and group strength levels are taken into account. By contrast, neither of these variables are even positively correlated with NPDES permit restrictiveness. In this sense, the results here are consistent with hypothesis 3, and with the expectation that federal policy structures entailing lower levels of federal involvement enable greater policy responsiveness to broad based state preferences and practices than do the preemptive structures used in issuing NPDES permits.

The evidence presented in this work tells a different kind of story, however, in relation to the *need* for aggressive state water pollution programs. The need for strong state water pollution programs does not appear to be systematically related to NPS policy activism, but it does appear to be systematically related to the restrictiveness of point source permit limits *in one of the two* measures of stringency used in this analysis – the one relating to conventional (as opposed to toxic) pollutant limits.

This result suggests that state NPDES permit writers are taking water quality threats and conditions into account as they establish permit limits on conventional pollutants, but they may not be doing so for toxic pollutants. This result is understandable in the sense that water pollution control efforts have often focused on conventional pollutants, so state knowledge levels regarding conventional pollutant threats is probably greater than exists for toxic pollutants in many surface water permitting situations.

It is appropriate, however, to be cautious in reaching broad and strong conclusions regarding the impacts of need on the aggressiveness of state water pollution programs for two reasons. First, the quality of available measures of need is subject to question because of differing methods used in the states to estimate the proportion of waters that are threatened or impaired. And, as a result, the conclusions here suggest that Congress should place much greater emphasis on assessing water quality conditions and trends in future revisions of the FWPCA. However, because the measures of need used here remain the best ones available, these results do suggest that the NPDES permitting process is at least somewhat responsive to broad water quality conditions in the state. At the same time, however, this result casts doubt about the overall validity of the hypothesis that states are better able to address *all* broad based influences when federal involvement is minimal, because need does appear to be a more influential factor in explaining point source variations than in explaining variations in NPS policy activism.

A second reason for exercising some caution in interpreting the results here in relation to the effects of water pollution program need on policy aggressiveness stems from methodological limitations inherent in this study's reliance on linear regression models to estimate the policy effects of differing variables. For, as noted previously, this approach does not account well for indirect effects of state preferences on water pollution policy aggressiveness, and this same point could also be applied to concerns about the need or strong water pollution controls. While the need variable does not attain statistical significance in the predicted directions in most models used here, the models used do not account for indirect or reciprocal effects of any kind. Consequently, it is possible that the need for strong programs may be systematically related to other independent variables, and therefore have indirect or reciprocal effects on NPS policy activism that are not well accounted for in the models presented here.

While the theoretical case for this concern in relation to the need variable is not particularly strong, as it is in the case of the preferences variable noted above, it is nevertheless appropriate to keep this caveat in mind in interpreting the results presented here. The concluding chapter thus suggests that future research consider utilizing statistical methods that can account for indirect and/or reciprocal effects.

Viewed as a whole, the results presented here also have significant implications for the scholarly literature. In broad terms, the results here suggest that ex ante statutory controls are fundamentally important mechanisms of Congressional influence over administrative decision-making and policy implementation, and that – given this importance – they seem to be under-emphasized in extant research. However, they also suggest that these kinds of controls are imperfect and may be affected by factors associated with the variable nature of policy direction(s) at the national level, variable federal oversight of state policymaking, and state specific factors. The results also suggest, however, that the policy implementation process often produces predictable policy outputs – at least at a procedural level, even if it does not produce predictable impacts and outcomes. And finally, the results here suggest that policy implementation processes at the state level vary significantly depending on federal statutory design, as preemptive and supportive policy designs appear to lead to very different state policymaking dynamics at the state level. In the end, all of these implications suggest that Congress's statutory directions do matter, and that statutory policy design is a fundamentally important factor in producing desired policy outputs at both the state and federal levels. Thus, while McCubbins, Noll, and Weingast (1987 and 1989) argue that procedures matter, this work suggests that policy instruments and target audiences matter at least as much, and probably more.

In recognition of the importance of Congress's lawmaking powers in water pollution control, a number of potentially useful policy related insights also emerge from this work. These include major needs to improve our nation's systems for monitoring and reporting on ambient water quality, and to invest and appropriately target funding for the existing regulatory structures that have been developed in statute. We must address both of these needs if we are to accelerate progress toward our ambitious water quality goals and actually know if we are making progress. It is also important to think differently about how we develop and administer programs to minimize water pollution releases. While the statutory distinction between non-point and point sources may have been an understandable political reaction to the world as it appeared to Congress in 1972, this work suggests that it now distorts our current water pollution control efforts. Similarly, we need to recognize that there are large differences among the states in terms of their water pollution control related capacities and the strength of groups advocating aggressive water pollution programs at the state level. These differences are relevant to federal policy design. Future revisions to the FWPCA should take account of these insights, and build on them if we are to continue the progress that has been achieved over the past three decades.

And finally, it is clear from the analyses contained in this work that EPA and the states cannot make changes of the kind discussed above on their own. Congressional leadership is important early in the 21^{st} century, just as it has been in water pollution control over the last half century. And in the end, the kind of leadership needed is statutory, as managerial controls are fleeting and temporary. Ex ante statutory direction is necessary if we are to create the kinds of institutional patterns that are necessary for long-term progress in addressing complex issues in highly politicized environments. If the current Congress is unable or unwilling to follow through in re-authorizing the FWPCA with a well thought out set of policy changes – as it appears to be, then perhaps we can take heart in the fact that the next election is right around the corner.

PART I - FOUNDATIONS

2. THE THEORETICAL CONTEXT

Since the founding era of this country in the 1700's, discussions of Congressional-executive relations and federal-state responsibilities have been central to the study of American governance. For a century and a half, political thinkers and constitutional scholars tended to view the institutional foundations of American government in relatively straightforward and formalistic terms. Congress made laws and policy, and the bureaucracy implemented them. The federal government possessed specific enumerated powers, and state governments possessed all the powers that remained – including general powers to further the welfare of their people. The politics-administration dichotomy and dual conceptions of federalism dominated both scholarly and popular thinking about American government. Over time, however, the inherently messy character of reality has impinged upon these clean and traditional theories of American governance.

The Great Depression and the New Deal of the 1930's were of central importance in calling these traditional theories of American government into question. In a time of crisis, strong leaders in the executive branch – with the help of a majority in Congress – successfully expanded their powers to combat what was clearly a national crisis. The solutions that our country's leaders developed and implemented at that time also involved significant expansions of federal powers, and much broader interpretations of the scope of the federal government's enumerated powers under the Constitution. While these major changes caused controversy and led to well-publicized conflicts among the branches of government, they were eventually sanctioned as legitimate and began a new era of American governance [1]. Economic crises and World Wars are not for the weak kneed, and the efforts of American leaders to deal with them in the 1930's and 1940's led to substantial and enduring changes in the institutional relationships underlying American governance. In somewhat simplistic terms, the executive branch in the federal government became stronger, and the powers of the federal government vis a vis those of the states were strengthened as well.

The progressive domestic policy legislation enacted in the areas of civil rights, anti-poverty policy, health, and the environment in the 1960's and 1970's expanded and cemented these institutional changes. Only in the 1960's and 1970's, idealism and wealth, rather than crises and poverty, drove the changes. Expansions in social regulation provided the impetus for continued and expanded delegations of authority from Congress to the Executive Branch. At the same time, federal level visions of a Great Society, along with concerns about captured and amateurish state governments, provided further foundation for the expansion of federal powers vis a vis the powers of the States. Dual conceptions of federalism gave way more fully to complex federal-state relationships that fed off the idealism of the era, and were characterized by increasing intervention of the federal government into areas where the states had enjoyed great autonomy in previous years. State efforts to address racial prejudice, poverty, health and safety concerns, and protection of the environment were widely viewed as meager and inadequate. To deal with these concerns, Congress delegated powers to federal agencies, and these agencies became increasingly involved with state governments in matters that were previously left to the states. Previously accepted conceptions of American federalism as dualistic in nature were supplanted by more complex scholarly allusions to "picket fences" and "marble cakes" that involved both federal and state governments.

Spurred on by the election of President Reagan and his advocacy of a "new federalism" in the early 1980's, skepticism grew over the impacts of the lengthening tentacles of federal involvement in state policymaking and administration. In a number of domestic policy areas, the Republican administrations of the 1980's sought reduced federal involvement. A devolutionary mantra ensued that spread to both political parties, and resulted in Congressional passage of an unfunded mandates bill in the mid 1990's that sought to impose restraint on future federal mandates. The Clinton administration embraced this mantra, and sought increased flexibility for states in the expenditure of federal funds in environmental policy and other areas as well. In spite of these overtures, however, many domestic policy observers continue decry overzealous federal interference in state policymaking and administration. The second Bush administration elected in 2000 seems to be heeding this call – particularly in environmental policy. His first budget proposal, for example, sought cuts the EPA enforcement budget while creating a new enforcement grant program for state governments. Congress, however, did not follow his advice and effectively maintained the existing mix of enforcement measures.

It is against this backdrop of 20th century change that scholars are now debating Congressional "control" of administrative decision-making, multi-organizational policy implementation, and federal influences on state government and domestic policymaking. What follows is an overview of these scholarly debates and a description of the contribution(s) that this study seeks to make to them.

2.1. Literature Review

Over the last century, the scholarly literature in political science and public administration has undergone some major upheavals. In the early part of the 20th century, the politics-administration dichotomy (Wilson, 1885) and dual conceptions of federalism dominated scholarly thinking. There was relatively little concern about political control of policy implementation because institutional roles and responsibilities were thought to ensure that bureaucratic actions would comply with political directions. The onset of the "behavioral revolution" in the middle of the 20th century called this tautological line of thinking into question, as it pointed out – among other things – that the behavior of policymakers was influenced by political interests in ways that did not always coincide cleanly with institutional directives (Truman, 1951; Dahl, 1961). The development of rational choice theory in the 1960's and 1970's added further depth to the individually oriented analyses spawned by the behavioral revolution, because it pointed out that political actors often behaved rationally in pursuit of their ends (Downs, 1957). All of these influences added to the depth of our understanding of political behavior, but tended to foster scholarly work that under-emphasized the continuing influence of institutional factors that had been the hallmark of the discipline in the early decades of the 20th century.

More recently, however, "new" institutional scholarship has reminded us that not all behavior is rational, and that preferences are often defined by institutional patterns rather than individually calculated wants and needs (March & Olsen, 1984; Peters, 1999). This literature has been important because it has had the effect of fostering the development of needed context to add to the mathematically oriented work of behaviorist and rational choice scholars. Greater use of institutionally oriented analyses also holds particular promise for policy related studies because these studies are highly dependent on context to facilitate both a true depth of understanding and the actual application of scholarly findings. In these contexts, the central questions become "how strong are various forms of institutional influence in producing desired policy outputs" and "what factors influence their strength?" The study of Congressional use of statutory controls to influence administrative decision-making, policy implementation in multi-organizational settings, and state policymaking appear to be promising areas to address these kinds of questions.

It is against this broad backdrop of scholarly thinking that current controversies over Congressional control of bureaucratic decision-making, policy implementation, and federalism and state environmental policymaking are developing. However, while debates in all of these areas of the literature are clearly related, they have been explicitly joined on only an occasional basis. This is the case in spite of the fact that the vast majority of Congressional directives relating to US domestic policy are implemented through various forms of federal-state inter-governmental partnerships (Wright, 1988). Consequently, administrative responsiveness to both Congress's directions and varying state level conditions during the process of policy implementation is of central importance in arguments regarding the proper structure of federal-state relations in domestic policy generally, and environmental and water pollution policy in particular. In an effort to join these debates more explicitly, the discussion that follows briefly reviews and integrates existing literature on Congressional control of regulatory decision-making, policy implementation, and federal-state policymaking in environmental and water pollution control.

2.2. Congressional "Control" of Regulatory Policymaking

With the growth of Congressionally delegated social regulation during the 1970's, economists and political scientists alike expressed major concerns about the capture (Stigler, 1971) of regulatory agencies by private interests and the abdication of legislative responsibility through excessively broad delegations of power and authority to bureaucratic agencies (Lowi, 1979). Stigler suggested that government policymakers depended on economic interest groups for support, and tended to become captured by these interests in the regulatory process. Lowi believed that "runaway" bureaucracies were prevalent and traceable to Congress's abdication of its responsibility to make law in clear and focused fashion. He suggested that broad delegations of power to bureaucracy allowed the federal government to venture ever deeper into domestic life without clear standards to implement, thus giving rise to a system of "policy without law" that fostered the access of privileged groups to power and a lack of broad accountability. These concerns were re-enforced by major studies suggesting that Congressional oversight of bureaucracy was limited and haphazard (Ogul, 1976; Dodd & Schott, 1979).

Largely in reaction to these predominant views, a number of scholars in the 1980's and 1990's have argued that administrative agencies in the United States are indeed subject to Congressional "control." And some of these scholars have gone so far as to refer to US legislative-bureaucratic relations as ones of Congressional dominance (Weingast and Moran, 1983) and even micro-management (Gilmour and Halley, 1994 and Rosenbaum, 2002). A significant portion of this scholarship has relied on principal-agent theory for its analytical foundations. Borrowed largely from economics and rational choice schools of thought in political science, principal agent theory views the delegation of political authority from elected officials to government agencies as an exchange between a "principal" who delegates power and an "agent" who accepts this delegation based on a set of defined conditions agreed upon in the course of their exchange. Congressional authorities provide agencies with enabling legislation and program budgets, and – in return – expect that the agencies will operate in accordance with their will and direction. However, agencies may "shirk" this responsibility if their preferences differ from Congressional principals or their behavior may "slip" away from Congressional mandates in response to other influences. And furthermore, because the agency may hold substantial informational advantages over its Congressional principals, it may be able to hide its shirking or slipping behavior.

Matthew McCubbins (1985) has highlighted two broad strategies that Congress can use to prevent and control agency shirking and slipping behavior. First, Congress can use "structural" controls that rely on substantive and procedural directions that are built into statutes to ensure agency fidelity to its wishes. "Substantive" forms of structural control specify ways that institutional structures can foster behavior patterns that are consistent with Congressional wishes, and include requirements regarding the institutional setting in which decisions are made, the scope of the authorities provided, and the policy instruments authorized. Procedural directions govern the steps to be taken in implementing a statute, and can be used to ensure that various political actors (generally those supporting the winning Congressional Coalition) can influence administrative policymaking at specified points in the policy process.

The second strategy Congress involves "managerial" controls such as oversight, budgeting, and appointment powers that can be used to overcome information asymmetries, and to identify and correct errant agency behavior. In this context, administrative agencies behave as rational actors, adhering to Congressional preferences in order to avoid negative consequences associated with budget cuts, direct and visible oversight of their activities, and/or unfavorable Congressional actions relating to appointments and re-appointments (Weingast & Moran, 1983). While structural and managerial forms of control are related and complementary, they are nevertheless analytically distinct.

Empirical studies of Congressional control over the bureaucracy have often focused on Congressional use of managerial controls – the rewards, sanctions, and monitoring carried out by Congress after passage of a regulatory statute (McCubbins, 1985). And, to a significant degree, these studies have focused on the impact of Congressional Committee composition on agency policy outputs. Weingast & Moran (1983) found evidence that criticisms and re-directions of the Federal Trade Commission (FTC) aired in the late 1970's were traceable to changing Congressional Committee composition, while Moe pointed to the effects of Congressional committee composition on decisions made by the National Labor Relations Board (Moe, 1985). While some of the more recent studies have focused on Congressional oversight activities as opposed to committee composition (Wood & Waterman, 1991 & 1993), most of these studies focus on managerial efforts by Congress to control bureaucrats in their implementation of existing statutes. And, many of these studies have indicated that agencies do in fact respond to the preferences of Congress as expressed through these kinds of managerial interventions.

While these results have led some scholars to declare that the debate concerning the existence of political control over bureaucracy is largely resolved (Wood and Waterman, 1994, p. 74), other scholars have questioned the very assumptions upon which the principal-agent theories that yield these conclusions are based (Worsham, Eisner, & Ringquist, 1998). One of the critical assumptions criticized by Worsham et. al. relates to what they call "the reductionist fallacy of misplaced methodological individualism," the belief that "political phenomena can be modeled on, or reduced to, the individual actions of actors in the market" (Worsham et. al., 1998, p. 423). And indeed much of the principal-agent literature on Congressional-bureaucratic relations conceptualizes primarily in terms of relatively homogenous Congressional (sub/committee) and agency preferences that must be reconciled through systems of incentives and controls established between two actors (Calvert, McCubbins, & Weingast, 1989; Weingast & Moran, 1983). However, as Worsham et. al and others point out, there are differing opinions in Congress on most issues (Woolley, 1993; Gormley, 1989).

If we recognize this fundamental point, it is quite disconcerting that relatively little attention has been paid to Congress's use of structural controls to exert ongoing influence over administrative behavior. This is the case for at least two reasons. First, as is noted above, because structural controls must be enacted by (sometimes wide) coalitions of legislators, they operate broadly and do not require the reductionist assumptions that underlie principal-agent theory. Consequently, there is reason to believe that ongoing structural controls exerted through *statute* more accurately reflect "the will of Congress" as a whole than intermittent managerial controls exerted by Congressional committees and other actors. And second, because of inherent limitations relating to the number of issues on the Congressional agenda, it is likely that structural controls directly influence more agency policymaking and implementation behavior than managerial controls.

However, scholarly attention to structural controls has been limited, even though it has not been absent altogether. Epstein and O'Halloran (1994 & 1999) and Bawn (1995) have analyzed the factors contributing to Congress's choice of ex ante structural controls, and found generally that the choice of procedural controls depends on the differences between the preferences of key actors (Congress, President, and the Agency) and the extent of uncertainty regarding outcomes of the policymaking process. However, while this work helps us understand Congressional choices, it does not address the impact of these choices on agency decision-making, and therefore Congressional control.

Two articles on the impact of administrative procedures on subsequent regulatory behavior by McCubbins, Noll, & Weingast (1987 & 1989) have helped in this regard. They outline the potential influence of various procedural controls on policymaking efforts carried out pursuant to the Administrative Procedures Act, the Freedom of Information Act, and the National Environmental Policy Act, and the Clean Air Act. These articles have been important in laying a theoretical groundwork for the potential impact of administrative procedures on agency decision-making, but they are limited in that they focus primarily on procedural forms of structural controls, and in that they are more illustrative than empirical in focus.

Recently, Spence has begun to help fill these voids to a certain degree, as he has found that structural controls relating to the distribution of decision making powers among administrative agencies affected decisions of the Federal Energy Regulatory Commission (FERC). He also found that some forms of procedural controls influence FERC decisions, but these effects were not as strong as those engendered by structural controls associated with the institutional settings in which decisions are made (Spence, 1999A and B).

While this initial work on the impact of structural controls is useful, we are still very much in the beginning stages of our efforts to understand the impact of structural controls on administrative decision-making. As it currently stands, our understanding is subject to several important limitations. First, the empirical work in the literature on Congressional control done to date is limited primarily to Spence's (1999A and B) work on one agency – the Federal Energy Regulatory Commission (FERC). Second, this work still leaves unaddressed the important role of states as co-regulators with federal agencies in much of American domestic policy. Does the influence of structural controls extend to policies that are actually implemented by these sub-national entities and, if so, to what degree? Existing work gives us little insight on this important question. And third, in focusing primarily on procedural controls and the institutional setting in which decisions are made, Spence's work has not yet addressed the influence of the statutory scope and the specific policy instruments authorized by Congress – two potentially important forms of structural control of administrative decision-making that were outlined in McCubbins' (1985) work.

Is there any difference between the levels of control achieved through narrowly constructed policies that apply only to states vs. more broadly constructed pre-emptive policies that allow federal agencies to influence the behavior of a wide array of audiences above and beyond state governments? Put more specifically, are supportive policies based primarily on intergovernmental grant programs as effective in ensuring ongoing compliance with Congress's wishes as programs in which Congress has pre-empted state authorities and required implementation of specific command and control regulatory programs? Existing work in ex ante political control provides little insight in relation to these important questions.

Answers to all of these questions will require that our analyses extend beyond the conditions under which Congress establishes particular forms of structural controls to the manner in which these various forms of controls are implemented. For this reason, it is also appropriate to take advantage of the literature on policy implementation as we seek to fine tune approaches for answering these questions. It is to a brief discussion of this literature that we now turn.

2.3. Policy Implementation

The literature on policy implementation has developed primarily over the last several decades, as governments have expanded their mandates and delegated ever great amounts of power and discretion to administrative agencies. Two major schools of thought have developed in this literature, and they are referred to somewhat unceremoniously as “top down” and “bottom up”. These two approaches to the study of policy implementation also have implications for the design of ex ante statutory controls. Top down approaches focus on the fidelity of the implementation process to the directions provided by Congress in statute. They imply that statutes should “program” implementation in pre-specified ways (Berman, 1980), and the use of very directive and even coercive instruments is consistent with this perspective on policy implementation. “Bottom up” approaches, on the other hand, tend to suggest that policy change during implementation is inevitable (Majone & Wildavsky, 1984), and that what matters most is the relationship between service providers and the target audiences toward whom their services are directed. This conception of the implementation process suggests that more adaptive forms of statutory direction are appropriate in order to support optimal implementation.

Efforts have also been made to develop integrated models of the implementation process that combine insights from both the top-down and bottom-up approaches. While the specific approaches to integration are varied, they focus broadly on defining conditions in which the two approaches are applied and analyzing the impact of states and inter-organizational relationships on the implementation process, respectively. By contrast, relatively little effort has been made to define “successful implementation” systematically, with the result that implementation studies frequently fail to distinguish adequately among dependent variables that may be affected by differing causal processes (Winter, 2003). In general, the tendency in the implementation literature has often been to focus on goals and outcomes, while placing less emphasis on policy outputs and impacts that may in fact be consistent with Congressional directions but perhaps insufficiently strong to achieve Congressionally stated goals and objectives.

Concerns about policy implementation became acute in the late 1960's and early 1970's as scholars sought to determine whether the efforts of the Great Society had fulfilled their ambitious promises. One of the first major studies following up on this concern was Pressman and Wildavsky's famous assessment of the implementation of the Public Works and Economic Development Act of 1965 (Pressman & Wildavsky, 1984, originally published in 1973). One of the first of a number of "top down" studies (Bardach, 1977, Mazmanian & Sabatier, 1983, Edwards et. al., 1983, etc.), this analysis found that the ambitious original hopes of statutory framers were "dashed in Oakland" as a result of difficulties encountered during the implementation process. The analysis found that complexities of joint action implicit in policy implementation made successful "implementation, under the best of circumstances, difficult at best" (Pressman & Wildavsky, 1984, p. xxi). This study and others that followed it led to widespread pessimism regarding the ability of administrative agencies to implement statutory directions from Congress effectively.

Studies in the early 1980's became somewhat more optimistic, although not overly so. In a re-investigation of Pressman and Wildavsky's original work, Elinor Bowen (1982) re-cast the original probability framework used by Pressman and Wildavsky and found reasons for optimism stemming from the persistence of implementing officials, the packaging of clearances, and the existence of bandwagon effects among those involved in the implementation process. Likewise, Mazmanian and Sabatier (1983) found some reason for optimism regarding the success of the implementation when problems are resolvable, non-statutory conditions are favorable, and the statute itself is structured to support successful implementation [2]. Even so, they concede that these conditions are met only occasionally, and they suggest that successful policy implementation remains an "uphill" battle (Mazmanian & Sabatier, 1983, p. 276). Of the six cases they analyze, for example, only two are found to be characterized by "substantial" implementation effectiveness (pges, 274 and 275). The "top down" literature, taken as a whole, therefore, has tended to provide relatively pessimistic views of the policy implementation process.

The "bottom up" literature on policy implementation developed after the top down literature, and may be viewed --- at least in part --- as a response to it. In general, it suggests that the most important aspects of policy implementation relate to what happens at the "bottom" of the process where government programs actually interact with external persons, communities, and organizations. Rather than taking a macro-level perspective based on original statutes, researchers in this tradition (Hjern, 1982; Lipsky, 1978) focus on specific policy areas and then investigate the goals, activities, and strategies of actors working in that area. These studies find, more often than not, that success in implementation depends more on the skill of local actors and local implementation structures than on factors relating to statutory objectives and central control activities. As is noted above, scholars using this line of analysis point out that the process of implementation is inevitably one of policy evolution in which policies *change* as they are implemented (Majone & Wildavsky, 1984).

While the bottom up portions of the implementation literature developed from efforts to *describe* what happens during the policy implementation process, they have also developed clear *normative* implications. For, bottom up analyses have led some to suggest that policies at the center of a political system should be crafted to enable adaptation in order to allow discretion at the street level. In one of the more developed versions of this argument, a process of "backward mapping" is envisioned which can enable the development of statutes that maximize the probability for success in policy implementation (Elmore, 1982). Other scholars have pointed out that this kind of process effectively equates description with desirability, and therefore constitutes a fallacy of "misplaced prescription" (Linder and Peters, 1987). Descriptive accuracy, this argument suggests, does not constitute normative appropriateness. It further suggests that the conflation of these two concepts is potentially dangerous in a democratic society because it equates the legitimacy of decisions made by un-elected bureaucrats with decisions made by democratically elected officials.

For some time, a chasm has existed between top down and bottom up views of policy implementation, and this chasm has contributed to varying recommendations for statutory design. The top down models have emphasized the need for clear and strong statutory directions from Congress and other elected bodies, while those advocating bottom up approaches have argued for statutory structures that contain sufficient discretion to enable policy implementation to adapt to varying local circumstances.

Efforts have also been made to integrate these two perspectives in order to improve our understanding of these somewhat contradictory policy prescriptions. These efforts have come in two basic forms. The first form seeks to determine the circumstances in which top down and bottom up approaches might be most usefully applied. The second form has focused on looking at the entire policy implementation system in the context of inter-organizational relationships, and has paid particular attention to the roles of states in linking top down direction to implementation at the local level. These two kinds of effort will now be discussed in turn.

Berman (1980) instigated efforts to integrate top-down and bottom-up schools of thought, and suggested that a series of situational variables determines the appropriateness of top down vs. bottom up implementation. Stated briefly, he suggested that top down, or "programmed" implementation is most appropriately used when change is incremental, technology is certain, the environment is stable, goal conflict is low, and institutional patterns are strong and enduring. The implications of this situation for statutory design seem clear; statutes should be directive in nature, and should provide only very limited discretion for decision-making at lower level in the implementation process. By contrast, Berman suggests that bottom up or adaptive program structures are appropriate when the situational factors discussed above are not in place. And, in this case, the implications for statutory structure also seem clear. Legislative bodies are most effective in pursuing their broad goals when they develop supportive policy structures that leave substantial discretion to those involved in policy implementation.

This distinction between programmed and adaptive policy structures, and directive and supportive statutory designs, respectively, has implications for our definitions of successful implementation. Adaptive policy structures and the supportive policy instruments that buttress them tend to view successful implementation as implementation which leads to "positive effects" of varying kinds. There are obvious problems with this criterion in a democratic society in which elected bodies specify particular goals for policies, and implementing officials may favor "positive effects" that are not consistent with those goals. On the other side coin, "programmed" policy structures tend to yield definitions of successful implementation that involve compliance with specific legislative directions. This conception of success raises other concerns, however. For example, legislative goals are often either vague or (almost) unachievable, with the result that implementation failure is implicit in the yardsticks which are established to measure it.

In this context, it is important to recognize that implementation success can be measured in a variety of ways, and these may vary from procedural compliance with statutory directions all the way to full accomplishment of very ambitious statutory goals and outcomes. In general, however, the top down policy implementation literature has tended to focus on outcomes and goals, and this has contributed to the pessimistic assessments of policy implementation that have dominated this portion of the literature. In this context, the apparent prevalence of failures in policy implementation may reflect little more than the strong tendency of elected officials to legislate in terms of hopes rather than realities. We have not done enough, it seems, to break the process of implementation down into its constituent steps to understand when, and under what conditions, administrative behaviors – as opposed to challenging realities and inadequate statutory approaches – actually undercut compliance with Congress's wishes.

An alternative approach to integrating top down and bottom up approaches to implementation takes some initial steps in addressing this issue, and it focuses on the central role of the states in linking federal mandates with more localized concerns. This approach has developed particularly in the 1990's, and has developed at least partially in recognition of the ongoing and increasing role of the states in the implementation of federal policies (O'Toole, 2003; Lester, 1986). It has taken at least three major forms. First, Stoker (1991) uses regime theories as a basis for conceiving of policy implementation in a federal system as a process of building governmental capacities to act in accordance with Congressional wishes. In this conception, the complexities of implementation emphasized by Pressman and Wildavsky and others become tools to be used in building compound majorities at the federal and state levels that enable statutory objectives to be achieved. The problem of ex ante structural policy design then becomes one of constructing policies in ways that enable the establishment of compound majorities and the capacities that they bring. Adaptive policy structures, in this line of thinking, may contribute to progress in achieving

Congressionally specified goals and objectives – a clear contrast to what one might conclude based on top down analyses alone.

A second state based approach to linking top down and bottom up concerns is advanced by Goggin et. al. (1990), and it involves looking at states as linchpins in a communications system that links inducements and constraints emanating from the federal, state, and local levels. Here the argument is that the extent and quality of implementation depends on perceptions of the strength of federal and state-local inducements, as well as on intervening variables relating to institutional capacity, economic capacity, and salience and opinion regarding the subject matter of implementation. Goggin et. al. also suggest that a variety of different analytical approaches can be used to test this kind of model, and they offer a large number of candidate variables for consideration. In the end, the value of their analysis lies in conceptualizing the critical role of the states as a pivotal hub of communication and interaction in a new third generation of implementation research. However, their model and the numerous variables involved in it do little to simplify a field of study that is "over-determined" in literature already (Matland, 1995).

A final perspective that places states at the center of the implementation process is suggested by O'Toole (2003). His perspective differs from the two previous state based approaches to implementation in that he casts his net broadly and conceives of the issue as one of inter-organizational implementation, as opposed to just federal-state implementation. Nevertheless, the concepts he uses apply well to the federal-state relationships that are so important in modern day policy implementation in the United States. Contrasting his view with the complexity of joint action perspective offered by Pressman and Wildavsky, O'Toole argues – somewhat akin to Stoker -- that building cooperative relationships is critical in inter-organizational contexts. He goes a step further, however, and also argues that the structure of relationships matters a great deal in determining how implementation processes unfold.

In so doing, O'Toole suggests – at least implicitly – that structural relationships underpinning federal-state relations are important in the policy implementation process. And this argument, in turn, points once again to the potential importance of differing structural forms of ex ante control in affecting the manner in which policies are produced by multiple administrative agencies. When this line of thinking is applied specifically to federal-state interactions, it suggests clearly that the institutional relationships established in statute should affect both the process of policy implementation and perhaps also the extent to which it is consistent with Congress's wishes and directions. To understand these relationships, however, it is useful to gain an appreciation of the factors affecting state policymaking because these factors are likely to be important in determining the extent to which policy implementation strays from Congressional direction. And, because the literature on factors affecting state policymaking is voluminous, it is appropriate to focus our discussion of this literature on the environmental and water policy issues that are central to the specific research effort being undertaken here.

2.4. Factors Influencing State Environmental Policies

Studies of state policymaking assess a range of variables affecting state policy outputs. In general, these variables relate to theories of state policymaking that are grounded in concepts of policy responsiveness (Erikson, et. al, 1993; Elazar, 1984, etc.), state capacities (Dye, 1967, Bowman & Kearney, 1986 & 1988), and the interplay of groups in the policy process (Truman, 1951; Hrebenar & Thomas, 1987, 1992, & 1993A and B). Explanations of state policy outputs that are based on policy responsiveness focus on variables that reflect government responsiveness to conditions and views within their jurisdictions. They include variables such as the severity of the problem being addressed (Lester, 1994), public opinion (Erikson, et. al, 1993), political party strength (Schattschneider, 1960; Lester, 1980), and moralistic cultural patterns that encourage activist government (Elazar, 1984). Capacity based conceptions of state policy processes, by contrast, focus on the capabilities of the states and have taken both economic (Dye, 1967) and institutional forms (Bowman & Kearny, 1986 & 1988). They suggest that state policy outputs are largely a function of the capabilities of the states producing them, and – more specifically – that wealthier states and states with modern institutions tend to produce more sophisticated and effective policies than states without these capacities. And finally, group based theories seek to explain state policy outputs as by-products of the relative strength of differing groups seeking to influence policies, and they suggest that state policies are best viewed as reflective of the strength of the interests that influence policy development. The discussion that follows overviews the literature relating to these major explanations of state policymaking outputs, paying particular attention to the ways in which they have been applied in efforts to explain state environmental and water policy outputs, impacts, and outcomes.

Historically, there has been substantial concern about state policymaking processes, and these concerns have been grounded in all three of the conceptual models of state policymaking outlined above. During the first two-thirds of the 20th century, states were often viewed as manifestly un-responsive to many of the groups and interests within their borders – most particularly racial and ethnic minorities. States were also viewed as amateurish, and often lacking in the capabilities necessary to respond in technically oriented policy areas relating to the environment generally, and water pollution in particular. There have also been continuing concerns about the inordinate power of economic elites within the states, and with their ability to insulate themselves from effective regulation at the state level through a variety of means.

In this context, there are continuing concerns among those who study state policymaking about competition among the states for both jobs and people. While this competition is viewed as healthy in some spheres such as economic development where competition is thought to foster efficiency and effectiveness, it is thought to exact an unhealthy price in other spheres such as income redistribution (Peterson, 1995) and the environment (Stewart, 1977). A significant concern in these latter areas is a "race to the bottom" in which states progressively compromise important values and services that do not enjoy strong political support within their borders in an effort to attract jobs and taxpayers from other states. This "race to the bottom" argument has often been applied to welfare and environmental policies, sectors in which "free rider" and "externality" effects are thought to be prevalent and political pressures at the state level are thought to favor narrow economic rather than broader public interests. While some have argued against this race to the bottom position (Revesz, 1992 and 1997), the specter of unhealthy economic competition among the states remains a significant concern in analyses of state policymaking – including those relating to the environment.

In recent years, however, analysts have concluded that state policymaking processes are becoming "more capable, representative, and democratic" than ever before – even as unequal constraints and capabilities remain across the various states (Conlan & Riggle, 1999; Van Horn, 1996). According to these and other studies (Gray et. al, 1999), states are becoming more responsive to important variations in political conditions, socio-economic circumstances, and broad interest group influences, as well as more capable of handling the governance challenges that this responsiveness requires (Bowman and Kearney, 1986 & 1988). As a result, many scholars believe that states are now more capable of taking on the challenge of a "devolution agenda" than in "any previous decade" (Gray, et. al, 1999).

This general optimism is also quite apparent in the literature on state environmental policy. Some scholars are arguing for an increasing state role in environmental policy based on broad support for environmental policies among the general public and the breadth of state innovations in environmental policy (John, 1994; NAPA, 1995; Graham, 1999), as well as the general improvements in state policymaking capabilities noted above. However, this view is still far from unanimous. For example, Oliver Houck, in a recent analysis that is quite critical of state water pollution control policies, suggested that recent EPA efforts to strengthen the federal water pollution program will "come down to the will of a majority of states to do hard things that they have never been willing to do before, that will alienate powerful constituencies, and that will require in some cases changing state laws through legislatures long captured by forest, farm, and construction industries and in no mood to change" (Houck, 1999, p. 147). Clearly, there are still concerns about who and what state environmental policies respond to – and these concerns extend to water pollution control.

Amidst the current sea change in thinking about state government responsiveness and capabilities, our understanding of the factors contributing to variations in state environmental and water pollution policies remains incomplete. In general, scholarly efforts to trace state environmental and water policy variations to factors relating to policy responsiveness, state capacities, and group influences have encountered variable levels of support in differing studies. These somewhat mixed results are discussed in more detail in the paragraphs that follow.

Efforts to explain variations in state environmental programs as a function of policy responsiveness have yielded mixed results, and these results have often been tied environmental policies generally rather than water pollution policies in particular. For example, while Lester (1994) and Lowry (1992) were not able to establish substantial and reliable links between direct measures of environmental problem severity and variations in the state pollution control efforts, Bacot and Dawes (1997) have recently concluded that there are significant relationships between pollutant loadings and state environmental policy outputs. Furthermore, while recent estimates published by the US Environmental Protection Agency (USEPA, 2000A & B) suggest that the extent and nature of water pollution problems differ among the states, they also suggest that these problems are increasingly attributable to "non-point" – as opposed to "point" – sources. Of all the academic studies, however, only Lowry's dealt specifically with water pollution policy and also differentiated between measures to address point and non point source water pollution.

If states are becoming more responsive to the problems confronting their citizens – as the current state government literature suggests – these relationships should materialize more clearly with further study using appropriate measures. At the same time, however, because the measures of environmental quality used in these studies have often been suspect, there remains a case to be made that "more refined measures of pollution severity and other environmental problems are needed before its effect on state environmental policy can be fully known" (Lester, 1994). The discussions presented later in this work suggest that this statement is still largely true when the specific subject of inquiry is water pollution control.

The evidence relating to the impact of public views and cultural practices on environmental and water policy is also inconclusive. There is some evidence that state political ideology influences state water pollution control policies (Ringquist, 1993 & 1994), although this relationship has not yet been found to be particularly strong. Specific tests on the effects of moralistic political cultures on water pollution policies also appear to be lacking. Nevertheless, while broad studies do generally support the view that state political systems respond positively to the views of their populace (Erikson, et. al., 1993; Hays et. al., 1996), there is also disturbing evidence of state policy responsiveness to more selective socio-economic influences. Hunter and Waterman (1996, p. 202), for example, found a negative relationship between the percentage of Afro-Americans in a state's population and water quality outcomes in the state, thus suggesting concerns about racially segmented exposure to the effects of water pollution. Consequently, while the existing literature does provide some suggestion that state policies respond to prevalent views within their borders, the evidence remains inconclusive and may also be interpreted to support the view that state environmental policy outcomes respond to more insidious factors such as racial composition.

A final form of responsive state policymaking relies on partisan forms of citizen influence [3]. The hypothesis here is grounded in the classic partisan view of the policymaking process (Schattschneider, 1960) which suggests that people vote for political parties based on their platforms and positions, and that political parties – in turn – seek to enact their preferred policies into law (Calvert, 1989). Some may question the applicability of this view of the policy process based on recent research suggesting that the coalitional bases of political parties vary among the states (Brown, 1995). However, the variables analyzed in Brown's research are not demonstrably related to environmental and water pollution policy, specifically. Consequently, there is not sufficient reason – at least at this point – to summarily reject the findings of past research that has suggested a positive relationship between Democratic party control of state governing institutions and the strength of environmental policies on this basis alone (Lester, 1980; Calvert, 1989).

The weight of current evidence does seem to suggest that wealth has positive effects on the strength of state environmental programs, although the results of current studies are not completely consistent with one another. Consistent with theoretical arguments relating to both "post-materialist" values (Inglehart, 1977) and the general availability of resources, scholars have found positive relationships between wealth and state environmental and water policy strength measures (Lowry, 1992;

Ringquist, 1994; Hunter & Waterman, 1996). However, the impact of wealth (as measured by per capita income) lapsed into insignificance in one of the more advanced and integrated statistical models of state water pollution control program strength (Ringquist, 1993), thus raising at least some question about its independent impacts on state policy variation.

The evidence regarding the impact of institutional capacities on state environmental and water quality policy is somewhat mixed, depending in part on whether the focus of study is on legislative or administrative variables. Ringquist found relatively weak support for the idea that state legislative professionalism positively affects state water pollution program strength (Ringquist, 1993 & 1994). Thus, while elected officials at the state level clearly have authorities to influence state environmental policy, evidence that legislative professionalism enables them to have clear and consistent effects on environmental policies remains limited.

The strongest evidence of institutional impacts on environmental policies relates to state administrative agencies. In the early 1980's, Lester found that the existence of an integrated state environmental agency positively affected the adoption of state environmental measures in the 1970's (Lester, 1980), and this kind of effect was corroborated by Hunter and Waterman for water enforcement in later years (Hunter & Waterman, 1996). They found that Health Agencies were significantly less likely to enforce against water permit violations, while mini-EPA's were significantly more likely to enforce in these cases (Hunter & Waterman, 1996, pgs. 190-91). Hunter and Waterman also found that there were significant differences in enforcement levels across EPA Regions, and these differences at least partially endorse the importance of EPA regional variations that were previously found by Crotty to apply to state primacy delegations (Crotty, 1988). Thus, existing research on institutional influences in state environmental policymaking suggests a need to recognize that variations in state administrative agencies may affect environmental policy outputs.

Some of the better established factors contributing to variation in state environmental and water policies relate to the strength of groups involved in the policymaking process. For example, both Ringquist (1993) and Lowry (1992) found evidence of interest group influence on state air and water pollution control program rankings, although the specific industry-by-industry findings might be surprising to some. Neither study found that polluting industry strength (as measured by manufacturing industry strength) was a significant explanatory variable for state water pollution control programs. However, Ringquist found a strong and negative relationship between mining industry strength and state water pollution control rankings (Ringquist, 1993 & 1994). In addition, as is noted above, both Lowry and Ringquist found relatively strong and positive relationships between the strength of a state's agriculture industry and the ranking of its water quality programs. And finally, Ringquist found mixed evidence regarding the influence of environmental groups on state water program strength. His 1993 work in this area found only a statistically insignificant positive relationship between environmental group strength and state program strength, while his 1994 path analytical work found a notable impact (Ringquist, 1994, p. 36-7). Overall then, while the literature does suggest group influence in state water policy programs, its strongest findings in this area are focused on mining and agricultural group influences, with the former raising questions about advisability of further devolution of federal policymaking authority and the latter providing some minimal level of re-assurance.

Table 2-1 below summarizes discussion above. In general, as one moves from left to right across the horizontal dimension of the table, one moves from policy inputs and procedures at the state level (state primacy delegations) to outputs (expenditures, program strength measures, and enforcement) to policy outcomes (ambient water quality). The vertical axis, by contrast, lists major potential causal variables grouped in categories that align with major theoretical approaches to the state policymaking process. Several observations are appropriate here. First, if previous studies of policy implementation have taught us anything, it is that we need to be aware of the difference between policy inputs, outputs, impacts, and outcomes (Mazmanian & Sabatier, 1983; Pressman & Wildavsky, 1984; Gormley, 2000, etc.). For, while inputs affect outputs and outputs affect impacts and outcomes, the strength and nature of these relationships – to the extent they exist – vary substantially as a result of a wide range of contextual factors. Existing work in this area has not addressed this problem in any kind of systematic fashion.

Second, in reviewing the results of the studies in this table one is drawn immediately to Ringquist's (1993) suggestion that explaining variations in water pollution policies is a complex exercise that requires multi-factor explanations. Based on the major studies of state environmental and water pollution policies conducted over the last decade or two, it does appear that variations in state water pollution policies are traceable to factors suggested by responsive, capacity-based, *and* group-based theories of the policy process. It also appears that the impact of these variables may differ depending on the state water policy measure used. For example, of the independent variables investigated and reflected in Table 1, only wealth as measured through per-capita income appears to have a relatively consistent impact on water policies at the state level across the measures used – and, as noted above, the importance of this factor varies among studies and across the water policy measures used. The explanatory strength of the other independent variables, it appears, may also differ, depending on what measure of state policy variation is analyzed.

A final and related observation is that it is important for us to recognize that further research on the potential causal factors affecting state water pollution policies is necessary if we are to begin to simplify these complex findings, and relate them in sensible ways to Congressional control of the policy implementation process. In particular, two obstacles need to be overcome in this regard. The first obstacle relates to the range of state environmental and water policy variables we are seeking to explain. While Bacot and Dawes point out that the debate over dependent variables has revolved around the choice between expenditures and state program rankings (Hunter & Bacot, 1997), the debate is really broader than that. For, consistent with the discussion above, scholars have also investigated a number of other environmental and water policy outputs, including state decisions to accept primacy (Crotty, 1987 & 88), state enforcement levels (Ringquist, 1995; Hunter & Waterman, 1996; Wood & Waterman, 1991 & 1993; Wood, 1988), and ambient environmental outcomes (Lowry, 1992; Ringquist, 1993; Hunter & Waterman, 1996). However, this is only part of the problem that confronts us.

We also need to become clear about the true meaning of our aggregate measures of water pollution program strength. The measures used by Lowry and Ringquist, for example, rely heavily on rankings that are in fact a compendium of measures that tap various combinations of policy relevant variables (Hall & Kerr, 1991; Ridley, 1988) [4]. It may be that in trying to capture variation in a wide range of administrative outputs and environmental outcomes relating to state water program strength, these measures capture relatively little that is of theoretical importance. When combined with sometimes crude measures of the independent variables of concern, one might easily guess that current obstacles to our ability to explain variations in state water pollution policymaking and implementation relate as much to a lack of precise measurement as they do to our failure to understand the underlying relationships. While existing studies have uncovered evidence that variables drawn from responsive, capacity, and group-based theories of the state policymaking process affect state policies, they have not sought to systematically account for the differing dynamics that are likely to occur when differing measures of state water policies are used. And this is a significant omission because the most important causal factors may vary with the policy output being explained, as Lowry's investigation of point and non-point source water pollution suggests (Lowry, 1992). The overall point, therefore, is that advances in state policy research are likely to flow from efforts to build more clarity on the differing dependent variables we seek to explain.

A second major obstacle that needs to be overcome relates to the top down influence of federal policy structures enacted by Congress and administered by federal agencies on state environmental and water pollution policymaking processes. While there is good reason to believe that federal involvement affects state environmental policymaking and implementation (Lester & Lombard, 1990; Lester, 1994), relatively few studies have sought to ascertain this impact explicitly [5]. It is useful to note in this regard that – with the exception of Lowry's (1992) study – existing studies do not differentiate clearly between point source and non-point source water pollution programs. This is a concern because Congress has structured federal involvement in these two water policy arenas quite differently – as Lowry noted generally, and will be discussed in much greater detail later in this work.

Regardless, however, Lowry (1992) suggested that the federal government's more active involvement in point source water pollution control has led to a better matching between state policies and state needs in that area than exists in non-point source pollution abatement where the federal government has played a less aggressive role. However, this finding runs counter to much of the logic behind the current push toward devolutionary policies at the federal level, which suggests that oppressive federal requirements diminish the ability of states to respond effectively to state level concerns. Lowry also suggests that federal involvement has improved the dissemination of information on successful state programs, a finding that appears sensible from a variety of perspectives. He does not, however, seek to assess the extent to which state programs are consistent with substantive statutory direction from Congress. As was noted above, this latter point is of some significance because of continuing concerns expressed by both scholars and others regarding the extent of Congressional control over bureaucratic policymaking and implementation, and the implications of a lack of such control for democratic responsiveness and accountability.

Table 2-1 – Determinants of Variations in State Water Policies: Results of Recent Research

DEPENDENT VARIABLE(S):
MEASURES OF STATE ENVIRONMENTAL/WATER POLICY VARIATION

Independent Variables	**State Primacy**	**State $'s**	**Federal $'s**	**Point Source Program Strength**	**Non-Point Program Strength**	**Overall Program Strength**	**Enforce-ment**	**Water Quality**
Responsiveness								
Problem Severity		Bacot & Dawes, 97**			Lowry, 92*	Bacot & Dawes, 97		
State Opinion						Ringquist, 93; Hays, et. al., 1996**		
Democratic Party Strength						Lester, 80**		
Moralistic Culture								
% poverty							Hunter & Waterman, 96	
% black								Hunter & Waterman, 96
Capacity								
Per-capita income		Lowry, 91 PS	Lowry, 92 PS & NPS	Lowry, 92	Lowry, 92	Ringquist, 94		
Federal Grants			NA					Ringquist, 93
Organizational Form: Health, Superagency, &/or Mini-EPA						Lester, 80**	Hunter & Waterman, 96	Hunter & Waterman, 96
EPA Region	Crotty, 87 & 88						Hunter & Waterman, 96	
Group Influence								
Manufacturing	Lowry,92							
Agriculture					Lowry,91	Ringquist, 93 & 94		
Mining						Ringquist, 93 & 94		Ringquist, 93
Environmental Groups						Ringquist, 94		

PS = Point Source
NPS = Non-Point Source
* The measure referred to here was the percentage of the state's economy devoted to agriculture – a measure that may also be used to measure agricultural group strength.
** Bacot and Dawes (97), Hays et. al. (96), and Lester (80) use relatively broad environmental indicators in reaching their conclusion. Their analyses are not specific to water pollution.

Our discussion of the literature has now come full circle, as it has made the connection between the literatures on Congressional control, policy implementation, and federalism and state policymaking more explicit. Congress establishes structures for policy implementation as it selects specific policy instruments for implementation and determines the audiences toward whom those instruments are to be applied. The policy implementation process then links these Congressionally established structures to specific policy outputs, which then – in turn – influence policy impacts and outcomes. In environmental and water pollution control policy, like most other areas of American domestic policy, these outputs are influenced by policymaking processes at the state level. And these processes may affect the manner and extent to which policy outputs actually adhere to Congress's wishes. These outputs, in turn, affect water policy impacts and outcomes. At the same time, however, Congress's choice of instruments and target audiences may affect state policy dynamics, as well as the outputs themselves. For, directive policies that are based on Congressional pre-emption place minimum restrictions on state discretion that are not present with supportive policies, and this difference may affect not only policy outputs but the policy dynamics that underlie them as well. With these interrelationships in mind, let us now turn to a brief review of existing literature relating to Congressional influence on environmental policy and a description of the contribution this research seeks to make.

2.5. Congressional Influence on State Environmental Policymaking

Relatively little effort has been devoted to analyzing Congressional influence on state policy outputs and the policy dynamics underlying it. And this lack of research is quite evident for environmental policy. Speaking broadly, the studies that have been undertaken – like most others on Congressional control of bureaucratic decision-making – have tended to focus on managerial rather than structural forms of Congressional control. Studies of structural controls have been either uncommon or non-existent, depending on how one chooses to categorize those studies that have been undertaken. To the extent that studies of the influence of structural controls on state policymaking have been undertaken, they appear to have been grounded in either the implementation literature reviewed above (Mazmanian & Sabatier, 1983) or descriptively oriented analyses drawn from the literature on federalism and intergovernmental relations (Wright, 1988; Wellborn, 1988).

As noted above, a few studies have sought to analyze the influence of managerial controls by Congress on state policy outputs. Chubb (1985) outlined a two-tiered model of regulatory federalism in which Congressional Committees seek to control federal agencies that, in turn, exercise influence over state agencies. He and others have found evidence that state bureaucracies do respond to the preferences of Congressional Committees (Chubb, 1985; Hedge, Scicchitano, & Metz, 1991). However, this state bureaucratic responsiveness to political controls from above may be particularly focused on lower cost "symbolic" actions that leave sufficient resources for state agencies to respond to "task oriented" stimuli (Scholz & Wei, 1986). As conceived by Scholz and Wei, these "symbolic" actions reflect an effort by the agency to take less costly but sufficient actions to satisfy – at least temporarily – political principal(s). For this kind of strategy allows the agency to preserve sufficient resources and flexibility to enable it to respond to "task oriented stimuli" that presumably reflect true problems emanating from their immediate surroundings such as the nature of pollution in the state (Scholz & Wei, 1986). Once again, therefore, there is reason to believe that the effectiveness of Congressional controls in intergovernmental contexts may vary with the policy output being evaluated.

It is worth highlighting in this regard that most of the empirical studies of managerial "controls" over administrative behavior – whether focused at the national or intergovernmental levels – have sought to determine the extent of control by measuring enforcement related policy outputs, rather than other kinds of policy outputs (Weingast & Moran, 1983; Moe, 1985; Scholz & Heng Wei, 1986; Wood, 1988; Wood & Waterman, 1991; Wood & Waterman, 1993; Hedge & Scicchitano, 1994; Ringquist, 1995). This near-exclusive emphasis on enforcement outputs is troubling, since enforcement actions are only one among a number of policy outputs generated by state and federal agencies, and they are a particularly visible (and countable) form of output that is also subject to political manipulation (Gormley, 1989, p. 204). Other forms of policy outputs such as the kind and extent of state policy interventions undertaken or the restrictiveness of the actual controls applied may be just as important as enforcement – particularly at the state or street level where they determine what activities are encouraged, prohibited and subjected to enforcement. And furthermore, because these kinds of policy outputs are of immediate importance in local contexts and may be less "countable" in national contexts, they may be particularly sensitive to influences associated with structural – as opposed to managerial – controls.

It is in this context that the current absence of studies on the influence of structural controls on policy implementation is most notable. For, state policy outputs such as laws requiring active attention to environmental problems in state and local decision-making or the existence of mandatory controls on polluting behavior that are not specifically required by federal law have not frequently been linked to Congressionally enacted statutory goals at the federal level. Indeed, only Spence (1997 and 1999A and B) has sought to analyze the impacts of structural controls on policy outputs to any significant degree, and his work focused primarily on controls at the federal, as opposed to the state, level. Mazmanian and Sabatier (1983) pointed to the influence of statutory provisions in enabling successful policy implementation, but they did not link federal statutory construction to state policy outputs in systematic ways. And Wright and Wellborn have looked at various forms of structural controls and their connection to state policymaking, but neither of these studies sought to link structural controls, and the different forms they may take, to state level policy outputs in systematic ways.

From this discussion, it should be clear that there has been some initial work in assessing the influence of managerial controls on state policymaking, and this work has suggested that states do in fact respond to Congressional attempts at managerial intervention. These findings have led some scholars to suggest that federal-state policymaking and implementation processes allow for the adaptation of Congress's will to varying circumstances and, in so doing, enhance overall democratic responsiveness (Scholz & Wei, 1986; Wood, 1992). According to this interpretation, state abilities to integrate the demands of many political principals across both vertical and horizontal planes in the political system increase the overall responsiveness of the political system.

What is still missing in the literature, however, is any demonstration that state policymakers respond not only to occasional managerial interventions but also overall Congressional intent as expressed in substantive structural directions. For, where federal funds and fundamental national concerns are involved, statutory direction from Congress as a whole provides the structure according to which adaptive state behaviors can – and probably should – be exercised. Consequently, by limiting the bulk of its attention to managerial controls, the existing literature limits the normative reach of its conclusions and recommendations. The research conducted here seeks to make contributions designed address this deficiency in the current literature, while making contributions in other areas as well.

2.6. Contributions of this Study

The research presented in the following pages seeks to make contributions in three areas of the literature in Political Science and Public Policy. These three areas are: (1) Congressional control and influence on administrative decision-making; (2) policy implementation; (3) and state policymaking and intergovernmental relations. It also seeks to apply what is learned in these areas to the issue of policy devolution in an effort to help guide future water pollution policymaking efforts.

A central focus of this research is on Congressional "control" over administrative decision-making as it relates to water pollution policy in the United States. More specifically, this research seeks to extend our knowledge of the influence of structural controls on administrative decision-making by assessing the extent to which substantive structural controls actually impact water pollution policy outputs at the federal *and* state levels. It also seeks to ascertain whether differences in the policy instruments and target audiences chosen by Congress affect the extent of control and influence achieved. And finally, this work also seeks to assess whether shirking or slipping from Congress's directions at the state level varies according to federal policy design – an area of focus that is also important to the literature on policy implementation (discussed below).

The conclusions reached here provide a basis for assessing the nature and extent to which Congress influences policy outputs by creating ongoing institutional arrangements. This avenue for Congressional influence speaks to Congressional influence over the long term, as opposed to just shorter term influences that may be brought about by managerial interventions sought by particular political principals. At the same time, to the extent that significant Congressional influence is uncovered through this kind of mechanism, we will have identified, and potentially quantified, an important source of ongoing Congressional influence on bureaucratic policymaking behaviors.

This work also seeks to add to our knowledge in the area of policy implementation. While it takes an approach that is for the most part traditional and "top down", it seeks to make new contributions in several ways. First, it expands our knowledge of policy implementation by clearly separating procedural requirements and substantive policy outputs from policy impacts and outcomes in order to determine whether previously identified inadequacies in policy implementation are attributable to bureaucratic slippage and shirking behaviors, or factors relating to the contextual interfaces between public policy outputs and the audiences and behaviors they are seeking to influence. Second, it seeks to ascertain whether differences in the structure of Congress's statutory authorization affect the manner in which policy implementation occurs. Do more "programmed" pre-emptive forms of federal-state relationships yield greater levels of control than more cooperative approaches, as one might logically assume? This research will yield insights that help illuminate likely answers to this question. And finally, this research builds upon new "third generation" implementation research by looking at state level implementation of water pollution policies across the fifty states in an effort to assess state level influences on the water pollution policy implementation process.

The research presented here also seeks to add to the literature on state policymaking, federalism, and inter-governmental relations. More specifically, it analyzes the influence of differing forms of federal intervention on state policy outputs, as well as the policy dynamics that underlie them. While many studies have paid lip service to the influence of federal intervention on state policymaking processes, few studies have sought to assess the impacts of federal intervention specifically. This research addresses this gap in current research by analyzing the importance of various state level influences on water pollution policies under both highly directive (pre-emptive) and more supportive federal policy designs. Through this effort, we should learn something about the relative applicability of responsive, capacity-based, and group- based theories of the state policymaking process under these alternative forms of federal intervention. What we learn in these areas, in turn, should be of use in evaluating possible future directions for water pollution policy devolution.

As has been noted previously, current federal-state relationships in water pollution control differ according to whether pollution sources are considered "point sources" or "non-point sources". We will delve into these differences in some detail later in this work, but a brief overview is appropriate here. Structural controls for point sources of water pollution can be classified generally as "programmed" or "pre-emptive" because Congress has imposed rather strict "command and control" oriented policy structures that require compliance with specific federal regulatory requirements and give EPA authority to regulate polluting activities directly on an ongoing basis. The controls for non-point sources, by contrast, are basically "adaptive" because they do not include "command and control" requirements, but rather rely only on a few procedural requirements and federal funds to encourage active state efforts to reduce non-point source water pollution programs. For these non-point source water pollution problems, the FWPCA does not grant EPA ongoing authority to regulate water polluting activities directly on an ongoing basis. The difficulties that the EPA and the states are now having in implementing the FWPCA's Total Maximum Daily Load (TMDL) program are due in part to this fundamental statutory disjuncture. Under the TMDL program states are left to determine which waters do not meet standards, and they are also required to develop and implement strategies for bringing non-compliant waters up to standard. However, strong EPA authorities are limited to controls on point sources only, so the effectiveness and equity of overall strategies depends on the extent to which states are willing to impose controls on non-point sources in the absence of a federal "gorilla in the closet".

In addition, judgments regarding whether and how to restructure federal-state relationships in water pollution policy depend at least in part on what states are likely to do with increased water pollution policy discretion. Those who support the devolution of greater levels of responsibilities to the states would point to highly diverse water related conditions across our country (Hunter & Waterman, 1996), the importance of flexible and cooperative policy strategies for addressing these variable problems, and increasing state level capabilities. They would further suggest that states are likely to use additional discretion to target their water pollution control efforts to differing needs and problems, and that their responses to these varying problems would be affected by the extent of state concern over water pollution problems.

Those who are skeptical of devolution, by contrast, would point to an opposing set of concerns relating to inconsistent policymaking among the states, the potential for industry capture, and the ills of competitive federalism, all of which would suggest that further policy devolution would foster more stagnant and lenient state water pollution programs. These concerns tend to point to the continuing need for a "gorilla in the closet" to leverage more active and stringent state water pollution control policies – particularly in recalcitrant states. In this view, analyses of state policymaking and implementation are likely to show that states frequently fail to follow Congressionally specified national mandates concerning water pollution control. According to this view, state generated water pollution control policies might also be expected to demonstrate a general lack of responsiveness to broad state level concerns such as the extent of existing pollution in state waters and public opinion concerning water pollution and the environment.

The quality of our judgments about further delegation of water pollution policymaking authorities to the states thus depends at least in part on the relative degree to which these two alternative versions of reality actually occur. Unfortunately, however, public policy research in water pollution control has given us rather limited information and insight regarding these two alternative explanations. While there is data on water pollution policy outputs at the state level, few attempts have been made to bring it together and analyze it in systematic ways. Through this research, we will gain a relatively broad picture of state water pollution policy outputs, and this picture will give us a sense of the range of state anti-water pollution activity as it relates to both non-point and point sources. This is important because it will provide a sense of the extent to which state policies vary under pre-emptive and supportive policy structures, respectively. The data sets developed will also provide a foundation upon which we can estimate the relative importance of differing potential causes of the variation under these two federal-state policy structures. If we find that state policy variations are relatively small and attributable to variations in problem severity and public preferences, the results will tend to support further devolution of policymaking authorities. On the other hand, if we find very large variations and evidence of capture by polluting entities, it will signal reasons for caution about the possibility of further policy devolution. In between these two extremes, of course, are a variety of possible results that require more nuanced explanations, and these explanations are also likely to have implications for future changes in federal-state relationships in water pollution control.

2.7. Conclusion

In summary, this research contributes to current theoretical debates in the political science and public policy literature over the extent and nature of Congressional influence on administrative decision-making, the nature and effectiveness of policy implementation, and the influence of federal intervention on state policymaking, as well as current policy debates about the devolution of water pollution policymaking authorities to states. It does so by assessing the extent to which federal and state policy outputs are consistent with substantive statutory directions provided by Congress. It also assesses the nature and extent of state variations in water pollution control policy under differing structures for federal-state relationships by analyzing the relationships between statutory direction and policy outputs relating to the control of non-point and point sources of water pollution. The research also seeks to provide insight regarding the likely causes of state variations uncovered during the course of the analysis. These analyses, in turn, will provide insight into the responsiveness of state policymaking to concerns and conditions within their jurisdictions, and to the potential impacts of devolving further water pollution control authorities to state governments.

3. AN OVERVIEW OF WATER POLLUTION PROBLEMS IN THE UNITED STATES

Water is of fundamental importance to all life on earth – human, animal, and plant. By far, the largest quantities of water on earth are in the oceans, although supplies of fresh water exist in rivers, streams, lakes, reservoirs, and in the ground beneath us. Where freshwaters meet ocean waters, estuaries result and serve as homes for very rich aquatic ecosystems. Overall, however, while water in various forms is rather plentiful, a relatively small proportion of it – less than 1% – is fresh water that could be used for human consumption (NETCSC, 1995). The United States is fortunate in that it possesses abundant water supplies in comparison to many other areas of the world, and it also includes access to the single largest source of fresh water on the globe – the Great Lakes. In spite of this relative wealth of water in the United States (US), however, we face major challenges in our efforts to maintain adequate supplies of water at quality levels that are sufficient to support existing ecosystems and human needs.

In its most recent (1998) report assessing ambient water quality in the United States, the US Environmental Protection Agency reported that about 40% of the nation's waters are impaired in some fashion (USEPA, 2000A). What's more, most of the population – about 200,000 people – lives within 10 miles of water body that is contaminated in some form (USEPA, 1998A). Inadequate water supplies are also a significant problem in some parts of the country – particularly in the west. Water is transported great lengths for use in metropolitan areas like Los Angeles, and conflicts over water supplies and water sharing arrangements are plentiful and costly, as well as increasing in frequency and severity. Pollution of our waters (in both the west and east) is also costly. It results in negative health impacts for ecosystems and human beings, economic hardships for persons and communities that rely on water for their economic livelihoods (fishing, tourism, etc.), reduced recreational values, and higher costs for waters used for consumption and other economic purposes. In an effort to reduce these costs, we spend about

$50 billion in the US annually to combat water pollution through treatment and source reduction efforts (NAPA, 2000) [1].

This chapter provides an overview of surface water pollution in the United States. While it touches upon issues associated with ensuring safe drinking water, maintaining groundwater quality, and managing quantities of water available for various uses, it focuses on characterizing water quality problems in surface waters such as rivers, lakes and estuaries. The chapter begins by providing a brief historical perspective on water pollution in the US and the developed world. It then overviews water pollution problems by discussing surface water uses, the extent to which these uses are impaired by water pollution, different types of water bodies, sources of water quality impairment, and the kinds of water pollutants that cause water quality problems. The chapter closes with a short discussion of current difficulties associated with monitoring surface water quality and measuring policy outcomes associated with our water pollution control efforts. After reading this chapter, the reader should have a broad familiarity with both surface water pollution problems in the United States and the technical playing field on which water pollution politics is played.

3.1. A Brief Historical Perspective

In many respects, water pollution is as old as mankind. Since the beginning of human life, human beings and animals have used water for sustenance that has been contaminated by animal (or human) waste products and/or exposure to other toxic substances (minerals, chemicals, etc.). However, over the last century or two, as human beings increasingly concentrated their populations in urban areas and industrialized their economies, problems relating to contamination of surface waters have become more widespread and severe. Concentrated populations yield larger volumes of contaminated water to be discharged in smaller areas, and industrialization and economic advances give rise to greater varieties of pollutants that can reduce water quality. With these changes in the scope and severity of the problem, concerns over water pollution have also increased. While these concerns grew steadily during the course of the 20th century, they reached their zenith in the United States in 1969 when the Cuyahoga River in Ohio became so covered with industrial pollutants that it caught fire! Since that time, concerns over water pollution have remained, and have given rise to ongoing efforts to improve the quality of surface waters throughout the country.

Fortunately, over the last century and a half, we have also become more aware of the connections between water quality, and human and ecosystem health. While advances in our understanding of water quality problems – and treatment and prevention approaches – have helped us manage increasing pollutant loads to US waters, significant and important sources of water pollution remain. It is important to understand, however, that concerns over differing sources and pollutants vary over time, based on both changing circumstances and changing perceptions. Due in part to improvements in our understanding of the relationship between pathogens and human health, early concerns over water quality tended to focus on domestic sewage and the manner in which it was disposed and treated. Sewers were built to carry wastewaters "away" and, eventually, the need to treat wastewaters to improve the quality of water discharged to waterways was also recognized. As the economy flourished in the post World War II period and obvious water pollution discharges resulted, concerns began to focus more heavily on industrial water pollution sources and pollutants. As strong regulations enacted in the 1970's and successful pollution abatement efforts by a number of companies have led to improvements in industrial pollution control practices, concerns have shifted to new sets of concerns. Over the last twenty years or so, these new concerns have included unregulated toxic pollutants, wet weather runoff from urban areas, agriculture, forestry, and sewage sludge management. As we shall see in the following chapters, these waves of changing perceptions and circumstances have given rise to Congressionally enacted changes in US water pollution control legislation, and these changes have served as a guide to policy change and implementation in this policy area.

3.2. Water Pollution: Causes, Sources, and Pollutants

While some forms of water pollution are readily apparent to the eye, precise definitions of the term "water pollution" are hard to come by. In broad terms, water pollution can be viewed as a discrepancy between the level of water quality necessary to support the "intended uses" of a water body and the actual conditions in that water body [2]. Intended uses of water bodies vary, as do the extent to which they are impaired, and the nature of the water bodies themselves. What is more, sources of water pollution also vary, as do the specific kinds of pollutants they contribute to the nation's waterways.

3.2.1. Surface Water Uses, Impairments, and Water Body Types:

There are a number of intended uses to which a water body may be put – both literally and legally. In broad terms, however, these uses can be grouped into four categories. The first kind of use is human water supply, and refers to water bodies that are used to provide water for consumption by human beings. Approximately, two-thirds of the US population draws its water supply from surface waters (USEPA, 2001A, p. 1). Waters drawn from lakes and streams are pumped and piped to drinking water treatment facilities, from which they are then distributed to homes and businesses for consumption and other purposes. Public water supply uses may require high levels of "cleanliness" sufficient to avoid negative health impacts from human consumption. While drinking water treatment systems must meet specific standards of cleanliness under the federal Safe Drinking Water Act (SDWA) for systems supplying water for 15 connections or 25 persons, the water entering public water treatment works for direct human use must be "clean" enough to enable water treatment to be effective at reasonable cost.

A second category of water use relates to human recreation, and involves activities such as swimming and fishing. Here, the focus is on maintaining water quality at levels that are sufficient for direct human contact and that lead to fish populations that are relatively "safe" to consume. Water used for fishing and swimming must also be maintained at rather high levels of cleanliness, although perhaps not always as clean as may be required when waters are used as sources of public water supply. While fishing and swimming may not be done in all water bodies, these activities may be done in many or most water bodies in the country. It is for this reason that the Federal Water Pollution Control Act (FWPCA) established a goal that all water bodies in the US be “fishable and swimmable” by 1983. While this goal has clearly not been achieved, it remains important as a guide for policymaking relating to water pollution.

A third category of use is ecological and relates to ensuring that water bodies are of sufficient quality to support fish and wildlife. Here the concern is not necessarily with human uses of the water body, but rather it relates to the capability of the water body to support the ecosystem in which it is embedded. While it is probably safe to say that there has been less concern historically over the water quality requirements of this category of use than the two above relating to human consumption and recreation, this kind of use has been receiving greater attention by environmental professionals in recent years. This kind of use is also of central importance to those in the environmental movement who are driven by “deep ecology” related concerns over ensuring that global ecosystems remain healthy and viable, regardless of the impacts on human beings [3]. What is more, biologists and other environmental scientists are increasingly using monitoring approaches that rely on assessing fish, insect, and other wildlife species as indicators of the health of the water body. These approaches – in and of themselves – call attention to water uses that may not be directly related to human consumption and recreation.

A fourth and final broad category of water use is economic. Here the concern is with water as a factor of production in the creation of goods and services. Water is used in the production of many goods and services that are then exchanged in commerce. Businesses need water that is of sufficient quality to serve these economic purposes. The specific economic uses and their water requirements, however, vary considerably. Water may be used in the industrial production of various products, with the quality (and quantity) of water required varying considerably depending of the specific production process involved. Water is also used in agriculture and forestry, as crops and trees will not grow without it. In addition, water is also important for the production of fish, cattle, chicken, pigs and other animals that are later sold and consumed, and the water used by those animals must be of a quality that is sufficient to support their consumption by human beings. And finally, water is used in both transporting products and in creating energy. While water quality concerns relating to these latter activities may be less obvious than for other uses of water, the land and hydrological alterations necessary to dredge waterways for transport and build facilities for generation of hydro-electrical power are indeed significant.

Across all of these categories of water use, there are underlying issues associated with the quality of water necessary to fulfill the uses that are intended. When a state government or EPA labels a water body as "impaired," they mean that the quality of water in that water body is not sufficient to support intended use(s) that are specified by state governments in legally approved water quality standards. While water pollution control efforts in the United States over the last several decades have clearly reduced pollutant loads (ASIWPCA, 1992), impaired water bodies are still quite prevalent throughout the country. Table 3-1 below presents summary information on ambient water quality impairment in the United States, and sources of these impairments in rivers and streams, lakes and reservoirs, and estuaries. While it is probably the best summary information currently available on US water quality, the notations at the bottom of the table indicate that the information provided is subject to some questions regarding the extent to which it truly reflects water quality problems in the country. We will return to the issues underlying this note briefly at the end of this chapter. Regardless, however, the information in the table does reflect the best recent judgments of state water quality professionals around the country [4].

Overall, the data presented suggest that roughly half of the rivers, lakes, and estuarine waters in the US are impaired or threatened in some manner. They also suggest that both point and non-point sources of water pollution remain significant contributors to water quality impairments on a nationwide basis. While the distinction between these two categories of sources is not always clear in practice, it is nevertheless a useful way to think about water pollution sources. In general, "point sources" of water pollution are those sources in which pollutants reach surface waters through pipes, conveyances, or some other concentrated source. Non-point sources, by contrast, are ones in which pollutants reach water bodies from widely diffuse routes and activities. In general, point sources include discharges from industry and municipalities, as well as some forms of storm-water runoff [5]. Non point sources typically create problems as a result of wet weather runoff from agriculture, forestry, and other activities that disturb lands (or air, in the case of air deposition) in ways that foster pollutant exposure to wet weather. In broad terms, the data in Table 3-1 suggest that a mix of point and non-point water pollution sources contribute to water quality impairment in the country. However, it is useful to note that the most important water pollution sources in specific situations do vary considerably across the country (USEPA, 2000A). One significant dimension of this variability relates to the types of water bodies involved, and it is to a brief discussion of several of these types of water bodies that we now turn.

Table 3-1 - Major Causes of Water Quality Impairment in the United States

	River & Stream Miles	**Lake, Pond, & Reservoir Acres**	**Estuarine Miles**
Size	3.66 million mi.	41.4 million acres	90,465 sq.mi.
% Assessed	23%	43%	32%
Water Quality			
Good: meets Designated use	55%	45%	47%
Threatened	10%	9%	9%
Impaired	35%	45%	44%
Sources of Impairment In Impaired Waters			
Non-point Sources			
Agriculture	58%	31%	15%
Hydro-modification, Dams	20%	15%	
Forestry	7%		
Atmospheric Deposition		8%	23%
Waste Disposal on Land	7%	5%	12%
Resource Extraction	9%		
Point Sources & Urban Runoff			
Industrial Discharges		6%	15%
Municipal Point Sources	10%	11%	28%
Urban runoff/storm sewers	11%	6%	28%
Combined Sewer Overflows			12%

* This table is based on a table drawn from Environment.gov, 2000, National Academy of Public Administration. The data shown are drawn from USEPA, Office of Water, The Quality of Our Nation's Water: A Summary of the National Water Quality Inventory: 1998 Report to Congress, EPA 841-S-00-001, June 2000A.

** The data are based on 1998 State Section 305(b) reports submitted by states, tribes, territories, commissions, and the District of Columbia. Because of differing procedures used by states and territories for collecting and analyzing data, as well as incomplete assessments of US waters, the information provided should be viewed with some caution. Percentages may not add up to 100 because more than one source may impair a given river segment, lake acre, or estuarine mile.

3.2.2. Water Bodies: Rivers, Lakes and Estuaries

In discussing water pollution, it is useful to differentiate among differing types of water bodies. The differentiation among rivers and streams, lakes and reservoirs, and estuaries used in Table 3-1 is sensible for a variety of reasons [6]. These are different kinds of water bodies with differing characteristics, and they therefore tend to be used for different mixes of purposes. They also tend to be susceptible to different sources and kinds of pollutants. These kinds of water bodies are also located in differing places throughout the country, and may be exposed to different mixes of pollution sources for this reason as well.

Rivers and streams frequently support populations of flora and fauna, provide waters for public use, and serve as water sources for economic purposes. While they are significant sources of recreation, the proportion of rivers and streams used for these purposes may not be as high as it is for lakes and coastal areas, for example. Rivers and streams also tend to carry waters from higher elevations to lower ones, and – because they tend to flow – they have a self-oxygenating potential that tends to be greater than is the case for more stationary water bodies (lakes, for example). This aeration ability helps them absorb certain kinds of pollutants. Rivers and streams also carry pollutants away (often to lakes and/or estuaries), so they may benefit from dilution to a greater degree than lakes and estuaries. Rivers and streams are also the predominant water bodies in inland states, and therefore tend to be exposed disproportionately to sources and pollutants that predominate in those areas. The relatively high contribution of agriculture to river and stream impairment (affects 58% of impairments in the US) reflects, at least in part, the prevalence of rivers and streams in central parts of the country where agricultural activities predominate.

Like rivers and streams, lakes and reservoirs may serve all four purposes outlined in the discussion of water body uses above – public water supply, recreation, ecosystem support, and economic support. Unlike rivers and streams, however, lakes and reservoirs do not generally carry pollutants away – they collect them. Consequently, lakes and reservoirs are particularly susceptible to oxygen depleting pollutants such as organic materials and nutrients, and they may collect other pollutants from "up-stream" sources that are carried to them by rivers and streams as well. In fact, the overall eutrophication cycles experienced by lakes are in part processes whereby organic materials overwhelm the lake's ability to absorb them. As receptacles for pollutants (from both natural and "man-made" sources) carried to them from outside sources, these water bodies endure life cycles in which organic forms of pollution tend to grow in importance over time. While this aging process is "normal" in many respects, accelerating it through the introduction of pollutants can be problematic – particularly in the relatively numerous cases in which lakes and reservoirs support various sources of recreation and tourism.

While estuaries are not typically used for public water supplies, they are frequently used for recreation, the support of rich and critical ecosystems, and economic purposes. They may be particularly important economically, as they support critical fishing, tourism, and other industries for the areas in which they are located. It would, for example, be difficult to underestimate the economic importance of the Chesapeake Bay to the Baltimore-Washington region or the Puget Sound to northwestern Washington State. Like lakes and reservoirs, estuaries tend to collect pollutants from a wide array of sources. However, because they tend to be much larger than lakes (the Great Lakes excepted) and often receive drainage from larger areas, they may collect even larger volumes of a greater variety of pollutants than do lakes and reservoirs. The relatively large contribution of atmospheric deposition to estuarine impairments (23% of impaired estuarine miles) reflects in part the size of these water bodies, and the relatively even spread of sources of impairment shown in Table 3-1 reflects the range of stresses to which these water bodies tend to be exposed. In addition, because – by definition – estuaries occur where fresh water (rivers and streams) meets the ocean, they tend to be disproportionately close to coastal urban centers (Baltimore, Washington DC, etc.) and the pollution sources that characterize them. The comparatively high level of estuarine impairment from point sources reflects this fact. Thus, in spite of the significant progress made in combating point source water pollution over the last thirty years in this country [7], point source water pollution discharges remain significant contributors to water quality problems in estuarine environments.

While the uses, extent of impairment, and nature of water bodies differ, so too do the sources of water quality problems and the pollutants that actually lead to them. Consequently, it is to a general discussion of the differing sources and forms of impairment that we now turn.

3.2.3. Water Pollution Sources

The pollution of surface waters can and does occur in a wide range of ways. And the particular kinds of pollutants that contaminate surface waters vary depending on both water pollution sources prevalent in the area, and the nature of the receiving waters to which they are released. In general, however, one can say that water pollution can result from both human activities and natural processes, and it can result from both concentrated and diffuse sources. The pollutants emanating from these sources may be naturally occurring substances or conditions that become harmful because of their level of concentration or presence in a water body where they may inhibit desired uses, and/or threaten human health or the environment. However, pollutants may also take the form of chemicals that are developed synthetically and then reach water bodies through production process discharges, or after production in some other manner. What follows is an overview of the major point and non-point sources of water pollution in the United States, followed by a general summary of the kinds of pollutants that these sources produce.

3.2.3.1. Point Sources of Water Pollution

Broadly speaking, point sources can be divided into three categories of discharge: 1.) industrial; 2) municipal sewage and; 3) contaminated waters from urban storm-water runoff that are defined as point sources under the FWPCA. While the first two of these categories of point source discharge --- those relating to industrial and municipal discharges to surface waters – have long been considered both point sources and significant water pollution sources, urban storm-water runoff has received more attention over the last decade or two. Under current regulatory definitions, storm-water runoff from large separate and/or combined sewage systems is also considered a "point source," while some forms of storm-water runoff may not be considered "point sources" (see footnote 5).

Industrial point sources of water pollution include discharges of waters that have been used in various kinds of commercial processes. These waters may have been used in making products such as steel, chemicals, pulp and paper, energy, etc. To the extent that this is the case, these waters may contain pollutants that are characteristic of the production processes from which they emanate. Industrial point source discharges may also include "non-contact" cooling waters that are used in commercial enterprises. While these cooling waters can be important sources of thermal pollution, they may not contain large amounts of other pollutants. Industrial discharges of wastewater occur throughout the country, but it is worth noting that the specific forms of industrial discharge are highly variable and depend on industrial composition in particular states and regions. For example, pulp and paper mills tend to operate in the northern parts of the country, textiles in the south, coal in the Appalachian region and Rocky Mountains, and so on. Consequently, the specific kinds of industrial and commercial discharges that are most prevalent also vary substantially by state and region. In general, water pollution from industrial sources may be reduced through treatment facilities, or through alterations in production processes that change the composition of wastewaters flowing from the facility. While changes in production processes can be made by companies at their own discretion, facilities used to treat industrial and commercial wastewaters must perform well enough to meet minimum regulatory requirements established for the facility.

A second major category of "point source" discharges results from publicly owned treatment works, or POTWs [8]. POTWs treat sewage that is generated by residences and commercial enterprises that release wastewaters into sewers – generally in relatively populated areas. These discharges include "black water" from toilets, "gray water" from showers and sinks, as well as wastewaters of different kinds from commercial enterprises that discharge to municipal sewers. The size and nature of the discharges involved varies both with population and the kinds of commercial enterprises that discharge indirectly through the POTW. Unlike direct commercial and industrial discharges to surface waters, discharges to public sewers can be regulated *by municipalities* through "pretreatment programs" that are required of a number of municipalities. Overall, these pretreatment programs are designed to ensure that industrial discharges to municipal sewers do not cause failures [9] in the operation of the municipal wastewater treatment facility. Because POTWs tend to serve relatively concentrated populations, their pollutant contributions to surface waters are often most significant in densely populated regions where large cities have grown – particularly, for example, on the east, west, and Gulf coasts, and in the Midwest along the Great Lakes. However, point source pollution problems are by no means limited to these areas.

A third category of point source water pollution relates to releases of contaminated waters during storm events. Urban storm-water runoff and concentrated animal feeding operations in particular have been receiving substantial attention in recent years. When storm events occur in urban areas, storm-waters run across non-permeable surfaces such as roadways, sidewalks, and parking lots. These waters then become contaminated by oil, grease, and other kinds of pollutants, and need to be managed in some manner so that they do not contaminate adjacent water bodies. In general, this storm-water runoff is managed either through systems of municipal separate storm sewers or it is combined with municipal sewage in combined sewers. Where these kinds of infrastructure are not sufficiently available, contaminated storm-waters may also flow diffusely as non point sources to waterways without entering a municipal sewage system.

Regardless of how it is managed, however, storm-water runoff is a potential source of water pollution. In separated sewage systems, storm-water may be discharged directly to surface waters and may contaminate the receiving water bodies if it is not properly treated. In combined sewer systems, large amounts of storm-water runoff may overwhelm municipal sewerage treatment plants and cause "combined sewer overflows" which carry both polluted storm-water runoff and untreated raw sewage into the receiving water. For both separated and combined sewer systems, therefore, specific kinds of storage and/or treatment facilities may be necessary to treat the wastewaters produced by storms in urban areas. Unfortunately, because sewage systems in most urban areas were not designed and developed with this purpose in mind, current treatment facilities for both separated and combined sewers are often inadequate to protect receiving waters. While water quality problems resulting from storm-runoff occur in populated areas around the country – often in coastal areas, they tend to be more prevalent in urban areas east of the

Mississippi where rainfall is more common and sewage collection system infrastructure tends to be older [10].

While point sources of water pollution remain significant contributors to water quality problems on a nationwide basis – particularly in urban areas and in estuarine environments – the data in table 3-1 and a number of other *analyses suggest that non-point sources of water pollution have become the most prevalent form of water problem in the country*.

3.2.3.2. Non-Point Sources (NPS) of Water Pollution

Non-point sources of water pollution have now overtaken point sources as the largest contributors of water impairments in the nation's waters. Indeed, in EPA's most recent (2000A) water quality assessment report, nearly all of the state summaries provided included clear suggestions that non-point sources of water pollution are now significant sources of water quality degradation within their borders [11]. Non-point sources of water quality impairment can be divided into several categories, based on the kinds of activities that give rise to them. While many sensible sets of categories could be used to describe these sources, the discussion here will focus on agriculture, forestry, hydro-modification, resource extraction, land disposal, and atmospheric deposition. The discussion here is quite general and seeks only to provide an overview and contextual setting for the subsequent analysis of federal and state policies in this area. Readers who are interested in more detailed information on non-point source water pollution, its sources, and the ways in which it can be managed should refer to available documents that provide this kind of information [12].

By nearly all accounts, agriculture is now the leading cause of water quality impairment in the United States. Agriculture, however, includes a rather broad set of activities, and these activities vary considerably both within and among the states. Some agricultural activity involves crops such as wheat, corn, and soybeans, while other forms of agriculture include dairy farms, beef cattle production, poultry and hog farms, and other forms of animal feeding operations (AFO's)[13]. The specific forms of pollution stemming from these kinds of agricultural operations differ. Agriculture involving crops can contribute to soil erosion and sedimentation, nutrient runoff from fertilizers, and pesticide contamination. Animal feeding operations can also contribute to soil erosion and sedimentation, as well as nutrient and pathogenic forms of pollution as animals and their waste products come in contact with adjacent waterways – either directly as animals wade in waterways or through contamination from runoff during storms. In all of these cases, rainfall, irrigation, and other processes lead polluting materials to emanate from the agricultural operation itself to surrounding surface waters.

While agriculture – broadly construed – is a significant water pollution source throughout the country, the forms it takes and the processes by which it creates water pollution also vary geographically. In general, crops are prevalent in the Midwest, fish farms are common in the south, hogs are raised in North Carolina, and irrigation is used disproportionately in the west. These variations in sources and processes give each area of the country a somewhat unique mix of agricultural water pollution sources. In the aggregate, however, these sources provide a substantial challenge for water pollution control efforts throughout most of the country. While specific treatment options differ based on the agricultural activity in question, the physical characteristics of the site(s), and the nature of the receiving waters, they broadly include measures to limit erosion from runoff and irrigation, animal access to waterways, and nutrient and pesticide contamination (For an overview of NPS management measures, see USEPA, 1993).

Human efforts to alter the nature and flow of waterways are often called "hydro-modification," and they can also pollute surface waters. The dredging of stream beds to enable improved navigation, for example, can disrupt sediment in the waterway, and lead to both altered levels of sedimentation in the water and – in some cases – the release of toxic substances that have settled and remained relatively benign in the sediment [14]. The construction and operation of dams can also disrupt waterways in many ways, including limiting the ability of fish to reach spawning beds, eroding surrounding soils on land, and disrupting soil and materials in the bed of the stream. Hydro-modification activities can also have significant effects up stream and down stream of the hydro-modification project as altered water flows can affect flora, fauna, and in stream characteristics. Hydro-modification projects also vary geographically. Dams are a commonly used source of energy and irrigation in the west, while the use of dams for flood control and the dredging of waterways for navigation is probably more common in the east. As with agriculture (and most other forms of pollution abatement), control and prevention measures for hydro-modification projects vary depending on site specific characteristics. In general, however, they may include measures to preserve trees and vegetation, control erosion and sedimentation during construction, re-vegetation, and mulching to name a few possible approaches (see USEPA, 1993 for more details).

Forestry practices are another significant source of water pollution in the United States. In forestry, the extraction of trees from the soil, the construction of roads to enable access to timber, and controlled burning for fire prevention can uproot soil and/or make it susceptible to erosion. Improperly applied forest chemicals can also lead to the contamination of nearby surface waters. As rainfall occurs, soils and other polluting substances are eroded and transported to nearby waterways where they contaminate them with soils, nutrients, and other pollutants. Forestry too varies geographically, with the northern areas of the country in the west, upper Midwest, and east being particularly (but not exclusively) subject to this kind of water pollution source. In broad terms, the management and control measures appropriate for forestry operations involve careful application of forestry chemicals and the implementation of various best management practices (BMP's) and planning processes for road construction, timber harvesting, and controlled burning operations that seek to minimize erosion effects on water quality and fish spawning.

Mining and other forms of resource extraction can also be significant water pollution sources. Here, the process of resource extraction damages the surface of the land, and provides opportunities for erosion, and the transport and deposition of other pollutants to surface waters during wet weather. At the same time, mining activities expose rock and metals of various kinds that also erode with rainfall and deposit chemicals in waterways. Exposed rock from past mining operations can also give rise to low ph runoff known as acid mine drainage that can then increase the acidity of surrounding water bodies. These kinds of mining related water pollution sources are particularly prevalent in the Appalachian region, southern Illinois, and areas of the western Rocky Mountains where mining is common. Treatment and prevention approaches for resource extraction include the implementation of Best Management Practices, as well as more involved treatment measures for active problems.

The disposal of wastes on land can also contaminate surface waters. These wastes may come in the form of solid and hazardous wastes in landfills, or in the form of septage that is treated in septic tanks and discharged to the soil for treatment [15]. Landfills – whether sanitary or hazardous – are essentially receptacles for pollution sources. As rain drains through materials in landfills, pollutants of different kinds can be transported through the creation of leachate that can seep into the groundwater and eventually contaminate surface waters. This leachate, if not absorbed in the soil can also flow over land to surface waters. Landfills – both sanitary and hazardous – exist in locations throughout the country, although they tend to be most prevalent in areas that are relatively close to major urban centers. While the number of currently operating landfills decreased during the 1990's due to the costs associated with more stringent regulation [16], current and former landfills (or "dumps") nevertheless remain a significant potential source of water pollution.

Onsite wastewater systems utilizing septic tanks are used in rural and suburban areas throughout the country to treat wastewater from residences, and – to an increasing degree – from commercial establishments as well. While they are a means for managing wastewater like centralized sewer systems, they are not generally considered point sources because they tend to discharge wastewater to the soil rather than directly to waterways. When onsite wastewater systems are properly designed, sited, and maintained, organisms and filtration processes in the soil then treat the wastewater before it makes its way to ground or surface waters. However, onsite wastewater systems that are improperly designed, sited, or maintained can lead to the release of untreated or poorly treated wastewater into both groundwater and surface water. While permissible designs for onsite wastewater treatment systems vary considerably by state across the country, these systems are a potential water pollution source in all states.

Increasingly, non-point source water pollution concerns are extending beyond the aforementioned land based sources, and include air deposition as well. As recent concerns over acid rain demonstrate, air pollution emissions from factories and automobiles can find their way into rain clouds and become distributed over wide areas through rainfall. As a water pollution source, air deposition is thought to be of particular concern as it relates to overall acidity, nutrients, and mercury. While these effects also vary geographically, the variation is based on wind patterns that extend across states rather than local characteristics as is the case with the land use related sources discussed above. Thus, for example, eastern states frequently complain about air deposition of pollutants emanating from factories in the Midwest. As Table 3-1 suggests, air deposition can become a particularly important water pollution source in larger water bodies such as estuaries where waters may collect pollutants from over large areas.

3.2.4. Water Pollutants: An Overview

While the pollutants affecting water quality in the United States are too numerous to describe comprehensively, it is useful to think about them in terms of whether they are solid, biological, or chemical in character. Solid pollutants include debris and sediments that may be suspended in water. Biological pollutants include pathogens such as bacteria and viruses that can cause disease. Chemical pollutants are wide ranging in character and can be described generally as pollutants that affect water quality through chemical reactions. They include nutrients such as nitrogen and phosphorus, organic materials that reduce oxygen levels in the water as they decompose, and a wide range of potentially toxic substances such as metals, and organic chemicals. Environmental conditions in ambient waters such as temperature and ph may also affect water uses and contribute to chemical conditions affecting water quality. While water pollution problems relating to solids and biological organisms are both common and of central importance to maintaining healthy waters, the wide range of potential chemical pollutants – particularly toxics –can make them more difficult and expensive to identify and treat.

Table 3-2 below relates basic categories of pollution sources to different categories of common water pollutants. It reveals differences in the kinds of pollutants released from different pollution sources, although it also reveals many cases where differing sources can emit similar kinds of pollutants. It is important to note also that the table makes no effort to differentiate large and small sources of various pollutants. For example, while urban storm-water discharges may contain nutrients, they are a relatively small contributor to nutrient problems when compared to POTWs or agricultural runoff. The point in this table is to show that there is variability in pollutants across sources, and that different sources can contribute similar pollutants. The discussion that follows the table provides a brief overview of each of the categories of pollutants shown in the table, including the major sources of pollutants in the category, their overall prevalence throughout the country, the kinds of effects they can have on water quality, the impact of these effects on various uses, and some basic pollutant measures (eg. parameters) that are used to detect its presence or absence. While the discussion is general and glosses over a number of differences between specific pollutants within particular pollutant categories, it is nevertheless useful for outlining the basic character of pollution problems that US water pollution policy must address.

Table 3-2 - Common Water Pollutants and Potential Sources

	Solids	Patho-gens	Nutrients	Oxygen Demand	PH & Temp-erature	Toxics
Point Sources						
POTWs	X	XXX	XXX	X		XXX
Industrial Discharges	X		X		X	XXX
Urban Stormwater – Combined Sewer Overflows & Separate Storm Sewers	XXX	XXX	XXX	X		XXX
Non-Point Sources						
Agricultural Runoff	XXX	XXX	XXX	X		XXX
Urban Runoff	XXX	XXX	XXX	X		XXX
Construction Runoff	X		XXX			XXX
Mining Runoff	XXX				XXX	XXX
Onsite Wastewater Systems	X	XXX	XXX	X		XXX
Landfills/Spills	X					XXX
Forestry Runoff	X		XXX	X		XXX

Adapted from: The 1992 Information Please Environmental Almanac, World Resources Institute, page 90. The data source was USEPA. The oxygen demand column was added by the author.
X - Not shown in Environmental Almanac table, but may occur from the sources indicated.

Solid matter may pollute rivers, lakes, and estuaries both when it is suspended in water and when it is deposited at the bottom of streams. Most often, this solid matter comes from soil in some form and is referred to as sediment, although other forms of solid matter may have detrimental effects on water quality. Sediment is a leading cause of water quality impairment in states throughout America. While it may come from both point and non-point sources, it is now particularly prevalent as a result of non point sources because most point sources in the United States receive basic treatment that allows solid matter to be removed with screens and/or settled out of the wastewaters through gravity in tanks (called "primary" treatment) before they are discharged to surface waters. Agriculture, forestry, construction, and mining tend to give rise to the discharge of large amounts solid material to waterways in the US. Releases of solid materials to surfaces water can have a range of detrimental effects, including limiting visibility in the water and the depth of sunlight absorption in ways that negatively affect plant and fish life. When the solid matter settles it may also have negative effects on the ecology and even physical characteristics of the water bodies in which it has settled. Water pollution from solids tends to be measured as "total suspended solids" in the water body or turbidity, which is a measure of visibility in water. For non-point pollution sources, sedimentation is typically reduced through efforts to minimize erosion such as planting vegetation, providing buffers between potential sources and waterways, and/or providing other forms of soil cover.

Pathogens are essentially bacteria and viruses that can cause disease in human beings and animals. While they are carried in a wide variety of ways, the most common sources of pathogens in water are human and animal waste products, and the release of these pathogens is a public health concern that can threaten drinking water supplies and lead to the closure of swimming and recreation areas. Major pathogen sources include municipal wastewater systems, combined sewer overflows (CSO's), failing onsite wastewater systems, and runoff from agricultural and urban areas where animals have deposited wastes. While these sources can give rise to a bewildering array of different kinds of disease causing biological agents, indicator bacteria called fecal coliform bacteria are frequently used as the basis for testing and monitoring. For municipal point sources, wastewater treatment for pathogens occurs through various forms of disinfection – the most common of which is chlorination. Non-point sources tend to rely on treatment occurring through the soil, and the physical separation of pathogen sources from waterways.

Nutrients are also a leading source of water quality impairment in the United States. Nitrogen and phosphorus releases are the major forms of nutrient pollution in the US. In general, nitrogen and phosphorus are naturally occurring substances that are essential for life and growth. They are released with the breakdown of animal waste products and are also elements of commonly used fertilizers. They are released from both point sources and non-point sources, although phosphorus discharges from municipal wastewater systems have diminished as non-phosphate detergents have come to dominate the laundry detergent market (World Resources Institute, 1992). In water bodies where nutrients are not present in high concentrations, nutrient discharges may be harmless or even beneficial. However, in water bodies with adequate supplies of nutrients or where nutrient discharges are substantial, nutrient releases accelerate the growth of algae and plants that can lead to eutrophication and limit the use of water for swimming and fishing. Excessive algae growth resulting from excess nutrients can also clog water intake pipes and absorb oxygen from the water, leading to anoxic conditions that negatively affect fish populations. Excessive nitrate concentrations in water consumed by young children can also cause "blue-baby" syndrome, which leads to low oxygen levels in infants and can also be fatal. Overall, nutrients are a major source of water quality impairment in the US – particularly in standing water bodies such as lakes or estuaries (like the Chesapeake Bay, for example). For point sources, nutrient releases can be reduced through advanced treatment facilities that can be added to wastewater treatment plants, while remedial strategies for non-point sources include best management practices of various kinds that are designed to minimize the use of nutrients and/or their flow to water bodies after storms and rain.

Oxygen is essential to aquatic life, just as it is to human beings. As organic waste materials are broken down in water, however, oxygen is used from the surrounding environment to facilitate the process of organic decay. Consequently, when organic material is released into water, it uses oxygen in the water that otherwise would have been available for aquatic life. Like nutrients, organic material is contained in wastewater streams from both point sources and non-point sources. Human and animal wastes contain organic materials that deplete oxygen supplies, as can waste from forestry and agricultural operations. As oxygen is depleted from a waterway, fish and other aquatic species that require it to live may die, and/or leave and not return. Oxygen depletion occurs in water bodies throughout the US, although – as noted above – it may be less likely to occur in fast running streams that are oxygenated by continuing motion and exposure to air. In ambient water, the presence of oxygen is measured directly through dissolved oxygen measurements. In wastewater effluent, the potential for oxygen depletion is often measured through five-day measures of biochemical oxygen demand (BOD5), which measures --- over time --- the extent to which wastewaters deplete oxygen from their surrounding environment. Treatments for oxygen depleting substances involve removing or minimizing organic materials in the water, and/or oxygenating the water through bubbling processes or motion.

The ph and temperature of water also affect its suitability for various uses. Fish and other aquatic populations, for example, need water that is of suitable ph and temperature to spawn and thrive. Waters that are extreme in temperature or ph can come from a number of sources, but the major activities that lead to these forms of water pollution in the United States are industrial and commercial in nature. Industrial facilities, for example, may heat water in the process of production and then discharge it to ambient waters. Mining operations expose rock and other substances that have acid content to wet weather run off that can pollute nearby streams and waterways. Tests for temperature and acidity are relatively routine matters involving thermometers and ph measurements, as is treatment for wastewaters of high temperature. Treatment for acid runoff from mines can be more difficult, expensive and time consuming.

Toxic substances also pollute waterways. They come in many different varieties, and the specific forms they take vary with their source(s). As Table 3-2 suggests, the sources of toxic substances are numerous. Toxic substances may be either organic or inorganic. Organic chemicals contain carbon, and include petroleum, grease, and a wide range of chemicals used in industrial and production processes. Organic chemicals are also used in agriculture in the form of pesticides and insecticides. Inorganic chemicals do not contain carbon, and include metals such as copper, zinc, mercury and cadmium and other non-living substances. Toxic substances can cause death, disease, behavioral abnormalities, cancer, genetic mutations, or physical deformations in living things (USEPA, 1996). Viewed as a whole, they are a substantial contributor to water quality impairments throughout the country, even if the particular toxic pollutants leading to impairment vary.

Tests and treatments for toxic chemicals also vary considerably. Typically, tests for toxic pollutants have been chemical specific, and allow for the identification of specific toxic substances [17]. More recently, however, greater efforts have been made to account for interactive effects among toxic chemicals and actual water quality impacts through tests of "whole effluent toxicity" (WET) and bio-assessment of water related ecosystems. WETs involve exposing small organisms to varying concentrations of wastewater effluent, and determining whether the organisms survive and prosper. Bio-assessment involves surveying plant and/or insect life in and around streams to determine whether the waterway is supporting the biological populations it should. Both of these monitoring approaches go a step beyond chemical specific monitoring, and seek to assess the net impact of potentially numerous toxic substances on aquatic life and ambient water quality. When toxicity is identified through WETs or bioassessment, specific treatment approaches will depend on further investigations to ascertain the actual causes of toxicity. Once the sources of toxicity are identified, they may be either eliminated through discontinued use or changes in practice, or treated through some form of advanced wastewater treatment.

The picture that should emerge from this discussion is one of a multi-faceted, complex, and important problem. Water is essential for all life, the economic well-being of the human population, as well as pleasure and recreation. Definitions of water pollution vary depending on the uses to which water is put. Put simply, water used for irrigation or manufacturing processes need not be of the same quality as water used for human consumption. Sources of water pollution are also numerous and multi-faceted, with both polluting activities and specific pollutants differing over time and space. While the discussion of pollutants was carried out in terms of broad categories, it is necessary to emphasize that pollutants both within and between these categories interact with one another in waters. Consequently, the actual problems confronting us in waterways throughout the country are often more complex than these categories imply. That complexity, in turn, contributes to difficulties in determining whether the policy actions we take to safeguard this essential resource are leading to the policy outcomes we seek.

3.3. Measuring Water Quality Outcomes

The picture we have drawn in this chapter of US surface water quality is (in all likelihood) generally accurate because it is based on input and data from water quality professionals from throughout the United States. However, it is also important to recognize that its accuracy and reliability is subject to significant limitations. Based on this data, we can ascertain with reasonable certainty that water quality problems remain throughout our country and that these problems now stem disproportionately from non-point sources. However, we still do not have clear water quality benchmarks to characterize changes in water quality either nationally or at the state level. This problem stems in part from the inherent complexities associated with measuring water quality on a highly variable geographic land mass of hundreds and hundreds of square miles. However, it is also traceable to the limited and inadequate efforts we currently make in the area of water quality monitoring and benchmarking at the national and state levels.

Monitoring water quality in a country as large as ours is an inherently complex chore. We can monitor for a wide range of purposes, including problem identification, the diagnosis of the sources of particular problems, and broad water quality characterization, to name just a few. These variations in potential purposes are complemented by the inherent technical complexity of the chore itself. In the US, there are thousands of miles of rivers and streams, as well hundreds and hundreds of square miles of lakes and coastal areas. There are also numerous potential pollutants to be monitored, and a number of these pollutants occur in the natural environment in varying concentrations. Consequently, it is not reasonable to assume that the presence of a pollutant is necessarily traceable to a correctable set of polluting activities. "Natural" ambient concentrations of pollutants in particular water bodies are needed if we are to ascertain what is really going on. Pollutant concentrations also vary significantly over both time and space, so learning when and where to sample in order to achieve our purposes can also be a difficult chore.

In spite of these technical challenges, we do make ongoing efforts to monitor water quality. However, the evidence suggests that our efforts are inadequate at best, and probably half-hearted when viewed in totality. To quote one prominent scholar of environmental policy, "…. little information exists about the quality of most American surface waters: much of what is reported is little more than sophisticated guesswork….. EPA assessments cover only about one third of all US surface waters" (Rosenbaum, 2002, p. 205-206). The information on water quality impairments presented earlier in this chapter is currently the best information available. However, it is based on assessments of only 23% of rivers and streams, 42% of lakes and reservoirs, 32% of estuaries, and 5% of ocean shoreline miles (EPA, 2000B). And, these figures are national averages that mask tremendous variation in the extent and nature of state efforts. In the most recent set of assessments, for example, Alaska assessed less than 1% of its river miles, while Mississippi claims to have assessed 46%. While these state efforts are supplemented by additional monitoring done by other government agencies [18], even these efforts are limited with respect to the number of stations monitored and the pollutants they seek to assess.

While the extent of current monitoring efforts is insufficient for the chore at hand, the failure of Congress, EPA, and the states to develop, and ensure adherence to, any coherent strategy for assessing water quality is more problematic still. While Congress has included requirements for state and federal monitoring of water quality since at least 1972, the language of the law and EPA's implementation of it has left states largely on their own to determine the monitoring strategies that are most appropriate for their purposes. This approach yields certain benefits, but it has led to not only limited, but also inadequate, state monitoring efforts in many cases. In general, EPA divides data submitted by the states into two categories. The first are monitored waters, and these waters are ones in which samples have been taken and analyzed within the last five years (EPA, 2000A, p. ES 3). The second category is "evaluated" waters, and these waters were assessed based on data older the five years, predictive models, patterns of land use, or other methods. Even within these broad categories, these evaluative data come in many forms across the states and we know relatively little about their overall reliability, even as we do know that they are widely used. Of the 46% of rivers assessed by Mississippi, for example, 43% were assessed based on these "evaluative" data (EPA, 2000A, p. 324).

Clearly, the approach we are currently taking to measuring water quality outcomes in this country is inadequate and haphazard. These inadequacies have led to numerous and continuing recommendations for changes and improvements for some years now (US GAO, 1986, Davies & Mazurek, 1998, Gormley, 2000, NAPA, 2000, & Hoornbeek, 2000 to name just a few). And while the EPA and other federal agencies have sought to make improvements in this area, progress has – and continues to be – quite slow. In the long run, however, our ability to manage our water resources intelligently will depend on improved efforts to address the admittedly complex challenge of measuring changes in water quality on national and state scales.

3.4. Conclusion

This chapter has emphasized the importance of surface waters to human beings, ecosystems, and the economy, as well as the complex technical considerations that underlie efforts to make and implement water pollution control policy in the US. Water pollution problems vary depending on our expectations regarding the uses of differing water bodies, the potential sources of pollution affecting those water bodies, and the particular pollutants discharged by those sources. All of these problem-related factors vary over time and space, and may impact differing states and regions in different ways. At present, our water quality monitoring efforts do not do a very good job of tackling the admittedly substantial challenge of characterizing this significant temporal and geographic water quality variation. Our failure to address this challenge adequately, however, further complicates the already complex process of policymaking that characterizes water quality decision-making in this country.

4. WATER POLLUTION POLICYMAKING IN THE UNITED STATES

Water pollution policy in the United States is a product of history, and this history has been one of growing policy activism at both the state and federal levels. While water quality problems have existed since the inception of our country, increasing industrial production since World War II and an expanding population have led to increases in the prevalence and severity of water pollution problems over the last half-century. Federal and state roles in addressing these problems have also changed over time, largely because Congress has altered its statutory directions in response to changing circumstances. Accompanying these changes in federal and state roles has been the development of a complex web of institutions and actors who play a role in determining the content of our nation's water pollution policies at both the federal and state levels.

This chapter provides an historical overview of the development of federal and state water pollution policies, as well as an overview of the current actors involved in making water pollution policies in the United States at the federal and state levels. It begins with a review of the constitutional and historical foundations underlying US water pollution policy, and includes a discussion of the constitutional divisions of responsibility between the federal government and the states, as well as a brief review of very early state and federal efforts to address water pollution problems and issues. It then suggests that there have been three major eras of Congressional direction in water pollution control in the US that have occurred since World War II, and outlines their defining characteristics. The discussion then turns to an overview of major current actors in water pollution policy, including public sector institutions at the federal and state levels, organizations and interests subject to water pollution policy and regulation, and environmental groups that seek to influence the policymaking process. Viewed as a whole, the chapter seeks to demonstrate the institutional and political complexity of the water pollution policy arena, and – in so doing – provides a context for the analyses that follow.

4.1. Water Pollution Policy: A Legal and Historical Overview

The US Constitution confers specific sets of authorities on the institutions of American government, including Congress and the States. Over time, the use of these authorities in relation to water pollution control has evolved toward increasing involvement at higher levels of government; first toward increasing state involvement and then toward increasing federal involvement. A brief review of these authorities and the changes in the way they have been exercised is appropriate to provide baseline understanding for the analyses that follow.

4.1.1. Legal Foundations and the Pre-World War II Era

The US Constitution provides a list of "enumerated powers" that define the legitimate exercises of Congress's lawmaking authorities. These enumerated authorities include the power to regulate interstate commerce (Article 1, Section 8 primarily), the authority on which most of Congress's regulatory actions are based. The Constitution also includes an "elastic" clause and a "supremacy" clause that further define the ways in which Congress may use its enumerated powers. The elastic clause (again in Article 1, Section 8) says that Congress may enact such laws that are "necessary and proper" for carrying out its enumerated powers and the "supremacy" clause ensures that federal laws which are enacted pursuant to Congress's legitimate powers will prevail if they conflict with the laws of individual states (Article VI). These powers, and the court cases that affirmed them [1], are of central importance to the growth of the federal government in a wide range of policy areas --- including regulation generally and water pollution control in particular. For federal water pollution policies in the US are typically grounded in Congress's powers to regulate commerce and the elastic clause that broadly defines its scope. In addition, Congress's adoption of strong and pre-emptive water pollution control authorities are also based on these constitutional provisions generally, and the "supremacy" clause in particular.

The Constitution also reserves for the states any powers not specifically enumerated for the Congress. Termed the state's "reserved" powers, these authorities are generally interpreted quite broadly to authorize measures states viewed as necessary and appropriate to protect the health and welfare of their populations – the so-called "police powers". These broad authorities have clearly included health and water pollution control, and – for this reason – state governments were the original legal focal points for water pollution control issues. These reserved powers remain important today in water pollution control, particularly as they relate to uses of land that may have impacts on water quality. For the control and regulation of land uses by private entities remains a central element of the states' reserved powers. To date, the Federal government does not have direct and routine regulatory authority over private land use decisions, except as they are related to interstate commerce [2]. Congress and the Federal government have, however, through the course of history, become increasingly involved in many of aspects of water pollution control.

Efforts to address water pollution and its effects date back to the early years of this country's existence, as cities established regulations and ordinances affecting sewage disposal. However, these local arrangements generally proved inadequate, as upstream localities had little incentive to control pollution affecting downstream populations and state nuisance laws proved difficult to enforce in the courts because of the inherent difficulties in tying particular nuisances to particular polluting activities (a problem that remains significant today). However, as these problems became more evident and the connections between water quality and human health became more clear, state governments started to become more active in seeking to address water pollution related issues. For example, during the latter half of the 19th century, states began to establish health boards of various kinds to promote water purification and pollution control (Davies, 1970, p. 121).

Broad national regulation of US waterways applicable to pollution began in 1899 with the passage of the Rivers and Harbor Act (USEPA, 1996) [3], although it did not supplant the primary responsibilities of the states in this area. The refuse provisions of the Act prohibited the dumping of refuse into navigable streams and lakes, and established a permit procedure administered by the Army Corps of Engineers. Overall, however, the Act was oriented toward ensuring adequate navigation on US waters, and fit squarely into the Constitutional authorities of Congress to regulate inter-state commerce. In spite of the 1899 Act, however, the policy action in water pollution control during the first half of the twentieth century remained primarily at the state level. For example, by 1948, all states had taken some form of responsibility for water pollution control, and most of them vested it in their health departments (Davies, 1970, pges.120-122; McElfish, 1999). Nevertheless, while the Rivers and Harbors Act was not specifically intended to protect water quality as were some state efforts during the first half of the 20th century, it was important for subsequent water pollution control legislation because it established a federal presence in the regulation of streams and waterways. Congress clearly intended to use its powers to prevent the obstruction and deterioration of US waters, and the Rivers and Harbors Act provided an early mechanism for pursuing this goal [4].

4.1.2. Water Pollution Control in the Post-World War II Era

Congressional direction in water pollution control policy in the post World War II era has progressed through at least three major stages. These stages have differed from one another with respect to their goals, the federal-state roles they envision, and/or the policy instruments they utilize. And, while the transition from one stage to the next is characterized in each case by significant changes in the mix of policy instruments used, clear and explicit changes in stated goals and federal-state roles occurred only in the transition from the first to the second era. In all three cases, however, these changes have been brought about by Congressional enactments that altered the statutory directions provided to federal administrative agencies and the states. What follows is an overview of these three stages and their defining characteristics.

During the era between 1948 and 1971, Congress initiated the development of significant federal capabilities in water pollution control, and sought to assist, support, and motivate further state water pollution control efforts. Congress's goal during this stage was the establishment of state water pollution programs that were effective in reducing pollution in the nation's waters, and the federal government's primary role was to help state governments build water pollution capabilities and carry out water pollution abatement activities that were widely recognized as state responsibilities. To fulfill this assistance role, Congress authorized a range of supportive policy instruments that were designed to aid states in addressing water pollution issues, and these supportive efforts became more aggressive over time. While initial authorities directing this approach were included in the original Federal Water Pollution Control Act of 1948, these directions were altered and expanded in significant ways in its successor acts in 1956, 1961, 1965, and 1966. Throughout the remainder of this work, this era in the evolution of US water pollution policy is referred to as one of **supportive federalism**, because the primary aim of policies in this era was to support the development and operation of state water pollution programs.

By contrast, the second major era in federal water pollution policy can be referred to as one of **preemptive (or "directive") federalism**, referring to Congress's direct and partial pre-emption of state authorities undertaken during this era. Here, the goal of federal policy was ensuring the cleanup of increasingly polluted US waters, and Congress believed that accomplishing this goal involved both a more active federal role in water pollution control and the authorization of a broader array of far more aggressive federal policy instruments. Congress enacted a series of aggressive and specific goals relating to restoring the cleanliness of US waters, including ensuring that all US waters were fishable and swimmable by 1983 and that all wastewater discharges were *eliminated* by 1985. Congress also expanded the federal role in water pollution control. The federal government was no longer confined to assisting states, but was now also directly regulating private and public sector activities that could result in water pollution. This change in federal role reflected growing Congressional concerns with the adequacy of existing state water pollution programs. These concerns gave rise to a series of new and more directive policy instruments that utilized federal pre-emption as the basis for direct federal regulation of polluting activities, as well a significant expansion of the kinds of supportive policy tools that had been used in the previous era. This era began in 1972 and extended until (about) 1986. Congress re-wrote federal water pollution law almost completely in its Federal Water Pollution Control Act of 1972, and its successor amendments in 1977 and 1981 made changes to the basic statutory approach that was established at that time.

In the mid to late 1980's, we entered a new era in the evolution of US water pollution control policy, one that drew elements from both of the two previous stages. The stated goal here remained largely unchanged from the previous era – to ensure the ongoing integrity of the nation's waters, and statutory provisions relating to federal-state roles remained roughly the same as well. However, the mix of policy instruments authorized during this era reflected an effort to develop a more cost-effective and targeted mix of supportive and directive federal policies. Congress enacted the 1987 Water Quality Act at the beginning of this era, but its statutory directions since that time have come largely in response to policy experiments that were initiated in the executive branch. For this reason, this stage is referred to here as one of **experimental federalism**, because it reflects an ongoing effort to re-think and re-structure the mix of policy instruments used in order to address both financial constraints and perceived changes in water quality problems.

In broad terms, the changes made during the experimental era appear to reflect a continuing sentiment in Congress and among the general public in favor of strong water pollution policies, a concern about water pollution problems that had not been fully addressed during the pre-emptive era, a new-found skepticism of the effectiveness and efficiency of uniform solutions to current water quality concerns, and larger trends toward the "devolution" of domestic policymaking authority to the states. The statutory changes made by Congress in response to these concerns included the 1987 WQA, the Coastal Zone Amendments and Reauthorization Act (CZARA) of 1990, the Government Performance and Results Act (GPRA), and targeted laws focusing on the new National Environmental Policy Partnership (NEPPs) and the new regulations governing the implementation of Total Maximum Daily Loads (TMDL) on polluted waterways.

Table 4-1 - Congressional Direction in Water Pollution Policy, 1948 – Present

Water Policy Era	Congress's Goals	Federal & State Roles	Policy Changes	Major Legislation
Supportive Federalism 1948-1971	Build State Capabilities to Improve Water Quality	*Federal Role: Assist States *State Role: Reduce Water Pollution	*New Supportive Policies providing $'s and Aid to the States	1948 FWPCA 1956 FWPCA 1961 FWPCA 1965 WQA 1966 WRA
Pre-emptive Federalism 1972-1986	Restore the Integrity of the Nation's Waters	*Federal Role: Reduce Water Pollution *State Role: Administer federal programs & address state-specific problems.	*Pre-emptive policies, establishing minimum federal standards and direct federal regulation *Expanded supportive policies, including major grants funding increases.	1972 FWPCA 1977 CWA 1981 Amendments
Experimental Federalism 1987- 2003	Restore the Integrity of the Nation's Water <u>New Goals</u> *Respond to Changing Problems * Reduce Program Costs	*Federal Role: Reduce Water Pollution *State Role: - Address state-specific problems & administer federal programs	*Expanded Pre-emptive policies for "unregulated" pollution sources *Re-structured supportive policies, reduced overall grant funding (except in targeted areas), & increased grant flexibility.	One Major Law: 1987 WQA Targeted Laws: 1990 CZARA 1993 GPRA 1996 NEPPS 2000 TMDL Spending Limits

Table 4-1 above summarizes these major stages in the evolution of Congressional direction in water pollution policy. For each stage, it specifies goals, federal-state roles, major changes in policy instruments, and the major legislation enacted during the era. While the table speaks to the broad nature of Congress's statutory direction in water pollution control, it only overviews the major evolutionary changes made and does not specifically address the policy instruments authorized or the manner in which they have been implemented. The Chapters that follow in Part II address these questions. With this historical context in mind, however, let us now turn to a discussion of the major institutions and actors currently involved in water pollution policy in the US.

4.2. The Politics of Water Pollution: Institutions and Actors

A large number and variety of political actors have roles and interests in US water pollution control policy. These actors include public sector institutions, policy target groups – or the "regulated community" – whose behaviors must be altered if water quality improvements are to be achieved, and environmental groups as well. In addition, some of the public sector institutions involved serve not only as decision-makers, but also as important policy target audiences whose direct actions affect surface water quality. What follows is an overview of these major institutions and actors, along with a discussion of their roles, interests, and general strategic orientations relating to water pollution policy in the US.

4.2.1. Public Sector Institutions

Public sector institutions at all levels of government in the US have roles and interests in water pollution policy. Institutions at the federal level establish water policy goals and strategies, provide monies for pollution control activities, oversee water pollution related activities at lower levels of government, implement water pollution control programs, and resolve legal conflicts relating to water pollution control policy. Public sector institutions at the state level have similar responsibilities for water pollution control, except that their options are circumscribed by federal policies in some areas, and they also receive funds for water pollution activities from the federal government. States also have broader authorities for water pollution control under the Constitution than the federal government because their authorities are not limited to practices that affect commerce. Local governments manage water pollution related problems directly through their wastewater management and land use control responsibilities, and they operate within the context of parameters established by policymakers at the federal and state levels. The following discussion focuses specifically on institutions at each of the three levels of government that have responsibilities and/or interests in water pollution control.

At the federal level, responsibilities for water pollution control are broadly distributed and fragmented in both the Congress and the executive branch. The fragmentation in the two branches tends to mirror one another, as executive agencies often grow in ways that are consistent with Congressional committee jurisdictions and these committee jurisdictions, in turn, tend to reflect executive branch organization.

In Congress, water pollution authorities are split between the House and Senate, and split further among committees and subcommittees within each chamber. In the House of Representatives, the Infrastructure and Transportation Committee has jurisdiction over most substantive issues pertaining to water pollution control. However, it is not the sole source of Congressional involvement and attention in this area. The Agriculture and Natural Resources Committees also play important roles in dealing with water pollution issues affecting farmers and federally owned lands. In addition, the Appropriations Committee establishes water pollution control program budgets, and it is further fragmented through subcommittee jurisdictions that roughly mirror the fragmentation that is evident among the House authorizing committees. The HUD and Independent Agencies Appropriations Subcommittee deals with EPA's budget, Clean Water Act expenditures, and funding for housing and urban development programs that may fund wastewater infrastructure. The Agriculture and Natural Resources Appropriations subcommittees deal with budget issues pertaining to water pollution related activities of the Departments of Agriculture and Interior. This fragmented structure is (somewhat) similarly constructed in the Senate, where the relevant authorizing Committees are the Environment and Public Works Committee, the Agriculture Committee, and the Natural Resources Committee. The Senate Appropriations Committee also splits its subcommittee jurisdictions along the same lines as those used in the House of Representatives.

The end result of this Congressional organization is a highly fragmented system of Congressional authorities, particularly for issues associated with non-point source pollution control that affect agriculture and federally owned natural resources. It is through these fragmented committee jurisdictions that federal water pollution laws are established, and the laws themselves reflect the pulls and tugs of these differing institutional actors and the clientele groups to whom they respond. Congressional intent, in this context, is best viewed as the statutory outcome of a legislative process that involves multiple actors and interests in both Chambers of Congress, rather than some kind of artificial estimate of the preferences of any single committee or actor in the process.

The fragmentation in Congress is mirrored by fragmented responsibilities in the executive branch. The U.S. EPA's Office of Water is the executive branch focal point for water pollution control issues in the United States. It includes offices dealing with a range of water pollution control issues, including point and non-point source pollution. Its roles include interpreting statutes and establishing water pollution control regulations, disseminating funds to states for water pollution control programs and activities, overseeing these activities, and issuing guidance documents that make recommendations regarding water pollution control activities.

However, while EPA's Office of Water is broadly responsible for federal water pollution policy, a number of other federal agencies also have substantial roles and involvement in water pollution control because of their ties to particular clientele groups and/or their role in managing federally owned lands. The Department of Agriculture's water pollution control related activities include financing wastewater infrastructure through grants and loans, as well as providing funding and technical assistance to farmers for water pollution control related activities. It also manages the National Forest Service, and therefore deals with water pollution related issues in that context as well. The Department of Interior also has a number of responsibilities that intersect with water pollution control, including its management of the National Park Service, the Bureau of Land Management, the Fish and Wildlife Service, and the Office of Surface Mining. In the Department of Commerce, the National Oceanographic and Atmospheric Administration (NOAA) manages programs and activities associated with coastal pollution, including a coastal non-point source pollution program established in 1990. And the Department of Housing and Urban Development (HUD) also plays a role in water pollution control insofar as funds from the Community Development Block Grant program it operates are used to finance wastewater treatment facilities and infrastructure in cities around the country. And finally, budgets and rulemakings in all these agencies are subject to review by the Office of Management and Budget (OMB), and any other review bodies established in the White House. Thus, while EPA is at the center of federal water pollution control in the United States, its ability to achieve its goals in this regard may be contingent on its interactions with other executive branch agencies, depending on the specific issue involved.

Finally, no overview of federal level institutions involved in water pollution control policy is complete without mention of the courts. For, the courts play central roles in resolving specific conflicts over both constitutional authorities and statutory interpretation. On the constitutional level, conflicts over the proper spheres of federal and state powers under the constitution are brought to the courts, as are expressed concerns over the limits of Congress's ability to delegate powers to federal agencies like EPA. More common, however, are differences of opinion over the meaning of statutory language and the adequacy of EPA and State administration of federal environmental mandates. These differences of opinion are frequently played out in federal court because provisions governing federal rulemaking generally, and the Federal Water Pollution Control Act (FWPCA) in particular, provide relatively wide access to groups and individuals who have concerns over federal water pollution control policy. The Administrative Procedures Act, for example, ensures that groups and interests have opportunities to provide input into the federal water pollution policymaking process, while the citizen suit provisions in the Clean Water Act itself (Section 505) enable private citizens and their representatives to seek redress in the federal courts in cases where EPA and/or the states have not fully implemented the Act. For these reasons, environmental policy generally – and water pollution policy in particular – is frequently characterized as litigious and conflict ridden (Vogel, 1986). In specific instances of statutory interpretation, the courts determine finally what the law is in its particular applications – unless of course

Congress steps to clarify its own intentions. Executive branch officials are well aware of these checks in the political system, and they may structure their behavior accordingly.

The picture that emerges from the above description of federal policymaking institutions in water pollution control is one of a wide range of institutional actors, with varying interests that are driven by their institutional responsibilities, jurisdictions, and the differing clientele groups to whom they respond. However, there is a common thread in this system, and that is federal law pertaining to water pollution control. In Congress, multi-faceted sets of committees and interests come together – with the cooperation of the President, in some cases – to establish laws and budgets that govern federal water pollution control activities. Federal Agencies are supposed to operate along the outlines of the laws that are established. Water pollution law thus provides a common set of understandings and a means to resolve disputes among the institutions charged with managing water quality at the federal level. Where conflicts arise over the exact meaning of the law, the federal courts and/or Congress itself can step in to clarify it. To a large degree, however, these laws and budgets affect not only federal agencies, but state and local governments as well. They are frequently required to respond to the basic outlines of federal law, apply it in differing circumstances, and integrate it with existing laws and policy practices at the state and local levels.

In many respects, state governments are the linchpins of US water pollution policy. State water pollution control policy is both broader in scope and older in age than current federal policies. As was mentioned previously, under the Constitution, states are reserved general powers to further the public welfare, and their efforts have historically spanned all aspects of water policy – drinking water, groundwater, water quantity, and control of surface water pollution emanating from point and non-point sources. States also have broad and long-standing authorities relating to the uses and regulation of privately owned lands. Consequently, their authorities in these areas are significantly broader than the authorities of the federal government. Partially as a result, many federal water pollution policies could not be implemented without the states, and many local water pollution related activities would not exist without the state laws that authorize them. Thus, state laws typically define major obligations relating to water pollution control, and they often serve as the vehicle through which federal policies are specifically defined and implemented. States therefore have a central place in the overall US water pollution control system, and are – in many cases – the part of the system that integrates and establishes actual policy. Consequently, an understanding of water pollution control policy in the US requires not only a review of federal water pollution control laws and institutions, but also an understanding of the variable ways in which states deal with water pollution issues within their jurisdictions.

Broadly speaking, state government institutions that deal with water pollution control are somewhat similar to the arrangements for water pollution control policy at the federal level – they include legislative bodies, executive branch agencies, and the courts. State legislatures establish laws and programs in a number of water policy arenas, and state executive agencies implement an array of water pollution policies. Where conflicts arise relating to state water pollution laws, systems of state courts can play important roles in resolving them. In addition, State Legislatures, like Congress – although perhaps generally to a lesser extent, have fragmented structures that govern state lawmaking relating to water pollution. In addition, while state agencies vary substantially in structure and focus, agencies with environmental, natural resource, and/or health related responsibilities do implement federal and state water pollution policies. And as is the case with the federal government, most (if not all) states have a range of other executive branch agencies that have interests in water pollution control. At the state level, these agencies include (but are not limited to) Agriculture Departments, Land and Zoning Commissions, and health agencies to name just several forms these additional state agencies may take. Consequently, as state agencies administer water pollution related policies, they must deal with fragmented responsibilities at the state level, as well as interactions with their federal counterparts at EPA, and with local governments that may serve as regulated entities and/or co-regulators depending on the context and circumstances.

Institutional arrangements for water pollution control at the state level do, however, differ significantly from similar arrangements at the federal level and from each other in a number of important respects. They differ from the federal government in that they must respond to laws and institutions that lie above them in the political system, and in their dependence of inter-governmental revenues. Overall, about thirty-one percent of state expenditures on water pollution control are provided by the federal government (ASIWPCA, 2001C and 2002), but this percentage varies among the states (ECOS, 2001B). In general, however, the proportion of state water pollution expenditures provided by the federal government has been decreasing over the last fifteen or twenty years (Brown, 2001; ASIWPCA, 2001 and 2002; ECOS, 2001B). In addition, state legislatures vary in the extent to which they benefit from professional legislative staff and expertise. The distribution of environmental responsibilities across differing kinds of state agencies also differs among state governments and between many state governments and the federal government. While some states share the federal government's division between a pollution control agency (an EPA) and a conservation agency (Department of Interior), other states possess umbrella natural resource agencies with both pollution control and conservation related responsibilities. Still other states continue to rely on older Health Agencies to administer their pollution control programs and activities. All of these institutional differences are potentially important to state water pollution control policies, and they effectively constrain the manner and forms in which states address water pollution issues within their jurisdictions.

Like state level institutions with responsibilities in water pollution control, local government responsibilities for water pollution control vary tremendously among the states – and even within them. Basic water pollution control related functions are performed by different kinds of local governments in different states. While most states have counties or parishes with relatively broad jurisdictions, they also house an array of municipal governments such as cities, villages, and towns, as well as a large number of special purpose governments. Broadly speaking, local governments have four sets of responsibilities that are particularly important in the overall US surface water pollution control system. They manage and operate local wastewater collection and treatment systems, regulate land uses through systems of zoning and building permits, participate in long term planning for both water basins and economic development, and they regulate commercial users of local wastewater collection treatment services through industrial pretreatment programs. The distribution of responsibilities for these four major functions among specific types of local governments varies across the states, and – in some cases – some of these functions are carried out at the state level. Nevertheless, all four of the above mentioned functions are of critical importance to the long run success water pollution control policy in this country, and local governments are intimately involved in them in some fashion in most states.

It is important in this context to emphasize the roles of special purpose governments in water pollution control, because they often play important roles in carrying out some of the four major sets of local water pollution related responsibilities noted above. For example, sanitary districts may operate local wastewater collection and treatment services, regional planning commissions may take responsibility for water basin and/or economic development planning, and zoning commissions of various kinds may be responsible for land use regulation. In all of these cases, important decision-making processes relating to water pollution and its impacts may be made by semi-independent bodies that are ultimately accountable to state and/or local governments, but somewhat independent of them on a day to day basis.

All of these local governments – whether they are general or special purpose bodies – tend to have agendas of their own that are only tangentially related to improving ambient water quality. Wastewater treatment plant operators worry about collection system leaks, service fees, and local acceptance, regional planners worry as much or more about economic development as they do water quality, and zoning and building authorities tend to worry more about smooth operations and friendly business relations than they do water quality impacts. Consequently, in all of these cases, local governments tend to value and protect their own autonomy and resist efforts by federal and state governments to interfere with their broader agendas as a result of what they may perceive to narrow water quality based concerns.

As American water pollution control policy enters the 21st century, institutional actors at the local level are beginning to look as much like target audiences for federal and state water pollution policies as they are authoritative governmental bodies. They are, increasingly, the political actors whose behavior must be influenced if future efforts to reduce surface water pollution are to be successful. As local governments join the ranks of those with substantial interests in water pollution control policy at the federal and state levels, they join the traditional business and environmental interests that have played continuing roles in American water pollution policy to date. While business and environmental groups are not homogenous in their water pollution control interests, specific interests in each category do share at least some broad interests that accord relatively well to the water uses outlined in Chapter 3. These broad similarities in interests are highlighted below, as are some important divergences of interests within target audiences and the environmental community.

4.2.2. Water Pollution Policy Target Audiences: "The Regulated Community"

In most situations, public policies are targeted toward specific audiences, and are designed to change or circumscribe behavior in some fashion. This is true of water pollution control policy, as it is of other policy areas. While it has been customary to use the term "regulated community" in water pollution control because people have viewed policy in this area as regulatory, the term target audiences is more accurate because a number of the target audiences for current water pollution policies are not subject to significant regulatory controls. Target audiences for federal and state water policies include a wide range of audiences that can generally be grouped according to whether their behavior(s) are subject to regulatory point source pollution controls or non-point source controls that may be either regulatory or non-regulatory. Nevertheless, in spite of an increasing emphasis on non-regulatory policies, target audiences for water pollution policies do share broadly similar economic interests in water pollution control policy. These economic interests relate to both the costs of minimizing the water polluting effects of their activities and their need to have waters of some minimum quality to use as needed for their purposes. Broadly speaking, the specific interests they tend to pursue are minimization of direct regulatory controls, and the establishment and continuation of subsidies that help them deal with the polluting effects of their activities. The strategies they use in pursuing these interests include lobbying legislative and executive branch officials, and pursuing their interests in courts.

Individuals and organizations that are subject to regulatory *point source* controls include both commercial enterprises and local governments. As was noted earlier, organizations subject to regulatory point source controls are those that discharge wastewater to surface waters through discrete conveyances, or pipes. Under the FWPCA, these organizations are required to obtain National Pollutant Discharge Elimination System (NPDES) permits. In the United States, thousands of organizations currently meet this definition, and a significant proportion of them are private sector enterprises. All of these enterprises have substantial interests in water pollution control policy because NPDES permits generally require the regulated entities to expend resources to ensure that they are in compliance with the requirements imposed. These resource expenditures may involve monitoring and reporting on the quality of their wastewater discharge effluents, building treatment facilities, training their personnel to comply with regulatory requirements, defending themselves against enforcement actions, and/or a range of other possible costs.

The specific types commercial entities subject to NPDES permit regulations vary tremendously. They include heavy manufacturing companies such as metal refiners, petroleum producers, or pulp and paper mills. They may also include "softer" commercial enterprises such as retail establishments, construction companies, and educational institutions. The mix of these particular commercial interests varies geographically depending on industry composition. Pulp and paper companies are common in the upper Midwest, petroleum companies are common in Texas, and metal refineries are common in the "rust belt" states in the Midwest and the Mid-Atlantic. However, all states and regions in the country include commercial enterprises with economic interests, so there is some level of common concern over the cost of water pollution regulation nationwide. Specific interests, however, do vary significantly because regulatory requirements tend to vary across industry types and local water quality conditions. Technology based requirements are developed on an industry by industry basis, and controls imposed on point source dischargers may also vary depending on the condition of the receiving waters for the discharge.

Local government units that manage domestic wastewater collection and treatment systems must also obtain NPDES permits, and are therefore subject to point source pollution controls. As mentioned above, local governments in this country frequently have responsibility for collecting sewage from local residences and businesses, treating it, and discharging it to nearby waters. Larger local governments that manage wastewaters from large commercial enterprises are frequently required not only to treat and monitor their effluent, but also to operate pre-treatment programs for commercial enterprises that use their wastewater systems in order to ensure that pollutants discharged to their sewage system do not cause problems in its operations. All of these activities cost money and require human resources. Consequently, local governments have a significant financial stake in water pollution control policy. However, for local governments, this financial stake involves not only compliance costs associated with their effluent discharges, but also their interest in various subsidies that federal and state governments make available to reduce the cost of municipal sewage treatment plant construction and – to a much lesser degree – training and education for the operators of the treatment plants they construct.

Local governments and commercial enterprises also have interests in water pollution policies related to non-point source water pollution control. However, the entities and activities targeted by these policies, and the nature of the policies themselves differ from point source policies. For local governments, non-point source water pollution concerns may involve different local government organizations than point source water pollution concerns. Non-point source water pollution concerns may also focus on differing local government activities such as land use policies enacted by zoning commissions, or failing onsite wastewater systems that are not managed by the entities managing centralized sewage systems. Because local governments frequently have influence over development activities within their jurisdictions, federal and/or state water pollution policies may be oriented toward encouraging or requiring local governments to manage local land uses in ways that minimize water quality concerns. This costs local governments money directly, and potentially indirectly as well, if the policies established serve as a disincentive to attracting industry and business to their areas. In these cases, local government interests may revolve around minimizing costs both to themselves and to businesses that they are trying to attract or retain in their local areas.

Commercial interests such as farmers, foresters, and ranchers also have strong interests in non-point source water pollution control policies. For, entities involved in these kinds of activities may benefit from subsidies or incentives designed to bring about water quality friendly practices such as the establishment of buffer zones, cattle fences, crop rotation, or other water quality enhancing practices. At the same time, they may also have substantial interests in ensuring adequate supplies of quality freshwater for their animals and crops. And finally, in some instances they may be required to expend resources to comply with any regulatory requirements imposed. However, non-point source water polluters are not – for the most part – subject to ongoing federal regulatory controls. Consequently, the costs imposed on farmers, ranchers, and foresters, at least by federal water pollution policies, are not generally as great as the costs imposed on point source polluters.

However, this regulatory exemption for non-point sources is now being challenged in a number of ways. As was noted in the previous chapter, non-point sources account for a higher proportion of impaired waters than point sources, and point source controls imposed over the last thirty years have led to substantial reductions in point source pollutant loadings. As this has occurred, increasing attention is being paid to non-point source pollution loadings. One important example of this recent attention is the Total Maximum Daily Load (TMDL) regulations proposed by EPA in the summer of 2000, following a series of court cases in the 1990's that required EPA to play a stronger role in implementing Section 303 of the FWPCA relating to TMDLs. In effect, these regulations, and the court cases that preceded them, sought to place greater pressure on state governments to identify impaired waters and develop strategies for enabling them to meet water quality standards. And, in many cases, these strategies would require stronger non-point source pollution controls to be successful. The end result here, of course, is the potential for substantially increased compliance costs for non point sources, as states are required to impose further requirements on them in more focused efforts to improve water quality in the water bodies identified through the TMDL process. What is more, the TMDL process also holds the potential bring point and non-point source dischargers into greater conflict as they vie for authority to utilize limited absorption capacities of the waters to which they both discharge.

In effect, the TMDL regulations and court cases have served as lightning rods for issues associated with the regulation of non-point source water pollution, as EPA comes to terms with its limited land use authorities and Congress is required to steer a course between its desire for strong water pollution control and its desire to protect agriculture and other non-point source polluting interests from the potentially significant costs of regulatory water pollution controls. After EPA issued the new TMDL regulations, a number of groups – including the Farm Bureau Federation – sued EPA charging that it did not have sufficient authority to issue the regulations. Shortly thereafter, Congress included a rider in the FY 2001 appropriations bill prohibiting EPA from expending funds to implement the new regulations. In July 2001, the new EPA Administrator, Ms. Christine Whitman, announced that EPA was withdrawing the previously issued TMDL regulations, and would re-evaluate them in the following months. At this writing, this process is still ongoing.

While it is not clear as yet how this issue will be resolved, it is increasingly clear that further improvements in water quality nationwide will require changes in land use practices relating to non-point source pollution. What is less clear is the optimal way for the federal government and the states to address the issue. The current approach, which is discussed in greater detail in the chapters that follow, relies on federal monies and state initiative. If the TMDL regulations advanced by the Clinton administration, or something close to them, are eventually adopted, more invasive federal regulation may also become a part of the solution. Non-point source water polluting interests such as agriculture, foresters, and ranchers are likely to oppose this latter approach in effort to avoid the potential compliance costs associated with it. Point source dischargers, on the other hand, are likely to oppose TMDL regulatory approaches that result in their absorbing the full cost of cleaning up impaired waters --- particularly in cases where non-point sources are responsible for the problems being addressed. Thus, while audiences that are targeted by water pollution policies share common economic concerns, their interests in particular policy solutions are far from identical.

4.2.3. Environmental Groups

In general, environmental groups are interested in the first three uses of surface waters outlined in Chapter 3 – those relating to ensuring clean water for human consumption, swimming and recreation, and ecosystem health. Their concerns do not typically extend to economic impacts, or the needs and desires of the regulated community. Their focus is predominantly on water quality uses and values that are not well protected through the economic system operating on its own. Despite this broad commonality, however, it is appropriate to point out that environmental groups differ somewhat in their goals and tactics.

Broadly speaking, environmental groups with water quality concerns in the United States can be understood from the viewpoint of a fivefold categorization. The first, and probably most extreme, category is comprised of groups that believe ecosystems and their health should the primary value. Holding "deep ecology" values that place flora and fauna on an equal plane of value with human beings, these groups tend to place the health of plants, animals, and ecosystems at the center of their political agenda. Human beings, in this context, are animals that happen to co-habit the planet with other life forms. Partially as a result of these views, these groups tend to use tactics that disrupt civilization and human activity. While there a number of groups comprising this category, the most well known in the popular press is probably Greenpeace.

A second category of environmental group is comprised of advocacy groups such as the Natural Resources Defense Fund (NRDC), the Environmental Defense Fund (EDF), and the Sierra Club. Like the deep ecology groups, these groups value ecosystems for their own sake, but they also place significant value and importance on human needs and activities. They are therefore also quite concerned about having clean water for human beings to drink, and about ensuring the availability of waters for environmentally friendly recreation. Many of these groups came into being in the 1960's and 1970's and have, over time, become institutionalized parts of the political system. While they differ in their fundraising approaches and organizational styles (some, for example, like the Sierra Club are membership organizations, while others are not), they share an inclination to operate within the broad confines of the existing political system – although they may do so quite aggressively. They tend, for example, to lobby Congress and the executive branch agencies regularly. And they also frequently take their concerns to court, where they sue both polluters and federal agencies in an effort to ensure the continuing effectiveness of environmental and water pollution laws. The major court cases that resulted in the Clinton administration seeking to revise the TMDL program noted above, for example, resulted largely by suits brought by environmental groups in this category.

A third category of environmental group is somewhat similar to the second group and consists of conservation groups, many of whom had their origins in the conservation movement in the early part of the 20th century. While these groups often have broad water quality and environmental concerns, many of their supporters are drawn from recreationally oriented groups such as hunters, fishermen, and hikers. Like the environmental groups in the second category, these groups participate actively in the political system, and they may be more likely to lobby than to sue in court to pursue their interests. They also often have well developed educational and service programs for their members and/or clients. Examples of this type of group include the National Wildlife Federation and the Izaak Walton League.

A fourth category of environmental group is comprised largely of research oriented groups, whose agenda focuses more on producing knowledge and disseminating it than on actively lobbying for particular policies. This category of environmental group includes groups like Resources for the Future and the Environmental Law Institute. While they tend to be advocates for the environment and water quality, their primary interests are research and education rather than advocacy, lobbying and litigation.

A final category of environmental groups relates to those seeking "environmental justice". Broadly speaking, environmental justice groups have tended to focus on the demographics of pollution, and the clear tendency of society generally and government agencies in particular to allow or enable higher concentrations of pollution in areas containing populations of minority groups of various kinds – black citizens, tribal groups, and Hispanics to name just a few. The groups concerned about these issues are varied, and include civil rights groups, church based groups, and some groups with close ties to deep ecology perspectives such as those held by Greenpeace or Earth First. While these groups are not specifically focused on water pollution, they do and can have concerns in this area and they may be influential in some cases such as those in which water pollution problems are focused in poor and/or urban areas.

While the discussion above focuses primarily on environmental groups at the federal level, parallel groups are present and active in many states. While this was probably not true thirty years ago, recent analyses do suggest that environmental groups have become more active in recent years at the state level (Gray & Lowry, 1996). Even with this change, however, environmental groups themselves tend to favor strong regulation at the federal level for a variety of reasons. In broad terms, these reasons include the cost efficiency of fighting one set of battles in Washington DC rather than many battles in state capitals, and the historical strength and generally open access that environmental groups often enjoy in Washington D.C.

4.3. Conclusion

Over the last fifty-five years, our country has instituted major changes in water pollution policies, and these changes have had the effect of creating numerous access points for water pollution policy influence at the federal, state, and local levels. As a result, it should also be clear that there are now numerous forums in which water pollution related issues are debated, discussed, and sometimes resolved. While the battle lines are drawn broadly between commercial and environmental interests, these broad categories of interests are not monoliths. Commercial groups have interests that differ from one another, depending on the issue and context. And environmental groups too have differing areas of focus, as well as differing strategies and approaches. It is in the context of this wide array of interests and multiple forums that water pollution policy issues are considered.

The manner in which our political system seeks to address water pollution problems – it appears – is just as complex as the problems themselves. It involves multiple institutions and decision-makers at all three levels of government, as well as the multiple and varying economic and environmental interests described above. Readers and analysts should recognize this complexity as they evaluate Congressional direction, federal policies, and state policymaking in this policy area. The analyses in this work seek to extract key components of this complexity in an effort to assess the responsiveness of our nation's water pollution policies to both Congressional direction and varying state level interests. Hopefully, readers will maintain a productive awareness of this complexity as they absorb and evaluate the analyses presented.

5. THE DESIGN OF THIS RESEARCH

In any social scientific study, it is appropriate to identify the specific hypotheses to be investigated and the approaches, methods, and data to be used. This chapter identifies specific hypotheses to be evaluated in this work and provides a road map outlining the evidence to be used in assessing their validity. The chapter is divided into two major sections. The first section outlines the three major hypotheses to be evaluated, and provides a brief overview of the theoretical rationale underlying them. This section also outlines the two major research approaches used in this work – one historical and the other contemporary and cross-sectional. The second major section then overviews the methods and data used in conducting both of these kinds of analyses. It includes a specific description of the underlying questions and processes used in conducting the historical analyses, and also overviews the cross-sectional approach used to analyze contemporary state non-point and point source water pollution policies.

5.1. Hypotheses

This research evaluates three hypotheses, each of which is derived in some manner from the theoretical literature associated with "institutionalism". This field of literature suggests – among other things – that administrative behaviors and policy outputs are influenced by the institutional arrangements that produce them. More specifically, this literature suggests that institutional structures (Weber, 1922), symbolic cultural patterns (Berger & Luckman, 1967), and other forms of routine behaviors (March & Olsen, 1984; Peters, 1999) affect administrative decision-making and policy outputs in systematic ways.

The point that is at issue in this work is the extent and manner in which Congress creates institutional practices through statutory construction, and then the extent to which these institutional practices maintain force as they influence policymaking behaviors at the federal and state levels during the implementation process (Peters, 1999). Thus, in the context of Congressional control of administrative decision-making, the hypotheses evaluated in this study suggest that the issue of Congressional control is as much a matter of creating and maintaining institutions as it is of "principal-agent" relationships that continually assume clear and conscious preferences on the part of Congress and administrative decision-makers. The three hypotheses evaluated assess water pollution policymaking responses to "structural" directions provided by Congress in statute (McCubbins, 1985), and state responsiveness to varying state level conditions and influences during the implementation process.

The water pollution case is an appropriate one for study for (at least) four reasons. First, water pollution policy in the United States is typical of US domestic regulatory policy in its reliance on federal and state partnerships. In this respect, it reflects a reasonably typical case of US domestic social regulatory policy. Second, water pollution policy has been cited by scholars arguing that politicians control bureaucracy (Wood and Waterman, 1994) and those concerned about runaway bureaucracy (Lowi, 1979), and it therefore represents an arguably neutral case for study. Third, water pollution is quite important in its own right (as water is essential for life), and current federal water pollution policies are now long overdue for full scale review and refinement. And finally, Congress's statutory directions in water pollution policy are bifurcated between highly directive and supportive policy designs, so they enable comparisons across differing forms of Congressional intervention in state policymaking processes. My hope is that the analyses undertaken in this work can also inform the inevitable debates over water pollution policies in the twenty-first century.

With these thoughts in mind, let us now turn to a description of the specific hypotheses to be evaluated. They are as follows:

H 1: Substantive statutory direction from Congress structures the extent and nature of federal involvement in surface water pollution control policymaking and implementation.

H 2: The extent and nature of federal policy direction affects state surface water pollution policy outputs.

H 3: State surface water policy outputs are more likely to be responsive to broad based state level influences when federal involvement is minimal than when it is extensive.

In general, the first and second hypotheses seek to assess the extent to which federal water pollution policies respond to structural directions provided by Congress (McCubbins, 1985), as well as the extent to which federal involvement affects state level policymaking and implementation. If the findings of this work support these two hypotheses, it will suggest that federal and state water pollution policies do respond to Congress's statutory directions, thus providing at least some assurance that states construct water pollution policies in ways that respect fundamental national concerns that are enshrined by Congress in federal statutes. This finding, in and of itself, will add to the literature on Congressional control of administrative decision-making by demonstrating that ex ante statutory controls extend to state, as well as federal, level decision-making.

The third hypothesis seeks to ascertain the relationship between different *forms of federal involvement* in state water pollution policymaking and the responsiveness of those policies to broad-based state level concerns. Critics of extensive federal involvement in state policymaking and implementation suggest that federal involvement absorbs valuable resources and reduces the ability of states to respond effectively to state level concerns (NAPA, 1997, p. 147). However, Lowry (1992) reaches a different conclusion because he suggests that federal involvement can create conditions that facilitate a matching between state needs and policies. The evaluation of this hypothesis conducted here addresses this question again and more specifically, using updated policy output measures that appear to be targeted more finely than the measures used by Lowry.

In assessing the third hypothesis, it is important to recognize that responsiveness to "broad based state level influences" suggests that state policymaking institutions and practices are operating roughly as designed in our federal system, although the influences themselves can be measured in different ways. As was noted earlier in Chapter 2, theories of responsive state policymaking suggest that state policy outputs vary according to the severity of the problem being addressed, public opinion regarding that problem, cultural practices in the state relating to government action, and/or the policy preferences of dominant political parties – the latter being a process consistent with the basic tenets of responsible party governance (Schattschneider, 1960). My evaluation of this third hypothesis is designed to help determine whether the mix of state level influences on water pollution policy outputs reflects responsiveness to these broad-based concerns or, alternatively, capture by relatively narrow interests. If state variation is explained largely by the former influences, it would lend support for devolutionary policies at the federal level because it would suggest that less directive federal policies enable state political processes to operate in ways that take account of the needs and concerns of polities within which they operate. On the other hand, if state water pollution policies appear to be heavily affected by narrow economic interests, it would suggest a clear need for caution regarding future devolutionary efforts. In between these two rather extreme sets of results lie a range of potential findings that require more nuanced interpretations regarding their implications for water pollution policy devolution.

5.2. Methods and Data

The basic approach taken in evaluating these hypotheses is comparative, although the comparisons conducted are supplemented by statistical data and analyses, and were informed by a number of discussions with water pollution policy professionals at the state and federal levels. Comparisons are undertaken on three levels. First, Congressional directions are compared with federal and state policy outputs to determine the extent to which the latter are consistent with former. Second, state policy outputs are compared with one another to determine the nature and extent of their variation. And third, comparisons are made among state non-point and point source water pollution policy outputs to determine if there are systematic differences in the variations among them, and whether they appear to be traceable to the varying statutory directions that are provided by Congress. The two latter comparisons, in turn, also provide a foundation for statistical analyses that shed light on the likely causal factors contributing to observed variations in state non-point and point source water policy outputs.

These broad comparative analytical approaches are implemented through two methodological strategies that are used to conduct three separate analyses. The first methodological strategy is meta-analytical and historical in nature. This analysis evaluates the first and second hypotheses by comparing major statutory directions provided by Congress between 1948 and 2003 with the major federal and state policy outputs produced during that fifty-five year period. The analyses conducted here are based on the extensive literature that exists on water pollution policy at the federal and state levels.

A second methodological approach is applied to contemporary non-point and point source water pollution policies, and is used to guide two separate analyses of policies in these areas. Viewed in combination, these two analyses provide a foundation for further assessment of the second hypothesis, and an evaluation of the third hypothesis as well. In both cases, these analyses involve defining current statutory directions provided by Congress (for non-point and point source water pollution policies, respectively), and then comparing policy outputs both among state water pollution programs and in relation to their overall fidelity to these directions. These state water pollution policy output measures, in turn, provide a foundation for regression analyses that seek to ascertain the comparative strength of differing explanatory causes of state non point and point source water pollution policy outputs. The discussions that follow overview the three analyses conducted, focusing specific attention on both the methods used and the data used in implementing them. Additional and – in some cases – more detailed information relating to the methods and data used in these analyses can be found in the chapters that present them, as well as in the Appendices to this work.

5.2.1. Historical Analyses

The basic approach taken in the historical analyses is meta-analytical, as it relies on existing literature to produce the information to be analyzed. This literature includes over twenty professional works outlining various aspects of the development of US water pollution control policy during the post World War II period [1]. These professional works are then supplemented by information and data gathered from a number of different EPA documents, Congressional Research Service Publications, and from Congressional Quarterly Almanacs for the years between 1948 and 2003.

After reviewing the literature, I produced a list of twenty-five major historical changes in Congress's statutory directions relating to water pollution control policy. These twenty-five major policy changes were selected on the basis of their focus on core surface water related portions of the Federal Water Pollution Control Act (FWPCA) that are administered by federal agencies and the states, their overall significance, and the availability of information on their enactment and implementation. While these major changes do not represent a comprehensive inventory of all major changes in federal water pollution policy during the post World War II period, they do constitute most of the largest and most important elements of Congress's statutory directions in water pollution policy [2].

To enable the process of explanation and presentation, I then divide the major policy changes identified according to the historical eras in which they were made. I also differentiate between federal policy changes that reflect supportive approaches to federal intervention and those that are highly directive (or pre-emptive) in nature. The idea here is to determine whether there are any major and identifiable differences among the historical eras analyzed or between the two major categories of federal intervention being addressed. For each of the major policy changes identified, I then provide a review of the literature in search of information and insights that would address the following questions:

1. Was the policy change implemented by the federal government in ways that are substantively consistent with its statutory authorization?

2. Was the policy change implemented by a significant number of states in ways that were substantively consistent with Congress's statutory directions?

3. Were there major difficulties or delays in policy implementation, or was the policy not implemented at all?

4. In cases where difficulties in policy implementation were uncovered, what were the likely causes of the difficulties?

In addressing these questions, I rely on the substantive evidence available in the literature, rather than highly technical information relating to the specific statutory provisions being implemented. For example, if the literature points out that a federal agency implemented the policy changes that Congress directed within a reasonable amount of time given the complexity of the action being analyzed, I conclude that the action was indeed implemented. Likewise, if the literature suggests that most states had implemented a particular policy, I accept this conclusion without undertaking the nearly impossible task of trying to determine the adequacy and timeliness of each particular state's policy response. And, where the literature makes it clear that a particular policy change had not been implemented, I rely on existing literature to provide the information necessary to identify the likely major reason(s) for the implementation failure.

This may sound like a process that requires subjective judgments – and to some extent it is, but it enables an incredibly broad analysis spanning three major eras of federal water pollution control policy, twenty-seven Congresses, fourteen presidential administrations, and fifty-five years. And, to a large degree, the judgments made are more clear-cut than might have been expected at the outset. In those few cases where I identified differences of perspective on the implementation of specific policy changes among the works cited, I mention this in the text or in an accompanying footnote. In the end, the results of the analysis provide a good summary of the rather clear convergence between Congressionally enacted statutory directives and federal and state policy outputs between 1948 and 2003. While the decision criteria used in the analysis are clearly lenient in technical terms, they are sufficient and appropriate for assessing whether federal and state bureaucracies actually produce policy outputs that are consistent with Congress's expressed policy directions. In other words, the approach used here seems quite appropriate for determining whether administrative decision-making is "running away" from Congressional policy direction.

5.2.2. Analyses of Contemporary Programs

While the historical analyses conducted in this work are sufficient for determining whether states *generally* respond to Congress's substantive directions, they do not illuminate or explain the variable nature of state responses. In addition, they do not distinguish the extent of variability in state responses occurring under different forms of federal intervention. Thus, while the historical analyses conducted in this work can help us determine whether or not federal and state administrative agencies have been "running away" from Congressional direction as some have alleged, they are not detailed enough to reveal the actual extent of Congressional control. What is more, the lenient criteria used for assessing state responses in these historical analyses do not provide sufficient information for developing estimates of the relative strength of various state level factors in producing particular state water pollution policies.

For all of these reasons, a more detailed cross-sectional approach is used to assess contemporary non point and point source water pollution policies. In broad terms, this approach includes three steps. The first step is to ascertain Congress's expressed desires in statute. The second step is to develop and analyze measures reflecting the fidelity of state policy outputs to those expressed intentions. And the third step involves developing regression models that test the strength of varying theoretical explanations for state policy variations identified in state non- point and point source water pollution policy outputs. Through these steps, the analysis generates additional evidence that can be used in the evaluating the second and third hypotheses outlined above – those relating to Congress's influence on state policy outputs and the relative strength of broad-based state level influences on policy outputs under varying forms of Congressionally sanctioned federal intervention.

In the case of the FWPCA, ascertaining Congress's expressed statutory desires is a relatively easy process and involves little more than a review of the statute itself. The FWPCA is quite clear in its goals and objectives, and a simple review of the statute makes it clear that Congress sought to *eliminate* discharges of wastewater to the waters of the United States and to ensure that the nation's waters are *fishable and swimmable*. The statute is also relatively clear regarding its applicability to both non-point sources and point sources, although its creation of two different statutory mechanisms for dealing with these two categories of water pollution problems takes some study to discern. At bottom, though, when one combines the ambitious goals of the statute with the two different sets of policy instruments and target audiences (that the Act outlines for the federal non-point and point source water pollution programs), it becomes clear that Congress's expressed statutory desires were to encourage the most active state non- point source water pollution programs possible and the most restrictive controls achievable for point source wastewater discharges. A more detailed outline of the reasoning underlying these interpretations is provided in Chapter 9 of this work.

A more challenging task is to identify appropriate measures of state non-point source water pollution control activism and state point source water pollution control restrictiveness. Only Lowry's (1992) study even attempts to measure state non-point source water pollution outputs, and – to my knowledge – no scholarly study conducted to date has even sought to measure the restrictiveness of point source water pollution controls *directly*. Consequently, significant efforts are made in this work to improve upon existing measures of both of these key concepts in US water pollution control policy. What follows are brief discussions of the procedural and substantive measures used to assess the extent of state compliance with Congress's expressed desire for active non-point source water pollution programs and restrictive point source water pollution controls. These discussions are then followed by brief descriptions of the analytical approaches used to estimate the relative importance of various state level factors in explaining variations in the policy output measures used.

5.2.2.1. Non-Point Water Pollution Policy Activism:

A variety of measures of state non point source water pollution policy activism are used in this analysis, some of which are procedural and some of which are substantive and goal- oriented. These measures are discussed in turn, and these discussions are then followed by an overview of the analytical strategies used to determine important factors contributing to variations in these measures of activism at the state level.

Three procedural measures of state non point source water pollution policy activism are evaluated in this study. The first is the states' submission of non-point source water pollution assessments required under Section 319 of the FWPCA. The second measure is their development of management plans for addressing water quality problems within their borders that are traceable to non-point sources – also required under Section 319 of the FWPCA. And a final procedural measure relates to the grant program authorized by Section 319 of the FWPCA, and the states' participation in it. For all three of these measures, state procedural compliance is evaluated based on data released by the EPA in public documents. Budgetary figures relating to the FWPCA Section 319 program are also presented in order to provide readers with a sense of the levels of effort devoted to non-point source water pollution control through this program.

Of somewhat greater interest, however, are the goal-oriented substantive measures that are developed to reflect state non point source water pollution policy activism – above and beyond participation in the Section 319 program. For these measures speak to Congress's broad mandate for active state efforts to address non-point source water pollution problems, rather than just the procedural steps required to participate in the 319 grant program. Three separate substantive and goal-oriented measures are used here, and they tap into differing potential aspects of state non-point source water pollution policy activism. The measures used relate to state policies for: (1) ensuring non-point source water pollution concerns are considered in state and local decision-making; (2) authorizing mandatory controls on non-point water pollution sources, and: (3) appropriating state funds to address non-point water pollution concerns. Each of these measures will now be discussed briefly in turn.

The first measure of state non-point source water pollution control policy activism relates to the extent to which the states have developed mechanisms for ensuring that non-point source water pollution concerns are factored into state and local decision-making processes. Based on a 1998 analysis conducted by the National Conference of State Legislatures (NCSL), this measure reflects the number of distinct legal approaches to ensuring consideration of non-point source water pollution concerns during state and local decision-making processes (Morandi, et. al, 1998). The NCSL survey inquired regarding five different legal approaches, and these different legal approaches are described in some detail in the chapter on non-point source water pollution policy activism in Part III of this work. State activism, according to this particular measure, is estimated by counting the number of distinct approaches each state utilized by 1998 --- the year the NCSL study was published and just over ten years after passage of Section 319 of the FWPCA in 1987. The range of values according to this measure was zero to four, with eleven states not having enacted any of the five approaches surveyed and one state – New Jersey – having enacted four of the approaches surveyed by NCSL.

The second measure of state non-point source water pollution policy activism relates to the availability of enforceable mechanisms in the state that can be applied to various sources of non-point source water pollution. The data for this measure are derived from the Environmental Law Institute's (ELI) 1997 analysis of enforceable water pollution control mechanisms in the 50 states. Using information drawn from this ELI analysis, numerical ratings of the strength of enforceable provisions applicable to non-point source water pollution problems are developed based on legal authorities contained in the states' water pollution laws, forestry laws, agricultural laws, and earth moving laws (eg. construction). The enforceable provisions in each of these laws are weighted equally such that an overall strength of enforceable law score is measured on a ten point scale. The range of scores here is .5 to 9.5, with Idaho garnering the lowest score and Maine being assigned the highest one. A complete description of the manner in which the ELI statutory information was coded to create these scores can be found in the Appendices.

The final measure of state non-point source water pollution policy activism used in the analysis relates to state budgetary activism. Here, the measure used is whether the state has externally documented expenditures of $500,000 or greater for non-point source water pollution control, above and beyond federal 319 funds and the required state matching funds associated with them. The data used are drawn from three recent studies that include compilations of state non-point source water pollution control expenditures between 1998 and 2001 (NASBO, 2000; ECOS, 2001A, EPA, 2002A). The measure used, however, is dichotomous rather than continuous because comparable continuous-level data on these kinds of expenditures are not available in the studies analyzed – or, it seems, anywhere else for that matter. While states do track water quality relating expenditures, they do not track the portions of these expenditures that are devoted to non-point sources in comparable fashion. Consequently, I rely on the compiled data from these three research efforts, and record whether or not the states are identified to have expended substantial resources on non-point source water pollution control during the years covered by these studies (1997-2002). In this context, the states are either documented to have expended high levels of resources on non point source water pollution control or they are not. However, because the sponsoring organizations for each of these three studies have some incentive to include all states with significant expenditures in their budgetary analyses, there is reason to believe that the accounting of state expenditures above the $500,000 threshold is reasonably accurate and comprehensive [3]. More detailed information on the manner in which these data are created can be found in the chapter on non-point source water pollution policy in Part III of this work and in the Appendices.

While each of these measures is appropriate and useful, none of them viewed in isolation is entirely adequate because Congress clearly provided in statute for the possibility that states can and should take differing approaches to building their non-point source water pollution programs. For this reason, an overall scale of activism that accounts for Congressionally expected variations in state approaches is derived based on these three measures. This scale has potential values ranging from zero to thirty, although the actual range of values for the fifty states is two (NM) to twenty-seven (Maine). Each of the three measures is weighted equally on the scale (10 total points for each measure), and the procedures for deriving individual state values are described in the non-point source water pollution policy chapter in Part III. Because of the wide latitude provided by Congress to states to determine components of their non-point source programs, this broad scale – which accounts for activism in a wide range of forms – provides a stronger measure of overall activism than any one of the individual measures in isolation.

At the same time, however, it is appropriate to recognize that the use of a scale assumes, de-facto, that similar causal processes operate to produce the outputs tabulated under each of the three components of the scale. For this reason, a Kronbach's alpha reliability test is conducted on the scaled values to assess the extent to which the three measures co-vary. The results of this test suggest a relatively high level of co-variation among the measures, particularly when one considers that the measures are intended to reflect differing forms of the underlying concept of non-point source water pollution control activism.

Consequently, there is at least some assurance that these specific measures tap into the overall concept of non-point source water pollution policy activism.

To assess the major factors contributing to state level variation in non-point source water pollution policy activism, I regress the states' overall activism score on sets of variables drawn from three major theoretical approaches to explaining state policymaking – the responsiveness, capacity, and group-based theories of state policymaking discussed earlier in this work. The specific variables used and the data sources underlying them are outlined in the Appendices. The variables comprising all three models are then combined into a single integrated model of non- point source water pollution policy activism, which is refined to produce the most powerful and parsimonious model possible. The beta weights and significance levels for the variable coefficients *within* this refined and integrated model are then be compared with one another to assess the explanatory strength of the differing variables and theoretical explanations affecting non-point source water pollution policy activism. Separate regression analyses are also conducted on each of the three components of the scale to provide a second measure of the extent to which causal processes may vary among the differing components of the scale.

The final mix of statistically significant explanatory factors for variations in state non- point source water pollution policies is later compared to the mix of statistically significant explanatory factors found to lead to variations in the restrictiveness of point source water pollution controls. To do this, the relative *within* model performance of the various explanatory factors for variations in *non-point source water pollution policy activism* is compared broadly to the *within* model variation of similar integrated models that seek to explain state variations in the *restrictiveness of point source controls*. This comparison allows us to ascertain whether or not the factors leading to state policy variations under the two forms of federal intervention in state policymaking are similar to one another. It also provides insights on whether there are different forms of political dynamics underlying state policy outputs produced under these two forms of federal intervention. These comparisons are presented initially in the chapter on point source policy restrictiveness, and are elaborated upon further in the concluding chapter as well. With these broad processes in mind, we now turn to a description of the methodologies and data used in the point source water pollution policy restrictiveness analysis.

5.2.2.2. Point Source Water Pollution Policy Restrictiveness:

Several measures of state point source water pollution policy restrictiveness are used in this analysis, some of which are procedural and some of which are substantive and goal-oriented. This sub-section overviews these measures, and these overviews are followed by a discussion of the strategies used to determine important factors contributing to variations in state point source water pollution policy restrictiveness.

The procedural measures relating to state point source water pollution policy restrictiveness used here include the delegation of federal program authorities to the states, and state issuance and re-issuance of National Pollutant Discharge Elimination System (NPDES) permits. More specifically, the analysis looks at the extent to which states have sought and received authorization to operate various aspects of the NPDES program, as well as the speed with which they actually received authorizations from the EPA. The analysis also looks at the number of permits issued by each state, and the extent to which the states have complied with the FWPCA statutory requirement that permits be re-issued every five years. Throughout these procedural analyses, care is taken to differentiate between the forty-four states that have received authority to operate the NPDES program within their borders and the six states in which EPA maintains primary ongoing regulatory authority.

While these procedural analyses provide a sense of the extent to which the states have taken an interest in regulating concentrated water pollution sources subject to NPDES permitting requirements within their borders, they do not speak directly to the actual restrictiveness of the permit controls imposed on wastewater dischargers. It is therefore appropriate to look at this kind of substantive measure of permit restrictiveness as well. Two measures of permit restrictiveness are used in this analysis, and they relate to toxicity and conventional pollutant controls on wastewater dischargers that have been categorized as “major” polluters by EPA and the States. The data used to develop these measures were drawn from EPA’s Permit Compliance System (PCS) database in 2001 and early 2003, respectively, and focus on “major” dischargers which have been identified by EPA and/or the states as presenting high risks to water quality [4]. An overview of these two measures is provided in the narrative that follows.

The first measure of NPDES permit restrictiveness used in this analysis relates to the imposition of permit limits and monitoring requirements on whole effluent toxicity (WET) – the degree to which wastewater effluent discharged to receiving waters is toxic to living organisms. WET is one of the most expensive pollutant parameters to monitor, and positive results on these tests can lead to even greater costs for dischargers if they trigger “toxicity reduction evaluations” (TRE’s). The use of the percentage of major permits within the states with WET requirements is therefore an appropriate measure of the state’s willingness to impose costs on wastewater dischargers within their borders in order to ensure public health and maintain compliance with the FWPCA’s prohibition against “toxics in toxic amounts” [5].

The data on WET requirements collected from PCS are presented for both industrial and municipal pollution sources. Combined data reflecting the imposition of WET requirements on all major dischargers is also presented. These combined data and the data for major industrial dischargers are then used in subsequent statistical analyses. The combined measure is appropriate because it assesses the overall application of WET requirements to both industrial and municipal dischargers, and because the data collected indicate that there is relatively little variation between state practices with respect to the imposition of WET requirements on these two classes of wastewater dischargers. The major industrial data are also analyzed because they allow us to speak more directly to the capture related concerns that are of interest in this study. More information on WET requirements and the measures of them used here can be found in Chapter 3 on water pollution in the US and in the chapter on point source water pollution policy in Part III of this work, respectively. Detailed information on coding procedures relating to the data obtained from EPA’s PCS database can be found in the Appendices.

A second measure of permit restrictiveness used here relates to conventional pollutants. It measures the percentage of major *municipal* permits that have effluent limits below 30 milligrams per litre monthly average or below 45 milligrams per litre daily (&/or weekly) maximum for two important conventional pollutants – Total Suspended Solids (TSS) or Bio-chemical Oxygen Demand (BOD). This measure is appropriate because it reflects the extent to which states impose requirements that are more restrictive than the federally established technology based standards for the discharge of these two pollutants from municipal sewerage treatment facilities. What is more, like the WET measure above, the measure used here is one of the few possible measures of permit restrictiveness that applies in comparable fashion across the fifty states. This is the case because limits on BOD and TSS in municipal permits are based on *uniform* national technology based requirements, and there are no similarly uniform limits for industrial facilities. According to EPA's technology based standards, industrial permit limits are often based on units of production and these standards apply to industry categories that vary widely among the states. Consequently, it is quite difficult – perhaps even impossible – to compare the restrictiveness of conventional pollutant requirements in permits issued to industrial dischargers among the fifty states. For this reason, the percentage of major municipal permits with permit limits below these technologically based thresholds provides a strong *and* nationally comparable measure of the willingness of the states to impose costs for advanced wastewater treatment in order to protect waters in which pollutant loads exceed or threaten to exceed water quality standards [6]. More information on these pollutants and the measures of them used here can be found in the background chapter on water pollution in the US and in the chapter on point source water pollution policy in Part III of this work, respectively. As with the WET measure discussed above, detailed information on coding procedures relating to the data obtained from EPA's PCS database can be found in the Appendices.

For both of these measures of permit restrictiveness, I develop regression models that assess the extent to which variations in permit restrictiveness uncovered among the states are traceable to theoretically significant variables drawn from the responsiveness, capacity, and group-based models of state policymaking processes reviewed earlier in this work. In addition, because of the strong top down pre-emptive statutory policy structure enacted for point source pollutants, efforts are also made to assess the impact of EPA oversight on the variations in permit restrictiveness uncovered. In contrast to the situation with the composite measure of non-point source activism discussed above, however, the likely causal factors leading to variations in toxic and conventional permit restrictiveness are analyzed separately. This is because the statutory structure for point source water pollution control does not suggest a multiplicity of different approaches in the same way as the non-point source statutory structure, and because of differences in the likely explanatory factors, audiences subject to requirements, and the pollutants measured in the two point source cases. In addition, from a statistical point of view, the two point source restrictiveness measures do not exhibit the same kind of co-variation that is apparent in the various measures of non-point source water pollution policy activism.

After separate models testing the influence of various state level variables are evaluated, models that seek to test the importance of top down interventions associated with federal authorization of the states to implement the federal NPDES program are also constructed for both the toxic and conventional pollutant measures. The variables from these "top down" models are then combined with the state policymaking variables in an effort to develop the most complete possible explanations for the variations in toxic and conventional point source restrictiveness that are uncovered. The relative strength of the variables *within* these integrated models are then compared with both one another, and with the relative strength of the variables contained in the integrated model of *non-point source water pollution policy activism*. These comparisons are initiated and overviewed in the chapter on point source policy restrictiveness and then receive further elaboration in the concluding chapter. They provide useful insight into the political dynamics underlying these two different sets of water pollution policy outputs, and – consequently – into the factors contributing to state level slippage from Congress's statutorily expressed goals and directions as well. These sources of slippage, in turn, provide further insights that may be useful in future discussions regarding further devolution in US water pollution control policy.

5.3. Conclusion

The hypotheses assessed in this work suggest that Congress exercises influence over federal and state water pollution policy outputs through the institutional frameworks it creates in statute. These frameworks, in turn, hold the potential to establish long-term patterns of influence on federal and state policy outputs. These suggestions are grounded in institutional theories of the policymaking and implementation process (Weber, 1922; Berger & Luckman, 1967; March and Olsen, 1984; and Peters, 1999) --- a theoretical perspective that has not frequently been applied to the question of Congressional control of administrative decision-making. This institutional perspective does, however, enable a unique look at the influence of various forms of *structural* controls on agency decision-making that have been highlighted in past studies of Congressional control (McCubbins, 1985). Given this set of theoretical influences, it should not be surprising, therefore, that the approaches, methods, and data used here differ from those that have been used in many past analyses of Congressional control over the policymaking and implementation process.

The analytical approaches used in this work are both longitudinal and cross-sectional. They reflect an effort to assess the extent to which Congress has broadly influenced water pollution policy outputs through structural controls enacted in statute during the entire post World War II period. They also reflect an effort to ascertain the extent to which Congress has achieved control over contemporary state non-point and point source water pollution policy outputs through differing forms of federal intervention into state policymaking processes. The results uncovered will therefore provide readers with a multi-faceted sense of Congress's ability to steer domestic policies over the long term through institutionalized practices fashioned through various forms of federal statutory intervention. They also yield insight regarding the extent to which differing influences at the national and state levels contribute to slippage from the institutionalized directions that Congress establishes in statute.

While this work has been structured largely around the issue of "Congressional control", it also draws heavily from analytical approaches used in the literatures on policy implementation and federalism and state policymaking. The focus on policy outputs – rather than impacts and outcomes, for example, provides a basis for assessing the extent to which past findings of implementation failures are attributable to bureaucratic intransigence vs. the complexity of the external environments in which public policies are implemented. At the same time, alternatively, the comparative analysis of state policy outputs under differing forms of federal intervention will provide insight into the nature of federal influences on state policymaking --- a frequently mentioned influence on state policymaking that is still under-studied. These and other insights, in turn, should illuminate current debates on federal-state policy devolution generally, and issues relating to federal and state roles in water pollution policy in particular.

As should be evident from the discussion above, however, a variety of methods and data are used in this work to evaluate the hypotheses identified. The multiplicity of information sources used and the variations in analytical approaches adopted result from the conviction that single indicators of larger concepts are rarely as accurate and useful as a variety of indicators that tap differing components of the concepts under study (Peters, 1998). As a result, the conclusions reached in this analysis are based on a preponderance of evidence gained throughout the research process, rather than any single indictor or test. With these thoughts in mind, let us now turn our attention to a set of historical analyses that seek to illuminate the nature of Congressional influence on the water pollution policymaking and implementation in the post World War II America.

PART II – RUNAWAY BUREAUCRACIES?: A HISTORICAL ANALYSIS

"… neither Congress nor the president has reviewed the substance of the thousands of standards and regulations emanating from EPA in order to determine whether there is any relation at all ….. between them and original legislative enactments."

Theodore Lowi, *The End of Liberalism*, 1979, p. 120

"There is no lack of implementation problems,
even in the provision of the most routine services."

George Edwards III, *Public Policy Implementation*, 1984, p. X

"Even the most robust policy – one that is well designed to survive the implementation process – will tend to go awry."

Eugene Bardach, *The Implementation Game*, 1984, p. 5

6. INTRODUCTION AND ANALYSIS OF THE SUPPORTIVE ERA, 1948-1971

6.1. Introduction

The quotations on the previous page reflect a view that has been prominent among scholars, particularly among those who have contributed to the literature on policy implementation. These scholars suggest (or at least strongly imply) that administrative decision-making frequently strays from Congress's intentions as expressed in statute. The analyses in this Part suggest that the impression left by these quotations is exaggerated – that administrative agencies frequently seek to implement policies in ways that are consistent with Congress's broad directions. In so doing, the analyses presented here provide support for the first two hypotheses underlying this work. They suggest that Congress's statutory directions generally structure federal involvement in water pollution control policy, and that these actions affect state surface water policy outputs.

While the historical description provided in Part I makes it clear that Congress's statutory directions relating to water pollution control have changed over the last half of the twentieth century, the extent to which changing Congressional directions have actually guided federal and state policy changes during the implementation process is less clear. Did the federal government respond faithfully to Congress's ex ante statutory directions? If so, did state water pollution programs change in a manner consistent with federal direction? If federal or state programs did not respond faithfully to Congress's statutory directions, why didn't they? Or, as McCubbins (1985) might ask, what were the sources of the slipping and shirking behaviors?

The analyses that follow seek to address these questions by outlining the major legislative changes made during the supportive, pre-emptive, and experimental eras of water pollution control policy in the United States, and by assessing whether the policies enacted were implemented by the federal agencies and the state governments to which they were assigned. The evidence presented suggests that Congress's broad statutory directions were followed in most cases by policy outputs consistent with them at the federal and state levels. The "runaway bureaucracy" argument, this evidence suggests, is at least overstated. At the same time, however, the results of these analyses also suggest that implementation may stray from Congress's statutory direction when it is not fully institutionalized as a result of faulty statutory construction, disagreements among political principals, limited resources, and/or technical complexity.

The analyses draw on the substantial literature on water pollution policymaking and implementation in the United States during the last half of the twentieth century [1]. While they do not seek to assess federal and state administrative fidelity to individual statutory provisions in great detail, they do seek to assess whether administrative policymaking and implementation at the federal and state levels responded substantively to major changes in Congress's statutory directions. Substantive compliance in this context is defined as the production of policy outputs that are consistent with Congress's statutory directions. Conversely, substantive *non*-compliance is defined as a failure to produce these kinds of policy outputs in reasonable amounts of time given the complexity of the tasks involved.

The analysis centers on twenty-five major statutory changes that were selected on the basis of their focus on core surface water related portions of the Federal Water Pollution Control Act (FWPCA) that are implemented by EPA and the states, their overall significance, their relevance to federal and state roles in water pollution policy, and the availability of information on their enactment and implementation. Viewed in the aggregate, these twenty-five changes constitute the largest and most important elements of Congress's statutory directions in water pollution control policy in the post World War II period [2]. For each major policy change, the analysis addresses the following questions:

1. Was the policy change implemented by the federal government in ways that are substantively consistent with its statutory authorization?

2. Was the policy change implemented by a significant number of states in ways that were substantively consistent with Congress's statutory directions?

3. Were there major difficulties or delays in policy implementation, or was the policy not implemented at all?

4. In cases where difficulties in policy implementation were uncovered, what were the l ikely causes of the difficulties?

In addressing these questions, the analysis is guided primarily by *substantive* rather than technical statutory criteria. Statutory directions can be highly technical in nature, and relying exclusively on technical statutory criteria to assess whether agencies and states have implemented Congress's directions can be deceiving. For example, an agency juggling numerous statutory deadlines may miss a deadline, but may actually do what the statute tells it to do in commendable form given the nature of the task. While this might be viewed *technically* as an implementation failure, it is probably not one substantively. In this analysis, the approach taken is to focus on substantive policy outputs – what Congress actually asked federal agencies and the states to do. An act is counted as implemented by the federal government if the affected federal agency actually *did* what the statute told them to do in a reasonable period of time according to at least one credible source. As a practical matter, the amount of time determined to be "reasonable" varies, as a number of major changes in Congress's policy directions in post World War II water pollution policy involved highly technical and complex issues that required substantial research and debate prior to final resolution. In a number of cases, Congress's statutory deadlines have simply not recognized this fact, so interpretations of what is reasonable vary from one or two years up to about fifteen or sixteen years (in the case of the federal technology based effluent standards), depending on the task. Major policy changes are counted as implemented by the states if at least one credible source in the literature suggests that a significant number of states did what the federal government directed them to do in reasonable amounts of time given the tasks required.

Where there are findings that an act was not implemented either at all or not in a reasonably timely or effective fashion, the explanations provided for these implementation failures are based on existing literature, which is then supplemented in some cases by the author's personal knowledge. In general, however, these explanations are pretty obvious and straightforward. In each case, the evidence relied upon to reach conclusions is presented, so the reader may make his/her own assessment as to whether or not successful implementation is demonstrated. In the case of the evidence dealing with state compliance with Congress's direction, the analysis focuses on broad indicators of significant reactions by multiple states. More detailed assessments of the extent of state variation in response to federal water pollution policy requirements are made in the cross sectional analyses presented in Part III of this work.

There are advantages to this approach for assessing federal and state implementation of Congress's statutory directions. First, the broad and sweeping longitudinal approach used in this historical analysis allows the capture of a wide range of policy changes, along with the establishment of temporal precedence over time periods that are sufficient to account for the time-consuming complexities of nationwide policy implementation. Yet another advantage lies in the approach's focus on Congress's instructions and the federal and state actions taken to comply with them, as opposed to the more difficult judgments that arise when one seeks to assess the overall policy impacts and outcomes, or the success or desirability of a particular policy – the kinds of things Congress seeks to do when it tries to change overall national policy. The major point we are concerned about here is whether federal agencies and the states are actually producing the policy outputs that Congress directed them to produce, not whether those policy outputs are appropriate or even ultimately effective. Consequently, the criteria used speak directly to the issue of Congressional policy influence that underlies this research, not a multitude of other factors relating to policy desirability such as regulatory reasonableness (Bardach & Kagan, 1982) or the effectiveness of the policy in ensuring improved water quality (Houck, 1999).

The disadvantages of the analytical approach used here relate directly to the advantages. First, the broad sweep of the analysis does not directly account for non-statutory factors that could influence policy implementation over time and among the various states. Part III of this work seeks to address this concern. It explores state variations in point source permit restrictiveness and non point source policy activism in some detail, and accounts for theoretically significant state level factors through cross sectional regression analyses designed to explain state level variations in water pollution policy outputs. The result here is that we gain a sense of the likely causal factors contributing to variations in differing state water pollution policy outputs.

Second, the reliance on judgments derived from secondary sources may be criticized, but it is precisely this kind of overview approach that enables the broad sweep of this analysis over both numerous policy changes and long periods of time. And, even if one may want to criticize one source or another, or the interpretation of that source's work presented here, these criticisms would have to be both numerous and substantial to have an appreciable effect on the conclusions reached.

And finally, the policy output oriented approach used here does not address important questions relating to policy impacts and ultimate policy outcomes. To alleviate – but clearly not eliminate – this concern, throughout these historical analyses, efforts are made to assess the general or likely impacts of the policy changes being assessed. These impact assessments are generally qualitative in nature, and are based on data and information contained in existing literature. They seek to determine the extent to which federal and state policy outputs actually affect the behaviors of key target audiences and water quality conditions throughout the country. Due to the inherent difficulties associated with assessing actual water quality trends given existing data (See the discussion in Part I, as well as Hoornbeek, 2000; NAPA, 2000; Davies & Mazurek, 1998; & Ringquist, 1993 for more discussion of some of these difficulties), only very broad and speculative efforts are made to assess actual policy outcomes of the implemented policy actions.

Nevertheless, information contained in existing literature is sufficient to enable an initial effort to categorize the twenty-five major policy changes analyzed here in terms of the likely magnitude of their impacts and effects on major target audiences and water policy outcomes. The outgrowth of these efforts is presented in the summary analysis at the end of Chapter 8. It represents an effort to synthesize existing information on US water pollution control about the relative impacts of various ex ante statutory changes in the post World War II era. In interpreting this analysis, the reader should be aware that the methodology used here – while sensible given the data that is available, the varying objectives of the policy changes assessed, and the extremely broad scope of the analysis – does not always specify common metrics for ascertaining policy impacts. Rather it relies on secondary literature relating to the size and type of audience impacted and estimates of the effects of the actions taken on water quality. As a result, the conclusions regarding policy impacts and outcomes that are presented should be viewed as sources of educated hypotheses rather than definitive conclusions regarding actual policy impacts and outcomes.

Organizationally, the analyses in this Part are broken into three chapters, each of which focuses heavily on one of the three major eras of US water pollution policy outlined in Part I. Overall results combining the separate findings for each era are then summarized at the end of Chapter 8, following the discussion of policy changes and implementation in the current Experimental Era. These results suggest that Congress has significantly influenced federal and state water policy outputs through the goals and federal-state roles it has established, the target audiences it has sought to influence, and the changing policy instruments it has authorized and funded. The evidence presented thus substantiates hypotheses 1 and 2 that were presented in the previous Part. Once again, these hypotheses suggested that Congressional direction structures the extent and nature of federal involvement in water pollution policy, and that this federal involvement influences water pollution policy outputs at the state level [3]. Viewed in combination, these hypotheses suggest that ex ante Congressional direction establishes ongoing institutional influences that affect water pollution policy outputs at both the federal and the state levels.

In this regard, the analyses here find that most of the major statutory changes specified by Congress during all three eras in the post World War II period were followed by policy outputs consistent with them at both the federal and state levels government, even though these changes in policy outputs did not always lead to the intended policy impacts or outcomes. Of twenty-five major water pollution policy changes directed by Congress that are analyzed in these chapters, federal agencies took clear steps to implement twenty-two of them – a compliance rate of 88% with Congress's directions. States, in turn, took steps to implement all of these federal implementation efforts, with the exception of the development of technology based effluent standards in the pre-emptive era and the order to cease use of the Clinton Administration's more stringent regulations governing the Total Maximum Daily Load (TMDL) program in the current experimental era. Both of these latter changes required actions on the part of federal agencies, but involved no direct requirements for the states.

The analysis does, however, find several cases in which policy changes mandated by Congress did not occur as directed. There were also a number of cases – particularly during the pre-emptive era – in which federal and state administrators experienced significant delays and difficulties, but did eventually comply with Congress's directions. These cases of "non-compliance" with Congress's directions and major "implementation difficulties" appear to be best explained by a number of factors that have been recognized in the literature on policy implementation – insufficient resources (Rosenbaum, 2002), statutory constructions based on faulty theoretical logics (Mazmanian & Sabatier, 1983), conflicts among political leaders (Aberbach & Rockman, 1988), and technical complexities (Gormley, 1986 & 1989). However, in most of these cases, even these obstacles were overcome in time as the institutions involved eventually were able to process and implement Congress's directions in some fashion.

Overall, based on these historical analyses, it is apparent that federal and state implementation of Congress's water pollution control policies is not a clear case of "runaway" bureaucracy, as some have suggested. At the same time, one should not conclude from this statement that the influences detected are sufficient to establish detailed and ongoing Congressional "control." The question of whether state responses are sufficient to suggest "Congressional control" of state policymaking through ex ante direction is not dealt with extensively in this Part, but rather is a target of inquiry in Part III which follows. In the meantime, however, it is appropriate to turn to an analysis of Congressional direction and policy implementation during the first major era of water pollution control in the Post World War II United States – the era of supportive federalism.

6.2. Assessing Congressional Influence: The Era of Supportive Federalism, 1948 - 1971

> "…. Congress in 1948 assigned the federal government to a very secondary position in relation to the states in water quality matters, the principal federal responsibility being to bolster local pollution control programs with technical services and money."
>
> N. William Hines, 1967

In a very useful analysis of the growth of federal water pollution policy through the 1960's, a prominent scholar of water pollution law used this language to describe the 1948 legislation that initially established an ongoing federal water pollution program (Hines, 1967, p. 810). While Hines' quotation refers only to the 1948 Act, it could also be viewed as an appropriate description of an entire era of water pollution control in the United States – one that quite arguably extended to 1971. Throughout this "supportive era", federal water pollution efforts were characterized by efforts to both assist states and maintain deference to their authority. While the appropriate extent of this deference became a point of debate during the latter years of the era, there is little doubt that states were the primary governmental units responsible for water pollution control until the end the supportive era.

This analysis in the remaining portion of this chapter reviews the major policy changes made during the supportive era of water pollution control. It also assesses the extent to which the policy instruments enacted by Congress were implemented as intended by the federal government and the states during the years between 1948 and 1971. In general, it finds that most – indeed, 78% – of the major supportive policy changes established by Congress during this era were implemented largely as intended by the federal government and a significant number of the states. This finding supports the notion that Congress exercised "influence" over bureaucratic policy implementation at both the federal and state levels, even as it also recognizes that this "influence" is not so far-reaching that it can properly be called "control."

6.3. Congress's Statutory Direction and Federal and State Policy Implementation

Five major pieces of legislation provided the foundation for water pollution policy during this first era of federal water pollution control. These five pieces of legislation were enacted in 1948, 1956, 1961, 1965, and 1966 [4], and they gave rise to Congressional directions in four major policy areas relating to water pollution control. First, Congress provided authorities and funding for the federal government to engage in coordination and technical assistance activities to assist the development and improvement of state water pollution programs. Second, it established an ongoing policy of federal financial assistance to communities in the construction of wastewater treatment plants. Third, it established mechanisms for federal involvement in abating and taking enforcement actions to remedy water pollution problems. And fourth, in the latter part of the era, Congress directed and encouraged the states to establish water quality standards for interstate and intrastate waters, respectively. The evolution of Congress's directions in these four policy areas is discussed below, and – in each case – is followed by an assessment of the extent to which each major policy change was implemented as intended by the federal government and the states during this era.

6.3.1. Federal Assistance to State Programs

Between 1948 and 1971, Congress established and progressively expanded the federal government's role as coordinator and technical assistance provider to state water pollution programs. The 1948 Act directed the Surgeon General of the Public Health Service (PHS) to promote cooperation and coordination at all levels of government involved in water pollution control. It also encouraged the development of more uniform state water pollution laws, and authorized $1 million for grants to assist in the development and improvement of state water pollution programs (CQ Almanac, 1948, p. 152). The Act also authorized the establishment of water pollution research facilities to provide research and assistance on water pollution control related matters.

While Congress did not appropriate monies to implement these authorizations immediately, it did appropriate a total of $9.4 million (of $83.4 million authorized) for these purposes between the years of 1950 and 1952 (Hines, 1967, p. 813). In 1952, Congress extended the Act until 1956, at which time it authorized ongoing assistance to state water pollution programs and, in so doing, established a foundation for continuing federal support in this area (Abkin, 1969, p. 75). A total of about $11.4 million was appropriated by 1956, and Congress subsequently expanded the Act's technical assistance and coordination activities further in the 1961, 1965, and 1966 revisions to amendments to the 1956 Act (Abkin, 1969, p. 75; Hines, 1967; CQ Almanacs, 1961, p. 267; 1965, p. 745; and 1966, p. 636). These expansions included the addition of new laboratories, the publication of model state water pollution laws, as well as increasing financial and technical assistance support to the states.

The evidence presented in major analyses of federal and state water pollution programs covering this era suggest that these federal technical assistance activities were generally implemented at the federal and state levels, and generally had the intended impacts on state water pollution programs. Toward the end of the supportive federalism era in 1966, for example, Hines wrote the following:

> "There seems little question that almost every state currently is carrying out a pollution control program more vigorous and more effective than at any time in its history. Further, evidence is beginning to appear that concerted efforts by states can achieve a large measure of success in remedying conditions of pollution."(Hines, 1966A, p. 234)

Did the water pollution laws enacted by Congress contribute to this apparent progress? Were there concrete steps taken by the federal government and the states that responded to these enactments? The evidence in the existing literature suggests an affirmative answer to both of these questions, and is briefly reviewed below.

To assist state programs during this era, Congress directed that the Public Health Service (PHS) establish federal laboratories to conduct water pollution research in 1948 and then again in 1961. The 1948 Act authorized the establishment of a national water quality laboratory in Cincinnati, Ohio (CQ Almanac, 1948, p. 152), while the 1961 amendments added authorizations for laboratories in other regions of the country. The new Cincinnati laboratory was completed in the 1950's (Kreissel, 2003), and additional laboratories in Duluth, Minnesota and other locations were established in the mid to late 1960's (Bastow, 1986). These labs provided a baseline technical capability that could be used to assist states in addressing water pollution control problems (for a discussion of the Duluth lab, see Bastow, 1986, pges. 11-14). The Cincinnati and Duluth laboratories have remained important sources of information and technical assistance relating to water pollution control for state governments, the EPA, and others.

The 1948 legislation also instructed the PHS to encourage the development of more uniform state water pollution laws and build state capabilities through program grants for the states. Pursuant to the 1948 Act, the PHS in 1950 published a "Suggested State Water Pollution Control Act" to assist states in upgrading their water pollution control programs (Hines, 1966A, p. 204). By 1966, Hines reported that about 40 states had adopted at least some of the provisions in this suggested act (Hines, 1966A, p. 215, note 136). He also reported that over half of the states strengthened their water pollution control statutes in the 1950's – largely in response to the Suggested Water Pollution Control Act (Hines, 1966A, p. 204). This suggested Act was later revised and republished in 1965 (Hines, 1966A, p.215).

This federal support effort was supplemented by progressive growth in the grant program to assist in the development of state water pollution programs. These grants were initially authorized at $1 million annually in 1948, and rose to $3 million in 1956, and then to $5 million in 1961, $10 million in 1965, and $20 million in 1966 (CQ Almanacs, 1956, 1961, 1965, 1966). While the literature reviewed for this analysis does not trace any specific policy outputs to these state grant funds, it seems reasonable to assume that at least some of the improvements in state water pollution programs mentioned by Hines are attributable not only to the Suggested State Program Guidance issued in 1950 and 1965, but also to the funds supplied by the federal government to the states for this purpose.

As a result of these and other efforts, it is clear that by 1971 Congress had established a clear and ongoing research and technical assistance role for the federal government in water pollution control. The federal government generally and the various agencies that administered the federal government's water pollution program during this era – the Public Health Service (PHS), the Department of Health, Education, and Welfare (HEW), and the Department of Interior (DOI) – also appear to have followed through on Congress's direction regarding research and funding support for state programs, the promotion of uniform state laws, and – based on the evidence presented by Hines and others (Leiber & Rosinoff, 1975, pges. 11-14) – a large number of states appear to have responded to these efforts.

6.3.2. Federal Financial Assistance for the Wastewater Treatment Plants

During the supportive era, Congress also established a federal role in providing funds to assist local governments in financing wastewater treatment plants. This financial commitment began in 1948 with a $22.5 million authorization for a loan program for the construction of wastewater treatments plants. However, no monies were appropriated for this purpose (CQ Almanac, 1960, p. 250; Davies, 1970, p. 42). Even so, the commitment was subsequently strengthened in the 1956, 1961, 1965, and 1966 Acts, as Congress increasingly committed the federal government to providing financial assistance to local governments for wastewater treatment plant construction.

In 1956, Congress replaced the 1948 loan program with a grant program to provide funding for the construction of wastewater treatment plants. It authorized $50 million in annual funding for this purpose (CQ Almanac, 1956, p. 570). These grants could pay up to 30% of the costs of wastewater treatment plant construction for projects that were approved by the state pollution control agency and the Surgeon General, and that were included in a comprehensive state plan developed pursuant to the act. Under the 1956 Act, the federal government was to disburse the grant funds to the states, which would then provide monies to eligible communities. Unlike the earlier 1948 loan program, most of these grant funds were in fact appropriated [5]. In the 1961 Act, the Congress further expanded the construction grants program by authorizing increases in funding on a sliding scale to $100 million over the next six fiscal years (CQ Almanac, 1961, p. 267) [6]. These authorizations were increased substantially once again in 1965 to $150 million annually, and even more substantially in 1966. The 1966 revisions increased construction grants authorizations to $450 million in 1968, $700 million in 1969, $1 billion in 1970, and $1.25 billion in 1971 (CQ Almanac, 1966, p. 635) – substantial increases by almost any accounting.

Congress's 1948 directions relating to the establishment of a wastewater treatment plant loan program do not appear to have been implemented by either the federal government or the states. The loan program was never funded through Congressional appropriations (Davies, 1970, p. 42; CQ Almanac, 1960, p. 250), and there does not appear to be any evidence that either the PHS or the states responded to its authorization in any significant way. However, the construction grant program that was originally enacted in 1956 and then expanded in 1960's was funded, and there is evidence that both the federal government and the states responded to it in ways that were both substantial and consistent with Congress's direction. There is also evidence that these responses resulted in significant improvements in wastewater treatment at locations throughout the country.

Within two years of the establishment of the construction grants program in 1956, proponents of the program declared the results "nothing short of phenomenal" (Hines, 1967, p. 819). While it is clearly not surprising that proponents of a law would declare it successful two years later, their declarations were supported by others. In hearings before the Subcommittee on Rivers and Harbors of the House Committee on Public Works in 1958, Congressman Blatnick (the House sponsor of the construction grants program two years earlier) reported that the federal government had made one thousand and five grant offers totaling \$84.1 million. What is more, these federal funds were contributing to projects that required a total of \$388.9 million in expenditures. According to these figures, each federal dollar expended under the grant program was generating three dollars and sixty cents in state and local expenditures (Hines, 1967, p. 819). Almost ten years later, in 1967, the federal grant program's new administrator, the Department of Interior's new Federal Water Pollution Control Administration, reported that over seven thousand municipal wastewater treatment works had been constructed or expanded with federal assistance and the total cost of these projects "was nearly four billion dollars of which \$800 million was contributed by the federal government" (Abkin, 1969, p. 77). According to Abkin, the federal grants had "inspired increased spending by the state and local governments well out of proportion to the federal funds spent" (Abkin, 1969, p. 77).

This evidence suggests that Congress's statutory intention that the federal government and the states assist local governments in the construction of wastewater treatment plants was realized in actual policy outputs at both the federal and the state levels. What is more, it is not a significant stretch of the imagination to suggest that these policy outputs resulted in impacts that were consistent with Congress's goal of building more active state water pollution programs and, beginning in 1965, its new goal of enhancing the quality of the nation's waters as well. By the end of 1960's, the federal government was clearly and strongly in the business of assisting state water pollution programs by financing wastewater treatment plants – another result that was quite consistent with Congress's legislative direction during this era.

6.3.3. Abatement and Enforcement

In the 1948 Act, Congress also established a federal role in the abatement of specific water pollution problems. For the first time, the 1948 Act authorized the Federal government to become directly involved in abating water pollution problems, although the authorities granted to the PHS under the Act were narrow, cumbersome, and fully effective only upon the request of state and local water pollution officials. This weak authority, however, was marginally strengthened by subsequent acts during the supportive era.

Briefly, under the 1948 Act, the Surgeon General could investigate interstate water pollution problems when s/he received authorization from state authorities to do so, and s/he could then issue formal notice to the polluting party(s). After providing a reasonable time for abatement, the Surgeon General could then give yet another notice and, if abatement was not forthcoming again, s/he could hold a public hearing which could produce a finding as to whether it was reasonable and appropriate to abate the pollution. Upon this finding and, *with the consent of the state in which the pollution originated*, federal authorities could request that the Attorney General bring suit to secure the needed pollution abatement. As Hines (1967, p. 812) suggested, "it is difficult to conceive of a procedure more ill-designed to secure meaningful abatement".

Ill defined or not, however, this cumbersome approach did provide initial authority for the federal government to become involved in water pollution abatement and enforcement, and this authority has been strengthened through the years. In 1956, after some debate, Congress strengthened the 1948 Act's cumbersome procedure in two ways. First, and most importantly, it removed the requirement of consent from the state in which the pollution originated for bringing polluters to court. In so doing, it enabled the federal government to take court action based upon a complaint from either the offending or offended state, rather than both of them. And second, the revised procedure called for the initiation of enforcement conferences between the "discovery of interstate pollution and the public hearing" (Hines, 1967, p. 818).

Revisions to the Act in the 1960's also affected the abatement and enforcement provisions of the Act. The 1961 amendments expanded federal abatement and enforcement authorities further by extending federal authorities to intra-state waters, and by establishing separate procedures for federal action in intra and inter state waters. Briefly, state consent continued to be required prior to federal investigations of intra-state waters, while federal authority to investigate interstate water pollution problems was not limited in the same manner (CQ Almanac, 1961, p. 267). The 1965 revisions to the Act extended the scope of activities that could enter abatement proceedings upon the initiative of the federal government (eg. without state approval) to include polluting activities affecting shellfish (Hines, 1967, p. 830), and the 1966 changes expanded the powers of the Secretary of the Interior – which had now received the authority to administer the Act from HEW – to call witnesses in conference proceedings (CQ Almanac, 1966, p. 635-6).

Congress's intentions relating to federal abatement of water pollution problems became more aggressive during the course of the supportive federalism era, but they remained essentially conservative and primarily designed to support state actions and wishes. It is clear, however, that federal agencies – and the states as well – responded to Congress's direction in this area after the 1956 amendments at least to some degree, although not before.

Because of the 1948 Act's requirements for state approval and the cumbersome nature of the proceedings, very few – if any – enforcement proceedings were carried out under the 1948 Act [7]. Thus, in the case of the 1948 legislation, while Congress sought to make federal abatement assistance available, it did so in a manner that provided little or no incentive for states to avail themselves of this assistance. The federal government did not respond significantly to Congress's direction because it did not have authority to, and the states did not respond because they saw little benefit in doing so.

After the 1956 Act, however, both the federal government and the states began to use the abatement and enforcement conferences authorized by Congress more aggressively. Between 1957 and 1960, thirteen enforcement conferences were called, and the initiation of these conferences was almost evenly divided between the federal government and the states (Holmes, 1979, pges. 319-320). By 1964, another seventeen enforcement conferences had been initiated, and seven of these conferences included at least one state official as a party to the initiation of the conference. The growth in the number of enforcement conferences held during the latter part of the supportive era suggests that Congress's legislative changes in 1956 and in the 1960's made the abatement process both broader in application and more workable, and that both federal authorities and the states responded to these changes at least to some degree. As a result, by the end of this era, the federal government had established itself as a point of legitimate recourse for states and parties that were negatively affected by interstate pollution. Nevertheless, federal involvement in the abatement of pollution problems on intrastate waters remained quite limited in comparison to current day practices.

While the abatement and enforcement procedures in place at the end of the supportive era do appear to have been utilized by both the PHS and the states, their actual impacts on the behavior of polluting parties are much less certain. Abkin cites figures from 1966 hearings before the Subcommittee on Air and Water Pollution of the Senate Committee on Public Works which suggest that enforcement proceedings in place at that time had the potential for significant benefits. The figures he cited suggested that seven thousand miles of waterways were being cleaned up as a result of federal enforcement actions, and that these actions involved more than one thousand municipalities and twelve hundred industries (Abkin, 1969, p. 92). However, Davies (1970) later pointed out that none of the conferences initiated had been completed by the late 1960's, thus indicating that in no case had enforcement recommendations been fully carried out (Davies, 1970, p. 189) by that time. Consequently, the overall effectiveness of these conferences in actually changing the ongoing behavior of polluting parties is questionable at best, and there is also reason for doubt regarding whether or not the significant policy outcomes and impacts claimed in the 1966 hearings were ultimately realized. Indeed, questions about the viability of existing federal enforcement mechanisms played an important role in the Congress's decision to re-write the FWPCA in 1972 in ways that ushered in a new and "pre-emptive" era of water pollution control.

6.3.4. State Water Quality Standards

The 1965 Water Quality Act (WQA) established the fourth major area of federal policy influence during the supportive era, and it related to the creation of water quality standards applicable to ambient waters. The 1965 Act also transferred administrative responsibility for the Act to HEW [8] and established a new and expanded statutory goal relating to the enhancement of water quality. Taken together, these changes signaled a significant change in Congress's intentions in water pollution control, as its deference for state authority clearly began to wane in favor of more aggressive – and even directive –approaches to water pollution control at the national level.

These changes were significant enough that one could make a reasonably good case that the 1965 Act constituted the turning point toward the more directive era that followed. However, while the water quality standards directive did established federal *requirements* for state action for the first time, it fell well short of the pre-emptive approach that characterized the second era of federal water pollution control (discussed in the following chapter). For example, Congress in the 1965 Act granted the federal government the authority to establish water quality standards for interstate waters, but it did so only after the states themselves failed to do so adequately. Unlike the partial pre-emptive statute passed by Congress in 1972, the federal government was not granted ongoing regulatory authority over public and private sector activities. In addition, the 1966 Act added monetary incentives for state development of water quality standards, so the overall approach taken to fostering the development of state water quality standards during the mid 1960's was still based as much or more on supportive grant mechanisms as it was on directive requirements. For these reasons, the approach taken in this work is to view Congress's actions in the 1965 and 1966 Acts as the beginning of the transition toward the pre-emptive era that followed rather than the beginning point of the new era itself.

In general, the creation of water quality standards involved the establishment of accepted water body uses, criteria specifying acceptable levels of pollution in ambient water that do not impair those uses, and a plan for implementation and enforcement of those standards (Holmes, 1979, p. 187). The 1965 Act created a specific timetable for state establishment of water quality standards containing these elements for interstate waters. Under the Act, states were given two years to establish water quality standards applicable to interstate waters within their jurisdiction. If the states failed to do this in a timely or acceptable manner, Congress directed the federal government to establish those water quality standards itself (Hines, 1967, p. 830).

As noted above, further federal enticements for the establishment of state water quality standards were subsequently created in the 1966 Act. The incentives established in that Act conditioned receipt of expanded 50% federal funding [9] on the issuance of federally approved water quality standards for interstate waters and state enforceable water quality standards for intrastate waters. Clearly, Congress wanted states to develop and use formal water quality standards in their pollution control programs, presumably to ensure that abatement processes were focused on defined ends and to provide a foundation for enforcement actions when those ends were not achieved. The 1966 Act, therefore, provided clear incentives for state development of water quality standards for both inter and intra state waters and, in so doing, supplemented the rather narrow and somewhat directive approach taken in the 1965 WQA.

In the mid 1960's, the federal government also issued guidelines for the development of water quality standards in order to implement the 1965 WQA's water quality standards requirements, although the process absorbed much of the two years that Congress had given the states to comply. However, it does appear that the Governors of all 50 states submitted letters of intent to develop and promulgate acceptable water quality standards by October 2, 1966 – the deadline for submission of these letters. In addition, all 50 states also appear to have submitted their required water quality standards by the 1967 statutory deadline (Holmes, p. 188). States also appear to have responded positively to the incentive provisions in the 1966 Act that were designed to encourage the development of water quality standards for *intrastate* waters (Abkin, 1969, p. 77). According to Holmes (1979, p. 190), the vast majority of states adopted standards for these waters as well, and many of them were consistent with federal requirements because they included both use based criteria and secondary treatment requirements for sizeable discharges of organic wastes. However, it is important to note in these contexts that there are disagreements in the literature regarding the extent and nature of these state responses (see Davies, 1970, Leiber & Rosinoff, 1975, and Holmes, 1979 for differing views). And, to a significant degree, these disagreements appear to reflect disagreements that actually took place at the time (see Lieber, 1975, pges. 13-14).

Nevertheless, by 1970, it is clear that the federal government had approved state submitted water quality standards for interstate waters in all 50 states, although only 29 of these states had standards that were "fully approved" (Davies, 1970 p. 169; Holmes, 1979, p. 190). The reasons for the failure to approve state water quality standards fully in the remaining 21 states were varied, although at least some federal officials at the time did not consider the remaining issues to be of major importance (Holmes, 1979, p. 190). This is not to say, however, that the process was without controversy. The federal government did establish standards itself along the Mississippi River due to the State of Iowa's refusal to require "secondary" treatment [10] in its implementation plan (Davies, 1970, pges. 170-171). Nevertheless, it seems fair to say that the states basically responded to Congressional direction in establishing the required water quality standards, even if the speed and adequacy of these responses is open to debate.

6.4. Conclusions

Table 6-1 below summarizes the findings discussed above regarding Congressional direction and water policy implementation during the era of supportive federalism. The table and the discussion above suggest that the federal government did implement the Congress's statutorily directed policy changes in most of the cases reviewed during this era. Overall, seven of the nine (78%) major policy changes occurring during this era appear to have produced policy outputs consistent with Congressional directions at the federal and state levels. The two cases of clear implementation failure identified here relate to the wastewater treatment assistance and abatement and enforcement roles under the 1948 Act. Both of these cases are instructive, as the difficulties experienced in these cases provide clues as to limitations on the ability of Congress to control the implementation of the statutes it enacts, ex ante.

The federal government's failure to implement a loan program for municipal wastewater treatment plant construction and the states' failure to respond to it are traceable to the simple fact that there was no money appropriated for this purpose. Clearly, Congress can direct that federal agencies implement specific statutory provisions, but if it does not provide funds – or provides wholly insufficient funds – its statutory direction is not likely to be implemented. In this kind of situation, the federal agency cannot implement Congress's directions for lack of resources, and the states have no reason or incentive to respond. While this is a relatively extreme case because no funds were appropriated at all, the same logics and concerns arise when funding is clearly insufficient for the purposes it is supposed to serve – a situation that has been quite common in water pollution control in the post World War II era.

The federal government's poor performance in enforcing against polluting entities under the 1948 enforcement conference procedures testify to a second impediment to Congressional control and "compliant" policy implementation – the soundness of the implementing statute. For, in this case, Congress produced enforcement procedures that yielded no incentives for action, and were quite cumbersome even such incentives did exist. The lesson here, it seems, is that if Congress wants to ensure ongoing administrative compliance with its wishes, it needs to develop statutes that provide incentives for action and do not require Herculean efforts to carry out – a lesson that continues to be valid to this day.

Table 6-1 - Congressional Policy Change and Implementation: The Supportive Era

Congress's Policy Directions	US Government Policy Outputs	State Policy Outputs	Major Problems? If so, why?	Policy Impacts & Outcomes
Assistance to State Programs, 1948-71				*Federal Laboratory & financial support to State programs.
Assistance	Yes	Yes	No	
Model Laws	Yes	Yes	No	*Water Pollution Program Improvements in many of the states
$ to States	Yes	Yes	No	
$ For Wastewater Treatment				
Wastewater Loans, 1948	No	No	NA, no money was appropriated	*None
Wastewater Grants, 1956 (expanded in the 1960's)	Yes	Yes	No	*Thousands of wastewater plants built or expanded. *Substantial state and local funds contributed.
Abatement and Enforcement				
1948 Procedure	No	No	NA, statute provided no incentive for action.	No major impact.
1956 Procedure (expanded: 1961)	Yes	Yes	Yes, cumbersome process & technically complex to ascertain polluter responsibility.	Unclear impact, although there were at least 30 enforcement conferences by the end of the 1960's.
Water Quality Standards				Yes, substantial development of State Water Quality Standards in the late 1960's, although not all states developed fully acceptable standards. Continued difficulties in reducing pollutant loads due to uncertain effluent standards.
1965 Required for Interstate Waters	Yes	Yes	Yes, a technically complex task, charged with political conflict.	
1966 Incentives for Water Quality Standards for Intra-state waters	Yes	Yes	No.	
	7 of 9	7 of 9	4 of 9	

7. THE PREEMPTIVE ERA, 1972 – 1986

"… the federal government does have a role to play in this country's effort to control water pollution. The present supportive role is probably insufficient to achieve the rapid elimination of the problem. Because water pollution is emerging as one of the nation's most urgent concerns, the national government should not hesitate to take all steps necessary to solve the problem. If an imbalance in federal-state relations is the price that must be paid to avoid a water crisis, it seems well worth the cost."

Joseph Abkin, 1969 (p. 103)

"… the federal Congress sent its relatively austere national water pollution program to the Public Works Committee of the Senate and House for an adjustment and it came out as the fanciest environmental protection act ever developed. In addition, the driver of the vehicle had changed. When the program entered the Public Works Committees' shops, it was driven by the States with the Federal Government leaning far forward in the back seat engaged vigorously in backseat driving. When the vehicle emerged, the Federal Government was at the wheel…."

Congressman Charles B. Roe, Jr.
(Quoted in Leiber and Rosinoff, 1975, p. 7).

These two quotations reflect the mood of the times in the late 1960's, and Congress's reaction to it several years later. As Professor Abkins' comments suggest, water quality problems and public concern with them were increasing during this period of time. Public outrage over the "death" of Lake Erie, fires on the Cuyahoga River in Ohio, and a series of major oil spills, as well as vocal environmental protests created a political environment that was susceptible to major policy change. In this context, debates over proper relationships between the federal government and the states were overshadowed by the more important need to deal with water pollution problems that many believed held the potential to threaten life itself.

Congressman Roe's comments, by contrast, reflect the magnitude of the policy changes that Congress made in enacting the 1972 Federal Water Pollution Control Act (FWPCA). Its passage over President Nixon's veto by overwhelming margins in both the House and the Senate reflected a move toward a new and more directive era of water pollution control in this country [1]. The provisions of the new Act made it clear that Congress and the federal government now intended to *direct*, rather than simply support, state water pollution control programs. While the 1965 Water Quality Act had declared water pollution to be of nationwide concern, the 1972 Act established ambitious and specific national goals for "waters of the United States." It also undertook a massive new effort to preempt state authorities, establish a new set of federal procedures and standards, and expand the supportive assistance that was already being provided.

This chapter reviews major preemptive and supportive policy changes made by Congress during the years between 1972 and 1986, and assesses the extent to which these changes were actually implemented by EPA and the states. In general it finds that – in spite of suggested criticisms to the contrary (Lowi, 1979) – most of Congress's directions were indeed implemented by EPA and the states, although only after encountering significant implementation difficulties in a number of cases. Despite the difficulties encountered, however, EPA and the states did implement most of Congress's directions in some fashion and, in so doing, exerted continuing influence on policy outputs at both the federal and state levels. The chapter reviews the major new preemptive policy changes first, and then looks at major policy changes that were supportive in nature. It closes with an overview of the policy changes made by Congress during the preemptive era and the manner in which they were implemented.

7.1. Statutory Direction and Implementation: The Era of "Preemptive Federalism"

Because of the magnitude and importance of the changes made by Congress beginning in 1972, it is appropriate here to provide a broad overview of the policy changes enacted during this new "pre-emptive" era prior to analyzing specific policy changes and the manner in which they were implemented. As is noted above, Congress clearly put the federal government – and the new EPA – in the driver's seat of water pollution control policy during this era. The 1972 legislation delegated to EPA substantial leverage over states, municipalities, and private sector actors in order to accomplish its new and ambitious water quality goals. Most important in this regard was the fact that Congress added a new set of "pre-emptive" federal authorities to the existing arsenal of federal programs and authorities.

These new preemptive authorities included a national set of technology based effluent standards for point source discharges, a new national permit program for municipal and industrial dischargers, drastically expanded federal enforcement authorities, and language requiring the translation of water quality standards into specific permit limits when technology based controls were insufficient to assure achievement of ambient water quality standards. These new and "partially" preemptive policies enabled the federal government to issue permits and take enforcement actions directly, while also allowing states to establish more stringent permit requirements and to carry out enforcement efforts of their own. Minimum federal effluent standards based on available technology were to be established, and both the states and the federal government were required to abide by them. These technology based standards became the new first line of defense in the federal government's ambitious effort to combat water pollution.

Congress supplemented these new preemptive tools of federal water pollution management with expanded resources and authorities to support state water pollution programs. By far, the most significant of these expansions was the massive increase in funding for the construction of wastewater treatment plants, but other forms of assistance to state water pollution programs were also expanded. These changes made in the 1972 Act were later supplemented by adjustments made in 1977 and 1981, and these acts served to fill in details that were not laid out clearly in the 1972 Act and also scaled back the ambitiousness of the overall effort in targeted areas.

The narrative that follows provides a specific discussion of major policy changes made by Congress during the preemptive era, as well as an assessment of the manner and extent to which EPA and the states implemented them. In each case, the analysis is designed to determine whether EPA and the states complied substantially with Congress's statutory direction. The discussion begins with a review of the 1972 Act's preemptive authorities – the national technology based effluent standards, the national permit program, the new concurrent enforcement authorities, and the process identified for translating water quality standards into effluent limits for NPDES permits. These analyses are then followed by a review of major statutory changes made in the EPA's supportive policies by the 1972 Act, and an assessment of the manner in which they were implemented. The specific areas of focus here include Congress's expansion of the construction grants program, its grants for state water pollution programs, its research and technical assistance, and its renewed efforts to assist states in developing planning mechanisms for their water pollution control activities.

7.1.1. The New Preemptive Policies

Congress's most significant policy changes in the preemptive era involved providing specific directions to state water pollution programs, under direct threat of federal regulatory action for non-compliance with these directions. The four major elements of this new preemptive policy approach are discussed in turn below.

7.1.1.1. Technology-Based Effluent Standards

The defining element of the 1972 Federal Water Pollution Act was a series of technology based effluent standards that were to be developed by EPA, and used as a basis for developing limits on the amounts of particular pollutants discharged to the nation's waters by both Publicly Owned Treatment Works (POTWs) and industrial establishments. These standard "technology based" effluent standards (or "guidelines" as they are frequently called) were to be developed by EPA according to the type of facility discharging wastewater effluents, and used as the basis for developing effluent limits applicable across the entire country. Under the law passed by Congress, industrial dischargers were required to meet "best practicable technology (BPT) limits by 1977, and "best available technology (BAT) by 1983. POTWs were required to have "secondary treatment" in place by 1977 (Freeman, 1990, p. 107).

Congress later altered these baseline requirements in the 1977 Clean Water Act (CWA) [2]. This Act extended the "best available technology" (BAT) deadline for industry from 1983 to 1984 (CQ Almanac, 1977, p. 699). This one-year extension, however, was only a minimal reprieve for industry – as it was added primarily to give EPA time to incorporate toxic pollutant controls more fully into its BAT regulations. The 1977 Act also extended the deadline for municipal compliance with secondary treatment standards from 1977 to 1983 for municipalities whose problems were due to delays in federal grant funding support (CQ Almanac, 1977, p. 699). In addition, it also provided more specific direction requiring EPA to address specific categories of toxic pollutants [3] in setting technology based effluent limits, and added a new category of pollutants, "non-conventional" pollutants, that included pollutants that were neither "conventional" nor "toxic." [4]. The deadline for controls on these non-conventional pollutants was in 1987, rather than 1984 as was the case for the BAT standards. In spite of all of these technical changes made by the 1977 Act, however, the central concept remained the same – to develop and implement nationally applicable standards based on technological capabilities to serve as minimum requirements for the development of effluent limits in NPDES permits.

While the new technology based standards were in many ways the centerpiece of the new act, the ambitious timetables included for the promulgation of the effluent guideline regulations – and the provisions made for citizens to sue the EPA for non-compliance with the Act [5] – pretty much guaranteed a high level of judicial involvement in the development of the new technology based standards. In general, the 1972 Act required the promulgation of effluent guideline standards by one year after the date of enactment – in 1973. However, in retrospect, given the complexity of the task of characterizing the effluents of multiple industrial categories on a nationwide basis and of adhering to the procedural requirements of the Administrative Procedures Act (APA) and the FWPCA itself, it is now quite clear that this was a highly unreasonable deadline. Perhaps not surprisingly, therefore, EPA had not promulgated even a single effluent guideline regulation by the time the one-year deadline arrived (Freeman, 1990, p. 112). The agency was then sued by a host of environmental groups and the actual implementation schedule for the effluent guideline regulations then became a focus of negotiation between the EPA, environmental groups, and industrial groups in the courts (O'Leary, 1993, pges, 23-46). The results of these court cases were then factored into Congress's consideration of the 1977 amendments to the act, and – as is noted in the discussion above – this resulted in a set of more lenient and arguably more reasonable deadlines.

In spite of these difficulties, however, the application of best practicable technology requirements to industry proceeded relatively quickly, *all things considered*. While EPA was not successful in promulgating all of the BPT regulations by the July 1, 1977 deadline for industry compliance, it was able to promulgate a number of them (Freeman, 1990, p. 112). And even though these regulations also engendered court actions of various kinds [6], industrial compliance rates were relatively high. About 80% of industrial dischargers met BPT requirements by 1977, and approximately 96% of industrial dischargers were in compliance with these standards by 1981 (Freeman, 1990, p. 112). These accomplishments were significant. For it was estimated that full compliance with the BPT standards would result in approximately a 65% reduction in industrial discharges of oxygen demanding material, an 80% reduction in industrial discharges of suspended solids, a 21% reduction in oil and grease, and a 52% reduction in dissolved solids (Freeman, 1990, p. 113). While no comparable figures were available for BCT and BAT limits (Freeman, 1990, p. 113), there is little doubt that the implementation of these technology based controls by regulated parties would also lead to significant reductions in pollutant loadings to the nation's waters.

However, the promulgation of regulations for best available technology and secondary treatment requirements presented even more difficulties than the regulations and controls for best practicable control technologies. For the BAT regulations required that EPA address a large range of toxic substances, and compliance with the secondary treatment regulations required the direct cooperation of numerous local governments that had competing political priorities. While EPA did fail to implement regulations on toxic pollutants as required by Section 307 of the Act within the one year timeframe, it was eventually able to promulgate regulations applicable to toxic pollutants that were specified by court decisions and written into the Act by the 1977 Clean Water Act amendments (O'Leary, p. 25). By April 1985, EPA had established effluent guidelines for 24 industrial categories under the effluent guidelines program (BNA, 1986, p. 476), according to Marv Rubin, Branch Chief of Analysis and Support in the Effluent Guidelines Division. According to Myrick Freeman, by 1988, EPA had issued effluent guidelines for all but one category of discharger (Freeman, 1990, p. 112).

The EPA's implementation of the technology based requirements of the 1972 Act was clearly not consistent with the deadlines Congress had established, but the Act's requirements were in fact implemented eventually. The delays, it seems, were primarily due Congress's unreasonable expectations regarding the rate at which legally defensible and complex regulations for a wide range of industries and discharges could be developed. In addition, when the technology based standards were finally implemented (after many a court case!), they appear to have been implemented in a manner that was at least generally consistent with the Act. And finally, it does appear that the eventual implementation of the technology-based standards in the Act did lead to impacts that were consistent with what Congress had intended. The EPA established a series of national effluent standards based on available technologies for many of the most polluting forms point source discharges, and these standards provided the basis for legally applicable wastewater effluent limits on individual discharges through their inclusion in the new system of federally authorized discharge permits.

7.1.1.2. NPDES - The National Wastewater Permitting Program

While the new technology based standards were the defining element of the 1972 law, the Act's most important single element was a new nation-wide permitting system for point source water pollution discharges. For this new permitting system put the federal government in the business of managing water pollution discharges directly, rather than just assisting and overseeing efforts by the states to do so. Indeed, it was the mechanism through which the new technology standards were to be given meaning and impact.

Briefly, the new program – entitled the National Pollutant Discharge Elimination System (NPDES) – authorized wastewater discharges to the waters of the United States only in cases where a permit was issued consistent with section 402 of the Act. Discharge permits were to be issued by EPA directly, or State water pollution programs if they met minimum federal requirements. States were to be explicitly authorized to administer the new permitting program by EPA, based on program descriptions developed specifically for that purpose. Under the "partial" preemptive provisions of the Act, the state program had to be at least as stringent as the federal program to be approved by EPA, although it could also establish requirements more stringent than those imposed by the EPA. Even after authorization of a state program, however, EPA retained the power to revoke state program authorizations and veto individual permits developed by that state. Thus, through the new permit program, EPA – not the states – became the primary regulator of pollution discharges to the nation's waters. While states maintained authority and flexibility to act in this area, the new law's partial preemption provisions limited its authorities to policy measures that operated above and beyond minimum federal requirements.

While the new technology based effluent limit regulations were to provide the core elements of the discharge limits that were to be included in the NPDES permits issued, the Act also provided for permit limits that were based on state water quality standards and best professional judgment (Sections 302 and 402, respectively – see EPA, 1996 for further explanation). The water quality based limits were to be implemented in cases where the technology based limits were not stringent enough to ensure that water quality standards were actually achieved in the receiving waters, while the Best Professional Judgment (BPJ) limits were used in lieu of technology based limits in cases where national technology based standards had not yet been developed or where adjustments to these standards were necessary to establish appropriate requirements for particular facilities. Viewed as whole, the new water pollution permit program provided for baseline national minimum effluent requirements, more stringent requirements when necessary to accomplish water quality goals, and relatively strong oversight tools for ensuring that regulations and permits issued by states were consistent with minimum federal requirements.

The EPA placed significant emphasis on establishing the new permitting program enacted in 1972. The first NPDES permits were issued after passage of the new FWPCA in 1972 and by the end of 1974, the new EPA had issued over 14,000 permits (Mintz, 1995, p. 27). Because of the delays in the issuance of the required technology based effluent standards, however, many of these initial permits were developed on the basis of BPJ rather than the new technology based standards (USEPA, 1996). By 1982, EPA and the states had issued 63,000 permits for wastewater discharges under the NPDES program, and

– by that time – a number of them were subject to minimum technology based limits established by the Agency through regulation. About 41,000 of these permits were issued to industrial dischargers, while the remaining permits were issued to municipal dischargers (ASIWPCA, 1984, p. 9).

There is also evidence that these permits were effective in reducing pollutant loadings to the nation's waters. In 1984, for example, the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) reported that industrial facilities had invested substantially in wastewater treatment facilities between 1972 and 1982, and that these investments were resulting in higher rates of compliance with industrial wastewater treatment requirements (ASIWPCA, 1984, pges. 6 & 9). They also reported improved wastewater treatment services to communities and reduced pollutant loads. By 1982, sewage discharges from 142 million people in the United States were treated at the secondary treatment level or better, an increase of 57 million people served by this level of wastewater treatment (ASIWPCA, 1984, p. 9). This improvement represented an increase of over 50% during the ten-year period between 1972 and 1982. Conversely, the number of sewer lines carrying raw untreated sewage to surface waters dropped substantially during this same decade. In 1972, about five million people contributed untreated wastewater to the nation's waters, while the number doing so in 1982 had dropped to about 1 million. Not surprisingly, these improvements in municipal wastewater treatment also led to reductions in pollutant loads to the nation's waters. The ASIWPCA reported a 46% reduction in oxygen demanding substances discharged to the nation's waters between 1972 and 1982, in spite of an increase of 12% in oxygen demand substances entering wastewater treatment plants. According to ASWIPCA, if wastewater treatment plants had not been built at a rate that exceeded the growth of water pollution discharges, the amount of oxygen demanding pollution discharged to surface waters in this country would have increased by 191% during the decade [7].

States also sought, and obtained, authority to administer the NPDES program within their jurisdictions. California was the first state to seek and obtain NPDES authorization in May of 1973. By the end of 1975, twenty-six states had received authorization. And, by the end of the era in 1986, thirty-six states had sought and received approval to administer the NPDES program in their states (USEPA, 2001B). In the late 1970's and early 1980's, the EPA also began to authorize states to administer other portions of the NPDES program within their boundaries, as states were offered the opportunity to regulate wastewater discharges from federally owned facilities, industrial users of municipal sewage systems, and discharges subject to statewide general permits [8]. By the end of 1986, thirty states had sought and received authority to regulate federal facilities, and twenty-four states had authorized pretreatment programs. Eleven states had sought and received authority to issue federally recognized general permits within their jurisdictions. More detailed information on state authorizations to administer the NPDES program is provided in Part III of this work.

Clearly, EPA had implemented the NPDES permit program expeditiously, even though it was forced to rely more heavily on heavily on BPJ mechanisms for establishing permit limits than it might have hoped in the early years. And states had also shown a strong interest in the new permit program. By the end of the preemptive era in 1986, about two-thirds of the states had obtained EPA authorization to administer the program within their jurisdictions.

7.1.1.3. Enforcement

While the new permit program was critically important because it established a floor of minimum requirements for water pollution treatment by point source dischargers, it was equally important because of its effects on the enforcement process. The new Act established clear authorities for the federal government to enforce directly against polluting industries and municipalities, thus eliminating the cumbersome conference procedures that had dominated federal involvement in enforcement during the supportive era. This change alone reduced substantially the effective barriers to adequate enforcement.

The permit provisions of the Act also made the process of carrying out individual enforcement actions much easier. Prior to the 1972 Act, enforcement was often conducted on the basis of observed water quality problems and/or violations of ambient water quality standards. It was undertaken when discharges led to clear and present problems in the receiving waters, of which the burning of the Cuyahoga River is probably the most well known example. In practice, however, this kind of enforcement process was difficult and cumbersome to administer because it required a demonstration that problems in the receiving waters were actually caused by the actions of particular dischargers. While this could be a difficult thing to ascertain even in the best of circumstances, it was particularly problematic in cases where there were multiple discharges to particular water bodies.

The new NPDES permit program streamlined this process by making point source wastewater dischargers accountable to specific effluent discharge limits in their permits, regardless of the impact of their discharge on the receiving waters. In so doing, it established a far more workable enforcement process because it allowed regulatory agencies to hold dischargers accountable for their discharge directly, and did not depend on the multitude of complex interactions that take place after the discharge mixes with the receiving waters. And of course, added to this simplified enforcement scheme were direct EPA authorities to take federal enforcement actions where they saw fit – in states with and without EPA NPDES program authorization. EPA became "the gorilla in the closet," to use Administrator Ruckelshaus' language, that could back up state enforcement actions and take action directly when states were reluctant to do so.

These new authorities to enforce permit limits directly in all states throughout the country were backed by strong language that created an obligation for the Agency to act forcefully upon discoveries of non-compliance. While the Act made provision for the EPA administrator to notify states and provide them with thirty days to enforce against violators of the act, it also created an obligation for the Administrator to issue administrative orders or refer cases to the Department of Justice (DOJ) for litigation if states failed to respond appropriately (Government Institutes, 1998, FWPCA, Section 309). Moreover, to these strong federal authorities and substantial enforcement obligations, Congress added authorities for "citizens" to sue dischargers (or EPA) for non-compliance in cases where EPA and/or the States did not take action. Thus, even if the "gorilla" was sleeping or otherwise incapacitated, these highly decentralized citizen enforcement powers led to a greater likelihood that NPDES permit requirements would be enforced in particular circumstances. Clearly Congress did intend that EPA and the States would enforce both the Act and the discharge permits issued under it.

From this discussion, it should be clear that some of the most important changes in the new approach to water pollution control ushered in by Congress in the 1972 Act related to enforcement. There is also substantial evidence that the EPA – and its first three administrators, William Ruckelshaus, Russell Train, and Douglas Costle – responded to these changes seriously. There is also widespread and continuing evidence, however, that the enforcement processes established were not fully effective in ensuring compliance with water pollution requirements (PennEnvironment Research and Policy Center, 2002, for example).

In the early years of the EPA, water enforcement received significant attention, in regard to both methods of enforcement and actual enforcement activities. In December of 1970 (the year EPA was established and took over water quality program operations from the Department of Interior), President Nixon issued an executive order requiring that the legal authorities for discharge permits under the old 1899 Refuse Act be applied to water pollution discharges. For the first two years of EPA's existence, both permitting and enforcement activities were carried out under this legal authority (Bastow, 1986; Mintz, 1995) in order to avoid some of the previously mentioned difficulties associated with the old conference procedure [9]. What is more, Mintz (1995) reports that the size of the enforcement staff quintupled in the first two years of the Agency's existence. He also points out that EPA faced difficulties because there was not all that much federal law to enforce. With the passage of the 1972 Act, however, this difficulty was relieved by the new NPDES permit program, and future enforcement efforts were guided primarily by violations of permit requirements, rather than by their resulting effects on ambient water quality.

Perhaps ironically though, the new permit program initially had a weakening effect on the EPA's enforcement efforts, as enforcement staff members were drawn from enforcement related activities to assist in the issuance on the new permits required by the Act (Mintz, 1995, p. 27). From the early to mid 1970's, EPA enforcement efforts were undertaken largely through informal means and administrative actions as opposed to litigation through case referrals to the Department of Justice. These forms of enforcement allowed the agency to avoid the large resource commitments that litigation requires. This changed in 1977, as Douglas Costle – President Carter's new EPA administrator – and other Carter administration officials at EPA initiated a stronger and more forceful agency posture in enforcement generally (Mintz, 1995, pges. 27-33). All of this changed once again, of course, in the early 1980's with the election of Ronald Reagan and the appointment of Anne Gorsuch (later Burford) as EPA administrator. During the early 1980's, enforcement efforts at EPA were drastically reduced and the reaction to these actions in Congress and elsewhere played a substantial role in the undoing of President Reagan's first team of appointees at EPA (Mintz, 1995, pges. 40-60).

The statistics on formal EPA enforcement actions largely support this line of events. The Table below outlines formal enforcement actions taken by EPA between 1972 and 1988, dividing them between Administrative Actions and litigation referrals to the DOJ.

Table 7-1 - Formal Water Enforcement Actions, 1972-1988**

Year	Administrative Actions*	Civil Referrals (DOJ)
1972	0	1
1973	0**	0**
1974	0**	0**
1975	738	20
1976	915	67
1977	1,128	93
1978	730	137
1979	506	81
1980	569	56
1981	562	37
1982	329	45
1983	781	56
1984	1644	95
1985	1031	93
1986	990	119
1987	1,214	92
1988	1,345	123

Source: Russell, Clifford, 1990.
* Includes actions relating to both wastewater and drinking water.
**The table does not include early water enforcement conference actions taken under the 1899 Refuse Act. These were the primary forms of enforcement undertaken in the early 1970's prior to the issuance of permits under the new NPDES program.

As Table 7-1 demonstrates, EPA formal water enforcement referral actions taken under the 1972 Act and its successor statutes started out slowly between 1972 and 1975, as the first rounds of NPDES permits were being issued. Starting in 1977, the incoming Carter administration increased pressures within the Agency for stronger enforcement actions, particularly referrals to the DOJ. Consequently, EPA formal enforcement actions increased during this period. However, actions began to drop off precipitously in the early 1980's during the Gorsuch/Burford administration, and then rebounded in the mid to late 1980's under the leadership of Administrators William Ruckleshaus and Lee Thomas. State governments were also taking enforcement actions during this era. For example, for the year 1982, ASIWPCA reported that there were 1223 "significant" facilities [10] in significant noncompliance. Of these facilities, the states had subjected 61% to pre-administrative enforcement actions, 23% to administrative actions, and had referred 11% for judicial action (ASWIPCA, 1984, p. 10). Overall, these figures suggest a clear state enforcement presence in the aggregate, although they appear to emphasize relatively informal enforcement mechanisms.

While enforcement statistics represent an important way to assess bureaucratic fidelity to Congress's statutory wishes, it is also appropriate to assess the extent to which the regulated community actually complies with water pollution laws and regulations. For, it is compliance – not enforcement, per se – that is the goal of agency enforcement. As many critics have pointed out, however, there were continuing compliance problems in the water pollution regulatory arena during the 1970's and 1980's, just as there continues to be today. There is also evidence, however, that rates of compliance improved during this time period – particularly among industrial dischargers (ASIWPCA, 1984). In analyzing compliance with water pollution requirements (or any other environmental requirements for that matter) it is important be clear about definitions of compliance. Violations of regulations or requirements can be either technical and inconsequential or broad and substantive, or somewhere in between. In general, those with an interest in demonstrating compliance problems tend to use more technical criteria that yield larger rates of non-compliance, while those seeking to minimize compliance problems tend to focus on only the most egregious violations [11]. The truth, of course, lies somewhere in between.

Using relatively strict definitions of compliance, there is little doubt that non-compliance with water pollution control requirements was widespread throughout the pre-emptive era, and continues to be today (PennEnvironment Research and Policy Center, 2002). For example, a series of studies conducted by the General Accounting Office in the early 1980's found widespread evidence of non-compliance – particularly in municipal wastewater treatment plants. One study found that up to 86% of the treatment plants surveyed by GAO had violated their discharge permits at least once a year, and 32% were in serious violation (USGAO, 1983, as sited by Freeman, 1990, p. 113). Violations were caused by a variety of factors including design and equipment deficiencies, overloads from storms and leaks, and inadequate operations.

However, the compliance picture during the pre-emptive era changes somewhat if one focuses on the major milestones required of industrial dischargers [12]. Eighty to ninety percent of industrial dischargers met the initial requirements for best practicable technology set forth in their permits by the July 1, 1977 deadline, for example (CQ Almanac, 1977, p. 702). Toward the end of this era, the states themselves reported that large industries had increased their levels of compliance with water pollution related requirements (ASIWPCA, 1984). Even by these more lenient criteria, however, municipal wastewater treatment plants continued to experience compliance problems throughout the era. "Fewer than a third" of the 12,800 POTWs needing to upgrade their facilities were able to meet the July 1, 1977 deadline for secondary treatment (1977 CQ Almanac, p. 705). Relatively high rates of municipal non-compliance continued through the mid-1980's and led to EPA's establishment of the National Municipal Policy (NMP) in the mid 1980's. It required, and to a significant degree achieved, improved compliance of municipal treatment plants by the late 1980's.

The implementation record of EPA and the states reflects continuing efforts to carry out the relatively strong language of Congress, although this effort during the pre-emptive era was not strong and consistent. The fluctuations in EPA enforcement efforts across Presidential administrations that are outlined above are well documented, and state governments during this era had an inclination to use a larger and less formal array of enforcement tools than are specifically authorized to EPA under the Act

(ASIWPCA, 1984). These fluctuations in EPA efforts and state tendencies to rely on more informal kinds of enforcement actions – along with the realities of limited enforcement resources – have led EPA and the states to focus primarily on large and continuing violations rather than smaller violations of short duration. They have also – inadvertently – helped to foster a strong environmental enforcement presence in the non-profit sector, as environmental groups representing "citizens" have repeatedly taken EPA and polluting dischargers to court in order to address violations that may not have been receiving substantial attention of federal and state regulatory agencies. And, while discharger compliance with the requirements of the 1972 Act generally improved during the pre-emptive era, discharger non-compliance remained a significant problem throughout the era. In short, the enforcement outputs desired by Congress were produced, but they were produced somewhat inconsistently and with only partial success in achieving the impacts they were intended to achieve. Federal enforcement actions were far more prevalent during the preemptive era than during the supportive era, but they also fell far short of what is necessary to ensure effective and continuing compliance, or achievement of the FWPCA's ambitious goals.

7.1.1.4. Water Quality Standards -- Translating Standards to Permit Limits

While the new effluent based permitting program – along with the new technology based standards and federal enforcement authorities that accompanied it – was clearly the centerpiece of the 1972 Act, it did not completely replace the water quality standards approach that had been initiated in 1965. Rather, Congress continued and supplemented the federally required water quality standards efforts that began in 1965 by constructing statutory mechanisms for translating water quality standards into effluent limits in NPDES permits. In this sense, Congress essentially built a new US water pollution control effort on top of the water quality standards program that already existed. While these water quality based provisions were clearly secondary to the technology based effluent limitation provisions – indeed the Conference Report on the bill said this rather explicitly (Lieber and Rosinoff, 1975, p. 102)[13], they did provide a water quality based foundation for future regulatory efforts. As one House staff member mentioned in reference to Section 303 of the Act which contributed key elements to this new approach, there was a need to provide a "game plan for the next generation" after the new technology based controls had been implemented (Houck, 1999, p. 24).

In the 1972 Act, Congress left existing state water quality standards in place, and provided some additional support for their continuing development. Section 304 of the Act directed EPA to develop and publish detailed water quality information and guidelines (later called water quality "criteria") to assist the states in setting and updating water quality standards. The new Act required that states review their water quality standards at least every three years (Section 303 c), but the initiative for changing or upgrading standards was left to the states. They were required to submit proposed changes in water quality standards to EPA, but neither the law nor the politics of the times during the early part of the pre-emptive era created substantial incentive for these standards to be upgraded on an ongoing basis. The focus at the time was on the new technology based standards and the permits through which they were to have impact. Not surprisingly, in this context, state water quality standards were not the primary focus of federal and state water pollution efforts, and existing state water quality standards remain subject to criticism (Houck, 1999, p. 141).

Congress did, however, include more specific direction relating to the translation of water quality standards to effluent limits and other pollution control strategies in other parts of the new Act. In section 303 d, Congress required states to both establish priority rankings of waters not meeting water quality standards and develop total maximum daily loads (TMDLs) specifying the pollutant loads that those waters could assimilate without violating water quality standards. These loads, in turn, were to provide the basis for waste load allocations which could be used as a basis for establishing permit limits and other control measures that were stringent enough to ensure compliance with water quality standards. In addition, Sections 302 and 402 of the Act required that NPDES permits be more stringent than technology based limits in cases where more stringent limits were necessary to achieve water quality standards. These Water Quality Based Effluent Limits (WQBELs) – as they were called – applied to any pollutant for which the state had developed water quality standards, and these included both specific pollutants and narrative standards that prohibited toxicity.

The EPA and the states were – at the very best – *extremely* slow in implementing the TMDL requirements specified in Section 303. Indeed, it is fair to say that these requirements were not substantially implemented during the fourteen years constituting the "pre-emptive era". After publishing an initial proposal that outlined pollutants for use in the TMDL process in 1973, EPA waited until 1978 to issue regulations triggering state submission of the TMDL listed streams required under Section 303d – and even this occurred only after court order (Houck, 1999, p. 50). These regulations were far from ambitious. They required states to submit only "one or more" water bodies for TMDL priority ranking (Houck, 1999, p. 51), a requirement that was tailor made for a minimalist response. And, indeed, the response was minimal. Some states submitted a few lists, and others submitted none at all (Houck, 1999, p. 51). The EPA appeared to pay little attention to them, in any case. Subsequent EPA regulations specifying how TMDLs were to be accomplished were issued in 1983, but these regulations again placed rather little emphasis on the timely submission of TMDLs (Houck, 1999, p. 52).

Despite the lack of attention being paid to TMDLs and their relationship to water quality standards, federal and state permit writers do appear to have been paying at least some attention to water quality based permits. EPA Guidance issued in 1985 placed substantial emphasis on water quality based effluent limits (EPA, 1985), ones that could be based on rather limited data and could be implemented without the water body identification and prioritization processes outlined in Section 303 d. There is also evidence that permit writers were issuing permits containing WQBELs. A 1987 Office of Technology Assessment (OTA) study, for example, included an EPA estimate that approximately 40% of major municipal permits were based in some manner on water quality standards (OTA, 1987, p. 205) [14]. Permits more stringent than required by the federal technology based standards were apparently being issued, but they were apparently being issued without the full planning processes that Congress had envisioned lying beneath them. But, as per Congress's written intention, the WQBELs were being issued. As noted above, the same could not necessarily be said of the TMDL lists required by Section 303d.

Thus, while the 1972 Act left the old supportive water quality standards approach in tact, EPA and the states did not place a high priority on implementing it – at least in comparison to the new effluent standard provisions of the Act. The relatively low priority that EPA placed on implementing the TMDL portions of the Act grew from several sources. The general skepticism of the water quality standards based regulation that was prevalent during the previous era and during the debate over the 1972 Act was probably one reason. Congress's overall lack of concern with the TMDL process was another reason (see explanatory note 13), as was the fact that much of this skepticism grew from Senator Muskie's office, and a number of his staff members went on to fill high level positions in EPA (Houck, 1999). There were also competing priorities and limited resources, as the most significant EPA efforts during this time period were applied to the establishment of the new technology standards, the new permitting program, and subsequently permit requirement enforcement as well.

The states, to the extent that they did implement the TMDL requirements, also appear to have responded to EPA's belated actions in this area in minimalist fashion. As late as the year 2000, EPA acknowledged that the states had not adequately followed through on the TMDL requirements in the Act (Fox, 2000), and this admission was re-enforced by outside observers (Houck, 1999). In retrospect, therefore, it appears that a skepticism of water quality standards based regulation borne from years of rhetoric and debate, multiple priorities and limited resources, and the lack of ongoing EPA and Congressional concern got the better of the 1972 Act's TMDL provisions. Even so, it also appears evident that federal and state permit writers developed and required WQBELs in NPDES permits, although – in all likelihood – their efforts in this area were not as extensive as they might have been if the TMDL provisions had been fully implemented. It is, nevertheless, significant that these kinds of limits were issued in the first place, as they suggest an effort on the part of Federal and State regulators to implement the kind of permit program that Congress had envisioned. They just did not view it as a program grounded in a sophisticated set of TMDL's.

7.1.2. Expanding the Federal Governments Supportive Efforts

To a substantial extent, Congress also put its money where its mouth was in the preemptive federalism era [15]. In total, the 1972 Act authorized almost $25 billion in water pollution related expenditures between 1972 and 1975 (CQ Almanac, 1972, p. 709), but the vast majority of these monies were to be used in implementing a massive expansion in the federal government's assistance to state and local governments – primarily for the construction of wastewater treatment facilities. The federal government's investment in supportive policies was therefore substantial by almost any criteria, except the true magnitude of the water pollution problem and the ambitious goals of the act itself. The bulk of the authorized funds were devoted to increasing the grant funds available to municipalities for wastewater treatment plant construction, but there were also increases in technical assistance and funding to support planning by the states.

7.1.2.1. Construction Grants Program Expansion

Congress provided a massive amount of money to support the construction of wastewater treatment plants in the 1972 Act. It authorized a total of approximately $18 billion for grants to construct wastewater treatment facilities between 1972 and 1975. These monies were to support the construction of more municipal wastewater treatment plants, and they also increased the proportion of project costs that could be paid for by the federal grants to 75%. The 1977 Act added still more funding to the construction grants program, after EPA had been slow in disbursing the original $18 billion authorized in 1972, due at least in part to President Nixon's decision to impound portions of the funds Congress had appropriated for this purpose. Congress also increased the annual funding levels for the years between 1979 and 1982 by $500 million over the amounts provided in FY 1978 (CQ Almanac, 1977, p. 698).

These substantial funding increases were halted, however, in the early 1980's with the advent of the Reagan administration. The 1981 amendments to the Act reduced both the aggregate authorization, and the proportion of project costs to be covered by federal construction grants. The total funds authorized for construction grants were reduced to $2.4 billion annually from about $5 billion (CQ

Almanac, 1981, p. 515). In addition, the federal matching share under the construction grants program was reduced from 75% to 55%, although this change did not actually take effect until 1984 (CQ Almanac, 1981, p. 515). Thus, while Congress was taking its first steps away from its long commitment to wastewater treatment plant construction grant assistance (a prelude to the experimental era that followed), this commitment remained strong in comparison to the amount of funding provided during the supportive era in the 1950's and 1960's.

Implementation of the expanded construction grants program was one of EPA's major priorities in the 1970's and 1980's. However, it got off to quite a rocky start in the early to mid 1970's, as the Nixon administration refused to expend substantial portions of the monies appropriated by Congress. President Nixon impounded a total of approximately $6 billion of the $11 billion in funds appropriated for this purpose between 1973 and 1974 (CQ Almanac, 1977, p. 700) – a clear violation of Congress's statutory direction. However, these funds were eventually expended, after the case was brought to the Supreme Court and decided in favor of the plaintiffs and against the Nixon administration [16]. The end result was that the unexpended monies were eventually allocated for projects, and reduced the need for Congressional appropriations in subsequent years. In 1977, for example, Congress appropriated no new funds for construction grants program because of the large amount of unobligated funds still available (CQ Almanac, 1977, pg. 279 and 283).

In spite of these initial difficulties, Congress invested $34.9 billion to support wastewater treatment plant construction for municipalities between 1972 and 1982 (ASIWPCA, 1984). These monies were given to states based on distribution procedures provided for in statute, and the states – in turn – allocated the monies to projects within their states. The EPA was frequently criticized for being slow in getting grant monies out to the states for distribution to local governments for projects, and these criticisms were acknowledged by senior officials within the agency [17]. Nevertheless, the grants did get out. John Rhett, the EPA's Deputy Assistant Administrator for Water Operations, reported that EPA had made 9,443 grants by 1977, and the total funding for these federal grants was $11.9 billion (CQ Almanac, 1977, p. 700). By 1981, 13,000 grants had been awarded (CQ Almanac, 1981, p. 517).

States participated in the program quite broadly. More than 30 states had used up their allotments for construction grant funds in 1977, although some states were slow in preparing and submitting their applications (CQ Almanac, 1977, p. 700). In that same year, Mr. Rhett reported to Congress that seven states and the district of Columbia were in danger of losing monies allocated to them because of application delays, and that New York City could lose up to $300 million because its financial condition was making it difficult to come up with the required 25% local matching funds (CQ Almanac, 1977, p. 700). A number of states also contributed their own funds to these programs. Between 1972 and 1982, a total of $5 billion in state funds were contributed to wastewater treatment projects within their jurisdictions (ASIWPCA, 1984, p. 8). The ASIWPCA also reported that these state supplements to the program were contributed by a number of different states. In all, thirty-nine states supplemented USEPA construction grant funds with their own funds (ASIWPCA, 1984). In addition, the federal and state expenditures for construction grants were substantially supplemented by local expenditures. Between 1972 and 1982, local governments spent a total of $14.9 billion on wastewater treatment control projects (ASIWPCA, 1984, p. 8). Clearly then, the construction grants program did have a significant influence on state and local water pollution program outputs, as state and local governments continued to contribute substantial resources for wastewater treatment projects within their states as supplements to the federal funds provided.

There is also substantial reason to believe that these projects had significant impacts on pollutant loadings to the nation's waters, although it is difficult to know for sure whether to attribute them to the construction grants program that funded them or the permitting program that required them (see footnote 7). However, to the extent that construction grant monies did contribute to treatment improvements independent of the new NPDES permit requirements, the loading reductions achieved were indeed significant. For, as was noted above in the discussion of the impacts of the NPDES permitting program, the numbers of people served by "secondary" wastewater treatment systems increased by over 50% during this era (ASIWPCA, 1984), and pollutant loads of oxygen demanding substances were drastically reduced as well (ASIWPCA, 1984).

The actual outcomes flowing from these outputs and impacts, however, are less clear. In fact, numerous studies were conducted during the era that attempted to tie the construction grants program to actual improvements in water quality. The GAO alone conducted at least 18 studies of the construction grants program between the late 1970's and the mid 1980's (CQ Almanac, 1981, p. 517). And these studies were supplemented by evaluative efforts by EPA and the states. There were numerous specific success stories reported. In 1977, for example, Mr. Rhett reported that one of EPA's studies found that fecal coliform counts had dropped significantly in 65% of areas it monitored, while dissolved oxygen and phosphorus levels improved in 40% (CQ Almanac, 1977, p. 700). However, in larger context, the dominant conclusion reached was that existing data did not provide sufficient information to substantiate conclusions regarding the impact of the construction grants program on water quality nationwide (USGAO, 1986).

In spite of this stated uncertainty regarding water quality outcomes, it is clear that EPA undertook a massive implementation effort to distribute grant funds to states, and that the states responded to this effort. States did provide construction grants to POTWs on a nationwide basis, frequently after contributing funds of their own. It is also clear that loadings of pollutants typically discharged by municipal wastewater treatment systems were significantly reduced during this era, although it is admittedly quite difficult to differentiate between the impacts of permit requirements and the impacts of federal subsidies that made compliance with them easier to achieve. And, while the studies conducted in the mid 1980's could not document a clear connection between this massive funding effort and water quality improvements, it is hard to imagine that this connection was completely absent. Whether it was ultimately the optimally cost-effective approach, of course, is another question altogether [18]. The fact remains, however, that – in spite of persistent opposition from President Nixon in the mid 1970's – the federal government and the states did (eventually) respond to Congressional mandates in this area, and that positive impacts were achieved even if those impacts fell well short of the Act's ambitious goals.

7.1.2.2. Technical Assistance: State Program Assistance and Planning

While Congress focused heavily on the new preemptive elements and the expanded construction grants program in the 1972 Act, it also remained committed to providing support and assistance to state and local water pollution control programs in the 1970's and 1980's. In the new Act, Congress formalized its financial assistance to states in a grant program authorized in Section 106 of the new Act. It also expanded the research and technical assistance provided to the states in both the 1972 and 1977 legislation. And finally, Congress established new policy requirements to build planning capabilities at the state and local levels. While state program planning related provisions appeared throughout the Act, the most important of these provisions were probably the grants provided under section 208 of the new Act.

Congress authorized a total of $135 million for the 1972 - 1975 period (CQ Almanac, 1972, p.709) for state program management under section 106 of the Act, a substantial increase over the $10 million annual authorization that was in place prior to that time (Lieber, 1975, p. 108). Funding for these grants was also increased incrementally throughout the remainder of the preemptive era (ASIWPCA, 2001A). Under the Act, the EPA Administrator was given authority to distribute these grant funds in accordance with the need of the state and/or reasonable costs of operating the state program. In administering this section after its enactment, the EPA provided a base 50% allocation for basic operating costs, and then distributed the remaining funds as "bonuses" for carrying out specific and desired program elements, such as gaining NPDES permit program authorization, planning, and monitoring, for example (Leiber, 1975, 108-109). Clearly, therefore, EPA sought to use these grants to encourage states to develop certain aspects of their programs, consistent with the directive tone that predominated during this era.

Congress also enacted a series of new technical assistance and research efforts in the 1972 Act and its subsequent amendments. These efforts included funds for technical assistance and training, research and demonstrations on toxic and onsite wastewater pollution, and a variety of other efforts. For example, Sections 104 and 109 of the Act authorized a variety of technical assistance activities to support municipal compliance with the NPDES permitting program. In the 1977 amendments, Congress also established new and more aggressive financing provisions in the construction grants program to support alternative wastewater system demonstrations for small communities, while also expanding technical assistance available to address problems associated with pollution from septic tanks and other kinds of onsite wastewater treatment systems. It also authorized the establishment of a National Clearinghouse for Onsite Wastewater Management, and took other steps to encourage greater use of alternative wastewater treatment approaches in smaller communities (CQ Almanac, 1977, pges. 697-700).

Congress also enacted a number of potentially important planning provisions during the pre-emptive era. Indeed, a number of statutory sections in the FWPCA – 102, 106, 201, 208, 209, and 303 – included planning requirements of varying sorts. Probably the most important and ambitious of these efforts was the Act's area-wide wastewater planning effort authorized by Section 208 of the 1972 Act. It was the only one of these provisions to specifically focus on non-point source water pollution as well the point sources that were the major focus of the Act, and it did so through mechanisms that envisioned strong area wide planning efforts that were at least somewhat independent of traditional state agencies with responsibility for water pollution control. Briefly, this portion of the Act authorized the EPA Administrator to make 100% federal grants to states to cover administrative expenses of planning agencies that were responsible for developing comprehensive water quality control plans for river basins, bays or lakes, although the federal share was to be reduced to 75% after three years (CQ Almanac, 1972, p. 710). Congress authorized a total of $300 million for this planning effort between 1972 and 1975.

After the establishment of EPA policies relating to the designation of these planning agencies, States were to designate the water bodies and planning agencies responsible and submit them to the EPA for approval. The plans developed by these planning agencies were to identify necessary treatment works, establish construction priorities, and generally guide pollution control decision-making relating to the water bodies within their jurisdictions. The EPA was authorized to make grants directly to these designated agencies, as opposed to funneling the monies through state water pollution agencies. In the 1977 Clean Water Act amendments, Congress took further steps to address area-wide planning and non-point source water pollution. It authorized an additional $150 million over three years (1978-1980) for area-wide planning and also authorized extended 100% grants to states for this purpose in cases where grants were made prior to October 1, 1977 (CQ Almanac, 1977, pges. 698).

While it is reasonably clear that EPA implemented the state grant and technical assistance programs substantially as envisioned by Congress, the Agency's compliance with the 208 planning requirements is open to question. Following the provisions of the new Section 106 grant program, the EPA did increase grant funding provided to the states, and the states used these monies to plan and build their programs over the course of the era. While some observers have criticized the Agency's use of "bonuses" to encourage particular sets of program activities (Leiber and Rosinoff, 1975, pges. 108-110), the language of Section 106 is reasonably clear regarding the Administrator's discretion to apportion funds according to either need or reasonable program costs, and the latter provision would seem to be quite consistent a system of bonuses in which additional funds are provided as the state takes on new program elements. A number of the research and assistance efforts were also carried about by EPA to support state water pollution programs. The research program on onsite wastewater management in the late 1970's, for example, yielded findings and information that are still used in that area. In addition, EPA established wastewater operator training centers authorized in sections 104 and 109 of the Act with state support, and many of these centers continue to conduct wastewater operator training to this day [19].

While there is also little doubt that Section 208 of the Act was eventually implemented, it is equally clear that EPA was slow in implementing this provision and showed little enthusiasm for the planning portions of the law in general. The EPA's strategy paper for implementing the new act – dated April 30, 1973 (Allayaud, 1979, p. 27) placed the 208 planning process in the lowest priority (Allyaud, 1979, p. 27), and subsequent agency efforts sought to subsume it under the statewide continuing planning processes required under Section 303 (Lieber, 1975, p. 102). The Agency was eight months late in issuing initial guidance for the selection of planning agencies eligible for funds, and the guidance itself was quite stringent – thus restricting the number of agencies that might be nominated and the proportion of authorized funds distributed (Lieber, 1975, pges. 103-104). By January 1975, only thirty areas had been designated by the states as covered by regional water quality planning agencies (Allayaud, 1979, p. 28). Eventually, the EPA was successfully sued by the Natural Resources Defense Council (NRDC) in 1975 (Allayuad, 1979, pges. 28-29), and the Agency was then forced to implement the 208 planning requirements more aggressively. Consequently, the states designated more planning agencies and 208 plans were written all over the country.

The EPA's reluctance to implement Section 208 fully was grounded in several sources. First, and probably most important, Administrator Ruckelhaus openly opposed the Section 208 planning requirements. And second, the independent planning agencies authorized to receive funds from the Act were not always supported by the states, and held the potential to duplicate and confuse existing planning processes. Ruckelshaus's comments to the House Public Works Committee allude to these concerns.

> "Basin wide, regional and metropolitan planning are already required pursuant to regulations governing waste treatment facilities construction grants. Moreover, new special purpose authorities should not be created without regard to other planning underway or without regard to important functions of other levels of government" (as quoted in Allayaud, 1979, p. 26).

In addition, the plethora of planning provisions included in the Act would be confusing to just about anyone, and probably had the effect of inhibiting overall planning and coordination – quite the opposite of Congress's rather clear intention. Consequently, statutory construction also appears to have served as an obstacle to the success of planning efforts in general. And finally, while Congress did clearly want to encourage planning, it was also particularly concerned about the new permit program and the construction grants efforts. Consequently, the EPA focused most of its energies in implementing these sections, often to the detriment of other sections of the Act – including those relating to planning.

In general, while EPA and the states clearly implemented the state funding and technical assistance related policy changes in some manner, the impacts and outcomes flowing from these implementation efforts are somewhat less certain. The continuing addition of new program delegations under NPDES (discussed briefly earlier in this chapter, and in more detail in Part III), and the growing capabilities of many states both testify to at least some level of impact relating to these implementation efforts (John, 1994). Other likely impacts included new state water pollution regulations and controls, technical assistance for citizens and organizations dealing with water pollution problems, and the availability of training courses for wastewater operators to name just a few. However, while we can be reasonably certain of these impacts, they are not easily quantified or tabulated in terms of their effects on water quality outcomes.

The impacts and outcomes of the planning processes implemented are significantly less certain than the impacts and outcomes of the state grant and technical assistance programs. While it is clear that many plans were written, it is not clear that many of them were in fact implemented; for, they were not required to be implemented under the law. The result was a lot of planning, but relatively little action. Houck describes the situation this way,

> "It is useful to recapitulate what states and EPA were doing all this time … They were "waste treatment planning" under Section 201. They were "statewide water quality management planning" under Section 208, and "basin planning" under Section 209 ….they were … looking for the magic bullet that would translate abatement measures from paper to practice, and it never materialized. Not for want of encouraging regulations. Not for want of funding. Basically, for want of a bottom line." (Houck, 1999, p. 135).

Thus, despite legitimate criticisms and significant delays, the EPA and the states did eventually implement the planning processes that Congress had asked for. But Congress had not specifically required them to carry out the plans, except for those specific and non-controversial components – like wastewater treatment plants and specific non-point pollution projects – that they funded themselves. The overall water pollution control planning structure was not accountable in any systematic way to the federal government for achieving actual basin-wide results. Consequently, while the 208 planning processes may very well have been helpful in guiding decision-making in a general sense and –more specifically – in relation to the funding of construction grants, the Act provided no clear leverage to ensure their broad implementation. As a result, to this day, "208 plans", as they are frequently called, often gather dust on shelves around the country.

7.2. Conclusion

Even a cursory review of the literature relating to US water pollution policy in the 1970's and 1980's will make one aware of numerous shortcomings in federal and state water pollution control policy and administration. Criticisms were abundant both at the time, and in retrospect. What is more, the criticisms have been made by groups in all corners of the environmental policy playing field. Environmental groups say the policies were not sufficiently protective. Industry groups and economists say the Act and its implementation was too costly. State and local governments say that EPA was heavy handed, and one could also argue on the EPA's behalf that Congress played a heavy handed role by enacting a statute that itself was unworkable in important respects. What is more, the criticisms extend to many aspects of the enacted law, including construction grants (CQ Almanac, 1981, p. 516), area-wide wastewater planning (Allayaud, 1979, pges. 24-33; Leiber and Rosinoff, 1975, pges. 100-108), technology based controls, and enforcement. The specific criticisms are also numerous and varied. They include missed statutory deadlines, unnecessary over-spending (Freeman, 1990), running rough-shod over states rights (Leiber, 1975), and heavy handed enforcement (Mintz, 1995, Chapter 2). The States have also been criticized for their lackluster implementation of the water quality standards provisions and TMDL requirements, among other things (Houck, 1999). While most, if not all, of these criticisms carry at least some kernel of truth, they do not tell the whole story.

A balanced reading of the literature on water pollution control, the discussion above, and the summary table below also reveal substantial compliance with Congress's statutory directions, and a number of policy successes accompany the more publicized difficulties. At the end of the preemptive era in the mid 1980's, EPA and the states had implemented Congress's preemptive policy directions, and – in so doing – created legally binding controls on about 65,000 water pollution dischargers nationwide. As a result, federal and state agencies, as well as citizens groups, throughout the country had gained clear legal recourse to enable compliance with these controls to reduce pollution discharges to the nation's waters, and they frequently used those legal pre-rogatives to reduce pollutant loadings and to improve water quality conditions. Funding administered by federal and state agencies had led to the construction of wastewater treatment plants in municipalities all over the country. These were Congress's highest program priorities during this era, and they were implemented with substantial success. The result was that the discharge of raw untreated liquid wastes had become an unusual exception rather than a common occurrence in waters throughout the United States.

A review of Table 7-2 above provides a snapshot of the policy changes enacted during this pre-emptive era, and an overall picture of their implementation. At the federal level, EPA substantially implemented eight of the nine major policy changes addressed in this era, with the new TMDL provisions going substantially un-implemented. Because the technology standards were to be developed by EPA and not the states, only eight major policies identified in this analysis were to be implemented by the states. Of these, seven major policy changes appear to have been implemented by a substantial number of states in some fashion, with the TMDL provisions again serving as the problem child. Nevertheless, in spite of substantial delays and difficulties in some cases, it is clear that the federal government and the states did implement the vast majority of major policy directions provided by Congress during this era. The delays and difficulties encountered during this era were, however, quite significant. Of the nine major policy changes implemented, significant difficulties were encountered in two-thirds of them.

Table 7-2 - Congressional Policy Change and Implementation: The Preemptive Era

Congress's Policy Directions	Federal Policy Outputs	State Policy Outputs	Major Problems? If so, why?	Policy Impacts and Outcomes
Directive Policies				
Technology Standards	Yes, but late	N/A	Yes, major delays due to unrealistic timelines, technical complexity, & limited resources.	Available standards for use in permits to reduce pollutant loads.
Permit Program	Yes	Yes	No, a Herculean effort to issue 1000's of permits in short order.	Thousands of Permits Reducing Pollutant Loads
Enforcement	Yes, but extent varies over time with Presidential Administration.	Yes, but vigor of enforcement varies among the states.	Yes, variable enforcement over time & many un-enforced violations due to variations in the views of political leaders & limited resources.	Improved enforcement in comparison to supportive era, but still high rates of non-compliance.
Water Quality Based Effluent Limits (WQBEL)	Yes, although through guidance more than oversight	Yes, although inconsistently & perhaps without adequate basis in TMDL planning.	Yes, some problems due to limited resources & uncertain technical foundations.	More stringent permit limits, where WQBELs were implemented.
Total Maximum Daily Loads	No, major delays & unjustifiably weak regulations.	No, only occasional implementation, at best.	N/A, not implemented due to other priorities & limited resources.	Weak technical foundation for priority setting, & -- in some cases WQBEL's also.
Supportive Policies				
Construction Grants	Yes, but late	Yes	Yes, massive delays due at least in part to Nixon impoundment.	Thousands of grants, and huge increases in the use of secondary treatment.
State Program Aid	Yes	Yes, although outputs not always clear.	No	Increased State Capabilities
Technical Assistance and Research	Yes	Yes	No	Available Technical Support for States
Planning	Yes, but late.	Yes	Yes, delays due to lack of interest among politicians -- Ruckeslhaus opposition	Unclear, at best.
	8 of 9	**7 of 8**	**6 problem cases**	

A brief overview of some of these implementation difficulties is instructive. The EPA's failure to complete a full system of technology based regulation in one year was as much a function of the technical complexity of the task, unrealistic deadlines, and insufficient resources, as it was any failure on the part of EPA. The continuing delays in the Agency's implementation of the expanded Construction Grants Program were largely attributable to President Nixon's decision to impound appropriated funds and the legal and political controversies that ensued as a result, as well as the inherent enormity of the chore. And, failures by the EPA and the states to implement water quality plans, and develop and implement Total Maximum Daily Loads can be attributed to the secondary importance accorded to those activities by influential members of Congress providing managerial direction to the Agency regarding its priority activities. Finally, the EPA's failure to implement the expanded construction grants program and the new 208 planning requirements in timely fashion had roots in the opposition of influence executive branch officials, although a proliferation of statutory planning requirements and the confusion associated with them also played a significant role in this case.

The overall argument being made here is that EPA and the states implemented the new FWPCA largely as Congress intended, and the evident flaws in implementation resulted primarily from problems of technical complexity, variable levels of commitment among political leaders, insufficient resources, and poor statutory construction. After each passage of law during this era, the EPA and most of the states sought to do what Congress directed most of the time. For the most part, they do not appear to been shirking from Congressional intent; rather, they were seeking to implement statutory directives that were clear in broad direction, in a technically complex environment characterized by disagreements among politically appointed officials and limited resources. In spite of these problems, however, the reality is that by the end of the preemptive era in the mid 1980's, EPA and the states had produced most – although clearly not all – of the policy outputs that Congress had directed in statute a decade and a half earlier, at least in some fashion. These outputs, in turn, led to numerous policy impacts that were consistent with Congress's intentions, even though the overall policy outcomes fell well short of Congress's ambitious goals.

While EPA and the states clearly did not achieve the outcomes they had sought during the pre-emptive era – the elimination of all wastewater discharges by 1985 and the full restoration of the integrity of the nation's waters, the outputs they produced were largely consistent with Congress's directions and appear to have had significant positive impacts in relation to the stresses American society places on its water resources – impacts that were also clearly in line with Congress's intentions. The federal bureaucracy and the states were not under the strict control of Congress, but they were clearly not running away from it either.

Consequently, it seems apparent that Congress's ex ante instructions were clear in broad direction and the federal government and the states made pretty good progress in implementing them during this era – all things considered. Congress's statutory direction provided the authorities that federal and state bureaucracies could use to make progress in cleaning up the nation's waters, in spite of substantial disagreements among politically influential groups at the national level and limited resources. The failure of EPA and the states to achieve the goals of the Act were more a function of Congress's ambitious goals than a function of major and un-reversible failures in federal-state implementation. Viewed in this context, the analysis provided here suggests clear support for the argument that Congress's ex ante directions structure federal level policy outputs and influence policy outputs in the states. Consequently, the results of this analysis are consistent with those of the supportive era, and the results from both eras support the first two hypotheses presented in Part I of this work. With these thoughts in mind, we now turn to analysis Congressional direction and water policy implementation in the current experimental era.

8. THE CURRENT EXPERIMENTAL ERA AND CONCLUDING THOUGHTS

> "… the nation's environmental policy (is) in the midst of a fundamental transition. Assumptions that formed the foundation for laws in the 1970's (are) being replaced by new ideas. National debate, however, (is) lagging behind." (p. IX)
>
> "During the 1990's the EPA …….attempted to reform the reforms of the 1970's to reduce the political tension between new needs and old laws, without waiting for Congress to Act. …. Whether these actions are the beginning of a transition to more effective national action or whether they are simply temporary coping strategies is not yet clear." (pges. 69-70)
>
> "The idea that bold national policy required a system of strict legislated deadlines and uniform directions that tied the hands of bureaucrats has been replaced, for the time being, by congressional gridlock and administrative experimentation, amid signs that the real influence of federal rules may be diminishing." (p. 89)
>
> Mary Graham, in *The Morning After Earth Day*, 1999

While the quotations above were made in reference to US environmental policy as a whole, they aptly describe the state of water pollution policy at the turn of the twenty-first century. In comparison to the two eras preceding it, the current era of water pollution control has not been characterized by extensive legislative activity. Only one major piece of legislation focusing primarily on the Federal Water Pollution Control Act (FWPCA) has been enacted over the last decade and a half – the 1987 Water Quality Act (WQA). While Congress has supplemented this major legislation several times, the statutory directions provided in these cases have generally been narrowly targeted and – in some cases – they have been rather simple responses to administrative initiatives and experiments undertaken by EPA. Overall, therefore, the current era has been one of administrative experimentation, rather than strong Congressional leadership like that which occurred in the supportive and preemptive eras. Throughout the current era, however, the 1987 WQA has provided the foundation upon which a number of experiments in water pollution control policy have taken place.

Like the other chapters in this Part, this chapter outlines significant changes in statutory direction made by Congress and uses existing literature to assess the extent to which the federal government and the states have implemented Congress's directions. And once again, the focus is on major policy outputs at the federal and state levels, although some attention is also given to impacts and outcomes. Where implementation has been absent or particularly problematic from national and multi-state perspectives, the discussion also provides brief assessments of the obstacles that have led to this state of affairs. While much of this discussion amounts to a summary assessment of EPA and state implementation of the 1987 WQA during the experimental era, it also extends to Congress's targeted interventions undertaken after passage of the 1987 Act. The chapter closes with a summary of federal agency and state fidelity to Congress's directions in water pollution control during the entire post World War II period, and a brief discussion of the implications of the historical analyses presented in this Part for Congressional influence on the policymaking process.

8.1. Congressional Direction and Policy Implementation

Congressional attention to water pollution control was relatively heavy toward the end of the pre-emptive era in the mid 1980's, and this attention finally culminated – after an override of President Reagan's veto [1] – in passage of the 1987 WQA. In some respects, the 1987 Act itself was a continuing mid-course correction that adjusted US water pollution policies to both changing circumstances and identified concerns with the policies created in the preemptive era. This targeted approach was echoed by Congress in the relatively few subsequent pieces of significant water quality related legislation that it passed after the 1987 WQA.

Congress included a mix of preemptive and supportive statutory changes in the 1987 WQA. It sought to increase regulatory attention to problems that were not dealt with effectively by existing pre-emptive policies – most notably, waters polluted by toxic substances and the control of pollution from storm water runoff. The 1987 WQA also sought to implement new and largely supportive policy efforts in non-point source water pollution abatement, geographic water quality management, and wastewater infrastructure financing. These major WQA initiatives were later supplemented by targeted

Congressional interventions focused on encouraging strategic management and redirecting proposed changes in the Agency's Total Maximum Daily Load (TMDL) program proposed by EPA.

The analyses that follow show, once again, that EPA and the States followed through on Congress's statutory directions in most cases. And, as was the case in the two previous eras, implementation efforts encountered difficulties in some cases and did not always yield the kinds of policy impacts and outcomes that Congress had envisioned. Inadequate resources and the complexity of the problems themselves once again constrained the effectiveness of EPA and state water pollution policies in achieving sought after policy effects. In this case, however, the statutory directions provided reflected a rather tentative and experimental form of Congressional direction in comparison to the stronger leadership exercised by Congress in the two previous eras. The result was relatively consistent implementation of Congressional directions that were best characterized as targeted and responsive to administrative experimentation, rather than expansive and ambitious.

8.1.1. Preemptive Policy Changes

In the 1987 WQA, Congress expanded the NPDES permit program to address problems that had not been dealt with adequately in the previous era. More specifically, it sought both to reduce toxic pollutant loads to ambient waters with known pollution problems and to regulate storm-water discharges from industrial sources and larger municipalities through pre-emptive policy mechanisms. In 2000, Congress also took decisive action to strike down aggressive new TMDL regulations sought by EPA during Administrator Browner's tenure in the Clinton administration. These major Congressional policy changes will now be discussed in turn.

8.1.1.1. Expanding NPDES To Focus on Toxic "Hot Spots"

In enacting section 304 l of the 1987 WQA, Congress took further action to reduce pollutant loads to waterways that were contaminated by toxic pollutants. In 1977, Congress had moved the process of controlling toxic water pollution forward by requiring the inclusion of requirements relating to toxics as a part of its technology based standards. In 1987, Congress went one step further. It required the states to submit to EPA lists of surface waters that were not expected to achieve compliance with state water quality standards for toxic pollutants after technology based controls were applied. It also required the states to identify point source discharges contributing to these toxic pollution problems, and to develop "individual control strategies" (ICSs) for reducing toxic pollutant loads to those waterways. The control strategies, in essence, required that NPDES permits be made more stringent in regard to the toxic pollutants identified as causing water quality problems and the changes made were supposed to be sufficiently stringent to achieve water quality standards within three years. Congress required that the EPA approve or disapprove of the control strategies proposed, and the agency was also required to identify the waterways affected by toxic pollutants and implement individual control strategies if the states failed to do so effectively – statutory directives that were quite consistent with the pre-emptive approach used in the previous era.

To a large degree, EPA and the states did implement these new sets of requirements. All but one state submitted lists of identified waters by the two-year statutory deadline, and included on their lists were a total of almost 500 polluted waters (Houck, 1999, p. 30). EPA subsequently added more waterways polluted by toxic substances to the list. When the list of waterways in need of ICS's was completed, the total number of polluting facilities subject to more stringent permit limits was more than 750. By July 1994, the states had converted 588 individual control strategies to permit requirements and this number had risen to over 675 by 1997 (Houck, 1999, p. 30). While we do not currently know the specific nature of these permit limit adjustments or their ultimate impact on the receiving waters to which they were applied, it is clear that EPA implemented the toxic hot spots requirements and state water pollution programs did the same thing – for the most part, in rather timely fashion. It also seems at least likely that these controls reduced toxic discharges to the nation's waterways to at least some degree – a clearly positive impact from the standpoint of Congress's goals in the FWPCA.

In spite of these apparently positive results, it is important to note that EPA and state implementation of the 304 l requirements left many potential toxic pollution problems unaddressed. A

1991 General Accounting Office study, for example, pointed out that many waters throughout the US were not assessed prior to the submission of these 304 l lists, and even those waters that were assessed may not have been assessed for all relevant toxic pollutants (USGAO, 1991). What is more, while ICS's were required for almost 700 facilities, it is not clear whether the control strategies implemented were sufficient to correct the toxic water pollution problems identified through the effort. Consequently, it seems clear that while EPA and the states followed through in implementing Congress's directions, the specific impacts and overall outcomes of those efforts remain unclear.

8.1.1.2. Expanding NPDES To Focus On Storm-Water Discharges

The 1987 WQA also required EPA to undertake a larger and more aggressive effort to regulate storm-water discharges from industrial and municipal facilities, and this has resulted in estimates of drastically increased permitting workloads [2]. Through new storm-water provisions (Section 402 p) passed in 1987, Congress established a phased system for permitting discharges of storm-waters to ambient waters. In the first phase, EPA was required to issue regulations applicable to large municipalities and industrial storm water dischargers with separated sewer systems. In the second phase, EPA and the states were to conduct a study of smaller storm-water discharges, and then issue regulations governing permitting requirements for these sources based on the results of the study.

EPA and state water pollution programs have taken a number of steps to implement the new storm-water requirements of the 1987 WQA, although these steps were taken later than Congress had required. EPA issued its phase I storm-water regulations in 1990, twenty-one months after the statutory deadline (Copeland, 2001A, p. 8). These regulations required that cities with populations of 100,000 or more obtain a permit for storm-water discharges associated with any municipal separate storm-water sewers in their jurisdictions. The regulations also required other entities to obtain an NPDES permit for discharges from sites with industrial activities, including construction activities that disturb 5 acres or more of land. States and EPA Regional offices were also permitted to bring additional municipalities and industrial entities within the purview of these new regulations if they deemed it necessary. The new storm water regulations are administered by NPDES authorized states in all but six cases where EPA administers the NPDES program. As of April 2001, about 1,000 medium and large municipalities were covered under these regulations (USGAO, 2001, p. 8). The number of non-municipal facilities covered by these regulations is larger still.

The EPA issued its final phase II regulations for medium size municipalities in December of 1999 (USGAO, 2001), roughly six years after the statutory deadline for their issuance. These regulations extended the Phase I regulations to municipalities in urban areas with populations of less that 100,000 and other areas designated by the states, and these smaller municipalities were required to provide their permitting authorities with a notice of intent to be covered under state issued general permits by March, 2003 (NETCSC, 2003). The regulations also expanded controls on non-municipal storm-water discharges. Land disturbing activities involving 1 to 5 acres were now to be regulated under the Act (NETCSC, 2003).

It is important to note, however, that the numbers of facilities covered by both phases of the new storm-water regulations is extra-ordinarily large, numbering close to 400,000 (OIG, 2001A, p. 7, 2001). As a result, these program changes effectively multiplied the size of the NPDES universe by a factor of almost seven without a commensurate increase in NPDES resources (2001A, p. 35 and USEPA, 2001D). Not surprisingly, therefore, both permitting and enforcement of these discharges is still quite spotty and limited by available resources (OIG, 2001A). It is safe to say, therefore, that the impacts of storm-water regulation have not yet been fully felt – at least in relation to the medium size communities falling within the scope of the phase II regulations. While it is clear that EPA and the states have made efforts to comply with Congress's directions on storm-water regulation, the adequacy of these efforts – and the impacts and outcomes associated with them – are at best unclear. Given the size of the regulated community and the resources devoted to the effort, there is reason for skepticism.

8.1.1.3. TMDL's: One Step Forward and Two Steps Back?

Congress has also played an important role in steering the EPA's resolution of the TMDL issue that was thrust upon it by environmental groups, the courts, and its own failure to act aggressively in this area during the pre-emptive era. In a clear message to EPA in the summer of 2000, Congress indicated that it was not interested in extending preemptive federal regulatory authorities to non-point sources of water pollution when it prohibited the agency from expending resources on new and more aggressive TMDL program regulations proposed by the Clinton administration.

In the mid to late 1990's, the Clinton administration initiated a series of efforts to strengthen its non-point source water pollution programs. In 1998, for example, efforts to address non-point source water pollution concerns received a boost from the issuance of the Administration's Clean Water Action Plan, which was a government wide effort to integrate water pollution related programs and activities. After numerous court cases and a major Federal Advisory Act Committee study (Boyd, 2000; Copeland, 2001A; Houck, 1999), the Clinton Administration followed up on the issuance of this strategy with the issuance of new and more aggressive regulations for the development of "Total Maximum Daily Loads" (TMDLs) for impaired water bodies.

These new TMDL regulations were complex and could be the subject of a book in their own right. Briefly, however, they tightened the processes used for EPA oversight of state specification of impaired water bodies and the actions necessary to return them to water quality standards compliance under the TMDL program. Implicit in these new regulations, however, was the concept that states must take whatever actions were necessary to achieve water quality standards – up to and including direct regulation of non-point water pollution sources. However, while direct regulation of non-point sources may be necessary in some cases to achieve state water quality standards, it is not at all clear that EPA has the authority to regulate these sources directly if the states refuse to do so. And this has been a major sticking point.

During the summer of 2000, Congress expressed a clear statutory view on this subject. It attached a rider to a military appropriations bill that specifically prohibited EPA from using monies appropriated to it to administer the new TMDL regulations (Fox, 2000). Once again, Congress had spoken clearly – and it suggested that non-point sources were to be dealt with through supportive rather than pre-emptive federal policy approaches. EPA has (again) complied with Congress' direction. It has not implemented the new regulations. In July of 2001, Christine Whitman – the Bush (II) Administration's first EPA Administrator – announced that the Agency needed another eighteen months to study the TMDL issue (USEPA, 2001C). Shortly thereafter, on August 3, 2001, the Agency released a cost estimate for implementation of the TMDL program to be between $900 million and $4.3 billion annually (USEPA, 2001E). In the meantime, the agency is studying the issue further in hopes of finding an acceptable compromise between the FWPCA goal of fishable and swimmable waters and the recent Congressional requirement that the Clinton Administration's TMDL regulations not be implemented. At this writing, final action on the TMDL is scheduled for June 2004 on EPA's regulatory agenda (NETCSC, 2003). However, given the technical and political complexity of the issues involved and the Bush administration's apparently minimal interest in environmental and water policy issues, it seems likely that this schedule will be adjusted backwards for some time to come.

8.1.2. Supportive Policy Changes

The 1987 WQA also included several statutory changes that were not directly tied to the FWPCA's pre-emptive provisions. In broad terms, these legislative changes sought to implement activities to address non-point source water pollution problems, transition municipal wastewater treatment grant assistance to a more flexible and austere shared revenue financing mechanism, expand and create a series of new geographically based water pollution control programs, and develop a new strategic partnership between the EPA and the States for addressing water pollution issues. These supportive water policy initiatives, and EPA and state efforts to implement them, will now be discussed in turn.

8.1.2.1. Non-Point Source Water Pollution Control

Congress has taken significant actions to address non-point source water pollution over the last decade and a half. In Section 319 of the 1987 WQA, Congress required states to assess and develop management plans for non-point source water pollution problems. It also provided grant funding for these activities. While the states were required to develop assessments and management plans for dealing with non-point water pollution efforts, they were not required to take particular actions as was the case with the Act's preemptive program elements described above. However, these new NPS program efforts were important because they involved EPA in fostering not only planning – which had previously been done under Section 208 and other portions of previous acts, but also actual implementation measures to reduce non point source water pollution.

Congress has provided significant funding to states for implementation of the Section 319 program. It authorized $400 million for this new non-point source water pollution abatement effort for the years between 1988 and 1991. Between 1990 and 1999, monies appropriated for Section 319 grant funding totaled $876.5 million, including a substantial increase in 1999 when Congress almost doubled its appropriation for the program (USEPA, 2001F). Since 1999, the grant program has been funded at levels exceeding $200 million a year. The Act also gave EPA authority to disapprove of the assessments and management plans created by the states pursuant to the Act, and conditioned grant funding on these approvals.

In general, EPA and the states have implemented the new supportive non-point source water pollution controls largely as Congress has directed. By early 1992, all states had received approval of their assessment programs, while 44 states had had their management programs approved. Later that year, EPA disbursed its first grants totaling $38 million (EPA, 2001F). The remaining six states subsequently had their management programs approved and began receiving grants under Section 319h (EPA, 1994). As noted above, since that time, EPA has disbursed well over $800 million in funds to the states for the implementation of non-point source water pollution control projects. While the overall impact of these grants on state policy activism in non point source water pollution control is not completely clear, it is clear that they have led to significant positive impacts in selected areas (USEPA, 1994, 1997A, & 2002A). A more detailed analysis of state activism in NPS water pollution control and its relationship to Congressional direction is provided in the Part III of this work.

8.1.2.2. From Construction Grants to State Revolving Funds

In the 1987 WQA, Congress also made substantial changes in the federal government's long-standing policy of providing financial assistance to municipalities for wastewater treatment. It phased out the construction grants program, and replaced it with a new state administered loan program capitalized by the federal government.

The construction grants program was phased out, and not eliminated immediately. The 1987 WQA continued the $ 2.4 billion funding level for construction grants for the years between 1986 through 1988, dropped the authorization to 1.2 billion in 1989 and 1990, and eliminated it altogether in 1991 (CQ Almanac, 1987, pges. 292-5). For the remaining years of this program, the Act also required that a portion of the construction grants be set aside to address marine and coastal pollution, as well as combined and sanitary sewerage overflows (CQ Almanac, 1987, 295). So went EPA's long term commitment to directly subsidizing wastewater treatment – yet another nail in the coffin of the theory that government programs never end (Hogwood & Peters, 1983).

To capitalize the new state revolving fund, the Act also added a total of $8.4 billion in funding between 1989 and 1994 (CQ Almanac, 1987, p. 295). Congress provided still more funding in later years (Copeland, 2001B, p. 3). While the EPA has provided initial financing for the new Clean Water State Revolving Fund (CWSRF), the states were to maintain the funds' solvency through loan proceeds derived from the federal government's original capital investment. The CWSRF provisions also expanded the eligibility criteria for projects funded through the CWSRF to include not only the construction of POTWs, but also non-point source related water pollution projects and projects relating to estuarine protection. States were required to contribute a 20% match to the EPA capital grant funds, but could also supplement these funds further. Taken as a whole, these provisions reflect major Congressional decisions to reduce the federal government's commitment to the construction of wastewater treatment plants, as well as to increase the flexibility of states to direct monies toward a wider array of purposes – including the abatement of non-point source water pollution problems.

The CWSRF program was implemented rather quickly, and at least generally in the manner specified by Congress in the WQA. By mid 1997, the EPA had disbursed almost $13 billion in capitalization grants to the States, and the states had matched that with a total of $2.6 billion themselves (EPA, 1997, p. 4). In addition, some states borrowed additional funds which they invested in order to leverage still more funds for use in their states. As a result, a total of $21 billion in CWSRF funding was available by mid 1997 to support priority water quality projects. As of 1997, these funds had been used to make "approximately 5900 loans totaling $17.1 billion. The vast majority of these funds – $16.6 billion – have been used for wastewater treatment projects, while $531 million has been used to make loans in support of non-point source and estuarine protection projects". (USEPA, 1997B, p. 4). Once again, however, while many facilities are clearly impacted positively by receiving financial assistance through this funding mechanism, the specific outcomes of this implementation effort are not completely clear. Even so, the relative success of this implementation effort led Congress to duplicate this kind of statutory direction, as it included a similar program – the Drinking Water State Revolving Fund (DWSRF) – in its re-authorization of the Safe Drinking Water Act in 1996.

8.1.2.3. Geographic Initiatives

Another major policy change stemming from the 1987 WQA was the establishment of a series of new geographically based water pollution control initiatives. These initiatives responded to concerns relating to specific and highly valued water bodies, and sought to coordinate state and federal water quality improvement efforts in the areas surrounding those water bodies. While some of these geographic initiatives were specifically authorized in their own right, a large number of them were supported as a part of a new National Estuary Program (NEP). In total, Congress authorized between $200 and $300 million for these geographic efforts between 1986 and 1990 in the WQA (CQ Almanac, 1987, p. 294), and these programs have also been funded in subsequent years.

Congress included several major program elements in the new NEP. It sought to identify nationally significant estuaries that were threatened by pollution, promote their comprehensive planning and management, provide grant funds for technical work, and enhance estuarine research. Congress invited the nation's Governors to nominate estuaries for support under the program, and provided a list of sixteen estuaries that were to be given priority consideration under the Act. The 1987 Act also included specific authorization for a number of high profile programs targeted toward highly important and visible water quality problems, outside the scope of the NEP. These programs included the Great Lakes Program, the Chesapeake Bay Program, and a $100 million grant program directed specifically at Boston Harbor – a gift to a retiring Tip O'Neil and his loved ones in New England!

The EPA and the States have been active in implementing both the NEP and the other geographic initiatives authorized and funded under the 1987 Act. To date, twenty-eight estuaries have been nominated and selected for participation in the NEP. The EPA administers these estuarine programs by providing financial, planning, and management support to groups of committees that direct the program coordination and management activities on a regular basis (USEPA, 2001G). State government officials are active members of these committees, and the support provided creates a viable forum in which estuarine issues can be addressed.

Like the National Estuary Program, the separately authorized geographic initiatives also appear to have been at least generally administered in a manner consistent with Congress's statutory direction. While EPA had some involvement in water pollution control in all of these geographic areas prior to the 1987 act – particularly in the Chesapeake Bay and Great Lakes cases, the new law focused these efforts and provided clearer legislative sanction for more specifically tailored water pollution control strategies in these areas. EPA now had explicit legislative sanction to foster coordination among state governments in their actions to protect coastal areas and the Great Lakes. While significant water quality problems remain in these highly important water bodies and the actual impacts and outcomes of the efforts remain at least somewhat unclear, even casual observers of water pollution issues can discern increasingly focused and coordinated efforts by state governments and the EPA to address water quality problems in these areas in recent years. The signs one now sees on roadways, such as "You Are Entering the Chesapeake Bay Watershed", in and of themselves, provide evidence of this increased attention.

8.1.2.4. Strategic Management: A New Federal-State Partnership?

Legislation in the 1990's also gave rise to efforts to focus federal activity on critical policy objectives. For EPA and state water pollution programs, these processes were guided through several legislative enactments.

In 1995, EPA Administrator Browner and a number of state agency heads signed an agreement to establish the National Environmental Performance Partnership System (NEPPS). Broadly intended to improve federal and state relationships, the NEPPS was designed to increase state flexibility in the use of federal funds while ensuring that states were held accountable to clear standards of performance. The NEPPs was then clearly authorized by Congress in the 1996 Omnibus Consolidated Rescissions and Appropriations Act, which enabled the combination of funds from 16 different categorical grants for flexible state use (Kraft & Scheberle, 1998. p. 137). Within two years of the establishment of NEPPs, more than 40 states had signed up to participate in the NEPPS effort (NAPA, 2000, p. 151), either through more flexible grant funding arrangements or agreed upon performance indicators – or both. This increased state flexibility under NEPPS was followed in 1997 by legislative language authorizing the transfer of funds between the state water quality revolving fund and the newly created state revolving fund for drinking water (USEPA, 2000C).

In addition, through the Government Performance and Results Act of 1993 (GPRA), Congress also required Federal agencies to develop performance standards and use them to measure and account for progress on specific programs by March, 2000 (CQ Almanac, 1993, p. 196). EPA complied with this Act and has developed goals for measures for water pollution control (NAPA, 2000, p. 141). Taken together, the GPRA and the NEPPS constituted a major federal policy change relating to water pollution control and “accountable devolution”. In combination, they have set in motion a whole range of planning and management exercises that seek to provide agreed upon objectives around which Clean Water Act implementation by the States and EPA will be carried out. They – along with other changes discussed above – have also enabled states to have greater flexibility in using EPA grant funds to address environmental problems within their borders.

Nevertheless, while EPA and the states have clearly sought to implement these new strategic approaches, it is not yet clear that they have been effective in improving administrative performance, federal-state relationships, or policy effectiveness. To a large degree, the difficulties encountered here are inherent in the process itself. As William Gormley states,

> “Environmental performance measurement faces technical, political, and administrative challenges ……. Technically, it is not easy to measure desired outcomes, much less the impacts of government activities on such outcomes. Politically, state environmental agencies find themselves under pressure from a wide variety of overseers and interested publics, each of which favors different values, regulatory strategies, and measurement approaches. Administratively, state environmental agencies have trouble overcoming the skepticism of career civil servants, who may regard performance measurement as an unnecessary burden or a significant threat.” (Gormley, 2000, p. 7)

Perhaps not surprisingly in this context, Gormley also found that EPA and the states continued to specify measures in terms of outputs rather than outcomes (Gormley, 2000).

NAPA’s most recent report on EPA’s management improvement efforts also found that even the strategic management efforts themselves were the subject of competing goals and strategies (NAPA, 2000). It found that the GPRA and NEPPS efforts were not well coordinated with one another, with the effect that they held the potential to undercut each other’s success. While recognizing that progress in strategic management has been made, the NAPA study also found that the states and EPA needed to improve their use of performance measures and work harder to recognize each other’s roles in the environmental management process. Consequently, while it is clear that GPRA and NEPPS have led to the development of the required performance measures, the impacts and outcomes of these strategic management efforts remains quite unclear.

8.2. Policy Implementation in the Experimental Era: A Summary

Table 8-1 summarizes the narrative analysis presented above regarding Congress's statutory influence on water pollution policy implementation during the Experimental Era, 1987 – 2003. The evidence presented provides further support for the first two hypotheses presented in Part I, which suggest that Congress's statutory directions structure water pollution policymaking at the federal level and this, in turn, influences water pollution policy outputs at the state level.

As the Table indicates, there were no instances where major policy directions generated by Congress during this era were simply not implemented, nor was there a persistent pattern of major implementation difficulties and delays – in spite of the delays that have occurred in implementing the new storm-water requirements. One could also argue that the federal government's generally compliant performance has helped states become more compliant as well. Based on this review of the secondary literature, it appears that the states did generate lists and permit controls limiting toxic discharges in areas of particular water quality concern, and they have certainly been active in implementing the new CWSRF. States have also taken clear steps to implement new supportive policies in the areas of non-point source water pollution control, geographic initiatives, and new management strategies based on performance indicators. In all of these cases, federal efforts to implement policies consistent with Congress's directions have engendered similar efforts on the part of a substantial number of states.

Table 8-1 - Congressional Policy Change and Implementation: The Experimental Era

CONGRESS'S POLICY CHANGES	**Federal Policy Outputs**	**State Policy Outputs**	**Major Problems? If so, why?**	**Policy Impacts and Outcomes**
Directive Policy Changes				
*Toxic "Hot Spots" & Individual Control Strategies	Yes, although many polluted waters were left unaddressed.	Yes, although one state was late and EPA added waters missed by States.	No, although implementation might have been more aggressive.	Yes, about 750 ICS changes were made to reduce toxic discharges, but outcomes are unclear.
*Storm-water Permitting	Yes, although policy change not backed by sufficient resources.	Yes, although state permitting, monitoring, & enforcement is suspect.	Yes, a massive chore with little or no additional resources.	Unclear, although this may change -- Phase I restrictions are probably slowing discharges from some large entities, but permitting and enforcement is still questionable.
Prohibit EPA from Implementing New TMDL Regulations	Yes	N/A	No.	Unclear, except cost savings and un-achieved water quality benefits due to the prohibition.
Supportive Policy Changes				
*Non-point source (NPS – Section 319)	Yes, with some delay.	Yes.	No.	Yes. Clear positive impacts from individual projects, but unclear impacts nationally.
*Geographic Initiatives	Yes	Yes	No.	Unclear, but more multi-jurisdictional activity is evident.
*CWSRF	Yes	Yes	No	Yes, about 5,900 projects with CWSRF Support.
* Strategic Management	Yes	Yes	Yes, difficulties in establishing measures.	Unclear.
	7 of 7	6 of 6	2 of 7	

On the other hand, while the policy implementation process during this era has led to potentially significant policy outputs – the ICS strategies implementing the toxic hot spots requirement and numerous low interest loans under the CWSRF come to mind as examples here, the era's impacts on the overall effort to eliminate wastewater discharges and achieve fishable and swimmable waters appear – at least at this point in time – to be rather modest. These rather modest potential impacts, in turn, appear to have their roots in the lack of clear and ambitious directives from Congress designed to improve water quality. Indeed, as was mentioned above, during much of this era, Congressional initiatives have followed administrative experimentation, rather than vice versa. Thus, while the federal government and the states appear to be approaching the tasks assigned to them with at least a minimal level of conscientiousness and vigor, the tasks themselves – as directed by Congress – appear to be less ambitious than in the past. It should not be surprising, in this context, that the likely impacts of current efforts appear more modest as well. Bureaucratic agencies that seek to implement Congressional directions can only be as impact-full as the directions themselves allow.

However, in making this statement it is important to acknowledge that we do not yet have a good historical perspective from which to view these developments, nor – as was emphasized previously – do we have particularly good measures of the impacts and outcomes were are trying to assess. With these general thoughts in mind, let us now turn to a summary analysis of Congressional influence on federal and state water policy outputs during the entire Post World War II era. For, it is this analysis that bears most directly and completely on our evaluation of the two hypotheses identified in Part I above.

8.3. Conclusion

What conclusions can we draw from the full set of historical analyses presented in Part II of this work? Overall, the evidence presented provides support for both the first and second hypotheses that form the basis of this work. Throughout the post World War II time period, ex ante statutory directions provided by Congress appear to have structured administrative decision-making on the part of federal agencies, and these actions – in turn – appear to have influenced state policymaking and administration relating to water pollution control. What is more, the evidence supporting these conclusions extends rather evenly across the three historical eras analyzed and it also appears to apply to both directive and supportive policy outputs, thus suggesting that Congress's ability to establish institutional practices, ex ante, through statute is not limited by time or policy type

In spite of this general support, however, the analysis also identified instances of relatively clear failures in the implementation of Congress's ex ante directions, and these implementation failures appear to be attributable to insufficient resources, faulty directions from Congress, conflicts among political leaders, and the technical complexity of the issues at hand. Notably, however, the somewhat fragmentary evidence collected on the likely effects of Congress's directions on policy impacts and outcomes appears to be less evenly distribution, as some policy changes appear to have had relatively clear and substantial effects while other policy changes appear to have had weak or non-existent effects. These broad conclusions will now be discussed in turn.

Table 8-2 summarizes the compiled results from all three of the analyses provided in Part II of this work. Overall, twenty-five major policy changes were identified and analyzed in the post World War II period, and twenty three of these federally implemented policy changes had direct effects on state level policymaking. Eighty-eight percent of the major policy changes analyzed appear to have been (at least eventually) implemented by federal agencies in a manner that is generally consistent with Congress's directions, while eighty-seven percent appear to have been implemented by a substantial number of states in a manner that was generally consistent with Congress's directions. There were, however, significant implementation difficulties encountered in roughly one-third of the cases, and there were clear implementation failures in just over ten percent of the cases analyzed (12% and 13%, respectively). Overall, however, the results do show that the vast majority of important water pollution policy changes made by Congress were indeed implemented in ways that are generally consistent with Congress's directions by both the federal agencies involved and a significant number of states.

Table 8-2 - Rates of Substantial Compliance, Federal Water Pollution Control Act: Major Policy Changes in the Post World War II Era, Federal vs. State Government

	Federal Government*	**States***
# - Major Policy Changes	25	23
# - Substantially Compliant Policy Outputs	22 (88%)	20 (87%)
- With Little Difficulty	14 (64%)	13** (65%)
- With Major Difficulty	8 (36%)	7** (35%)
#-no appropriate policy output	3 (12%)	3 (13%)

* The federal government had two more major policy changes during the Post World War II era than the states because the states had no responsibility for developing technology based standards in the pre-emptive era or for refraining from spending monies on the Clinton Administration's TMDL rules in the experimental era.
** The implementation experiences of the states as a whole exactly mirrored the experience of the federal agencies involved. When the federal government experienced difficulties, the states did as well.

This broad pattern of federal and state efforts to comply with Congress's ex ante statutory directions applies not only in the aggregate, but also individually within the three major policy eras that were used as the bases for the analyses. Table 8-3 below summarizes the evidence presented by historical era, and it suggests that over three-fourths of major water pollution policy changes made in each of the three eras analyzed in this work were in fact implemented largely as directed by Congress, with the range of compliance levels running from 78% (7 of 9) in the supportive era to 100% (7 of 7) in the current experimental era. In the supportive era, Congress directed the Public Health Service (PHS) to establish laboratories, help build state water pollution capabilities, initiate a grant program to fund wastewater treatment facility expansions, and participate in enforcement conferences. Later in the era, it also directed the Department of Interior to take steps to ensure that states developed water quality standards for their "inter" and "intra" state waters. Both of these agencies pretty much did what they were directed to do, and the states appeared to respond in most of these cases as well.

Table 8-3 - Rates of Substantial Compliance, Federal Water Pollution Control Act: Major Policy Changes in the Post World War II Era, by Era

ERA	Major Policy Changes	Substantially Compliant Federal Outputs # (%)	Substantially Compliant State Policy Outputs # (%)	Substantially Compliant Policy Outputs, but Major Implementation Difficulties # (%)	Implementation Failures
Supportive	9	7 (78%)	7 (78%)	2 (22%)	2 (22%)
Pre-Emptive	9	8 (89%)	7 (89%)	5 (56%)	1 (11%)
Experimental	7	7 (100%)	7 (100%)	1 (14%)	0 (0%)
Totals	25	22 (88%)	20 of 23 (87%)	8 (32%)	3 (12 or 13%)

As Table 8-3 shows, similar – and even slightly improved – results are evident for the pre-emptive and the experimental eras. In the pre-emptive era, Congress required the EPA to develop both a massive water pollution permitting program and technology based effluent standards to be used in implementing it. It also required the EPA to enforce federal water pollution standards directly, expand the construction grants program, and support state planning and administrative efforts in water pollution control. The EPA basically did those things, although it was late in doing so in a number of cases. And again, in most cases, the states responded, as federal agency actions were followed by corresponding state actions in all of the cases identified. It is worth noting, however, that the rate at which federal agencies experienced substantial implementation difficulties (56%) was much higher during the pre-emptive era than in either of the others (22% and 14%, respectively).

In the current experimental era, Congress has directed the EPA to expand the NPDES program to address previously under-regulated stormwater pollution sources, and to initiate a series of new supportive policy efforts relating to non-point source water pollution, regional management initiatives, water quality infrastructure project financing, and strategic management. The EPA has done these things, and many of the states again appear to be responding. Based on the evidence presented here, it appears that Congress's statutory directions generally fall on responsive, rather than deaf, ears in the federal bureaucracy and in the states as well, a conclusion that runs counter to those who have argued that bureaucracies run rampant and are generally out of control (Lowi, 1979).

Table 8-4 shows that the overall rates of compliance found here are also consistent across policy types, even though highly directive policies appear as though they may be subject to higher rates of major difficulties during the implementation process. As the figures in the table indicate, over 80% of both directive and supportive policies were in fact implemented by both federal agencies and a large number of states in ways that were largely consistent with Congress's directions. It is worth noting in this context, however, that implementation of five of the nine (56%) directive policies involved major difficulties, while the implementation of supportive policies encountered major difficulties in only 19% of the cases. It is not entirely clear from the analysis, however, whether these difficulties are attributable to the directive policy form itself, or to the difficulties experienced during the pre-emptive era when a large proportion of the major directive policy changes were made. By contrast, implementation failures appear to occur for the two different policy types at roughly the same rates (12% and 13%, respectively).

Table 8-4 - Rates of Substantial Compliance, Federal Water Pollution Control Act: Major Policy Changes in the Post World War II Era, by Policy Type

Policy Type	Major Policy Changes	Substantially Compliant Federal Policy Outputs # (%)	Substantially Compliant State Policy Outputs* # (%)	Substantially Compliant Policy Outputs, but Major National Implementation Difficulties # (%)	Implementation Failures – National Level # (%)
Supportive	16	14 (88%)	14 (88%)	3 (19%)	2 (12%)
Directive	9**	8 (89%)	6 (of 7, 86%)	5 (56%)	1 (13%)
Totals	25	22 (88%)	20 of 23 (87%)	8 (32%)	3 (12%)

* Denominators for State policy outputs are smaller than for federal policy outputs because 2 of the 25 major policy changes analyzed – the development of technology based wastewater effluent standards and the prohibition against spending funds to implement Clinton era TMDL regulations -- did not apply directly to the states.
** The 1965 Congressional requirement that states develop water quality standards is listed here as a "directive" policy, because it is backed by clear federal authority to implement the required water quality standards. While this requirement falls short of the standard used to define "pre-emptive" policies – command and control requirements that may be applied by the federal government to entities other than the states – it is sufficiently directive to be included in this category.

In spite of a basic responsiveness, therefore, some of Congress's directions are not implemented, and some are not implemented in smooth or timely fashion. At the national level, these failures and difficulties appear to be attributable in most cases to insufficient resources, the nature of Congress's directions, disagreements among political leaders in Washington DC, and/or the technical complexity of the issues themselves – all of which, as noted previously, have been mentioned in past literature as potential sources of implementation difficulties. In the early 1950's, the PHS did not implement Congress's directions regarding its loan program or its enforcement conferences, because Congress did not provide sufficient resources and its statutory directions provided no significant incentive for the states to participate in the enforcement conference mechanisms that were created, respectively. Congress's directions were not implemented because Congress did not design them in a manner that was susceptible to actual implementation. The implementation difficulties of the pre-emptive era appear to have been due to both of these factors, the technical complexity of the issues involved, and continuing conflicts among political leaders who had influence over the EPA's decision-making processes. Because Congress set multiple and unrealistic deadlines for implementation of a number of technically complex provisions in the 1972 Act, the EPA encountered great difficulty in complying with Congress's statutory deadlines. Consequently, and somewhat logically, the Agency simply set priorities among the mandates it was required to carry out, a strategy that has been recognized and even advocated in past regulatory policy implementation literature (Bardach & Kagan, 1982).

Continuing conflicts among political leaders in Washington DC also affect the implementation process. President Nixon's impoundment of $6 billion in construction grants funding clearly affected the rate at which EPA could implement the expanded wastewater infrastructure-financing program. Administrator Ruckelshaus's opposition to additional planning processes contributed to delays in the implementation of the 1972 Section 208 planning requirements. And, consistent with past analyses, differing positions across administrations clearly affected the implementation of water enforcement policies during the pre-emptive era (Ringquist, 1995). While bureaucracies do respond to Congress, they also respond to their appointed political superiors.

However, there does appear to be some method to this madness. The influence of executive branch political appointees appeared most clearly in the implementation of activities subject to short time horizons, like budgeting, scheduling implementation processes in cases of immediate competing priorities, and enforcement. Long-term programmatic implementation of the kind analyzed here, by contrast, appears to be influenced more heavily by ex ante statutory direction from Congress than shorter term decision-making that may be re-directed easily by new teams of political leaders. Once under way, for example, the NPDES permit program developed its own dynamics and grew with apparently limited interference by political officials. This is an important point for understanding Congressional influence on administrative decision-making that has been under-emphasized in past research.

The analysis here also suggests that state implementation of Congress's direction presents some unique challenges. First, the states cannot implement Congressional direction effectively if the federal agency carrying out those directions fails to effectively carry out its role in translating statutory guidance to regulation and policy. Every case of significant implementation difficulty at the state level identified in this analysis was preceded by difficulties at the state level. Second, state water pollution agencies face constraints at home, in addition to those presented at the national level. These constraints appeared evident some states' reluctance to build strong water pollution programs in the supportive era. Even Hines' somewhat optimistic analysis of state policy changes during this era, for example, did not argue that state water pollution policy improvements were uniform. And, in the implementation of controls over non-point source pollution in the current era, it is apparent that some states are more active than others (these differences will be discussed in much greater detail in Part III of this work). Regardless, however, these state level constraints result in uneven implementation across the states for any given federal policy.

However, the analyses here also suggest quite clearly that the sticks and carrots offered by the federal government do matter, and can be useful in facilitating action at the state level in cases where it is lacking. In this analysis, strong and directive federal policy changes resulted in relatively rapid state policy changes in a number of instances, such as the 1965 water quality standards requirements, the permitting requirements in the early 1970's, and the 1987 toxic hot spots legislation. Big carrots in the form of money also appeared to have leveraged state action. The 1956 construction grant program appears to have had clear effects on state programs, as did the massive expansion of this kind of effort in 1972. Even the new CWSRF seems to be having substantial effects.

The analysis also presents reasons for skepticism regarding the effects of at least some forms of required process changes. The multiple streams of federal planning requirements enacted in 1972 do not appear to have changed political dynamics at the state level, and there is still reason for skepticism regarding the NEPPS process in which we are currently engaged for the similar reasons. Processes, in and of themselves, can become stage directions for existing actors. They do not necessarily alter the underlying political dynamics, unless – perhaps – they provide concrete opportunities for meaningful input from actors who might otherwise be excluded from the decision-making process.

This latter insight relates to a final conclusion of this analysis. When we speak of Congressional control or influence, it is important to ask, "control or influence over what?" As is noted above, federal and state compliance with Congressional directions relating to policy outputs is clearly the rule rather than the exception. When one focuses on policy impacts and outcomes, however, a higher degree of uncertainty arises. Table 8-5 below presents educated estimates of the effects of major policy changes analyzed in this work on water quality impacts and outcomes, based on information retrieved from existing literature during the course of this research.

In general, Table 8-5 shows wide variations in the estimated effects of the policy changes called for by Congress in the Post World War II era, although several general patterns do appear. First, major policy changes in all three eras are associated with both high and relatively clear impacts and outcomes, as well as weak or uncertain ones. Each era, it appears, produced policy changes that had significant impacts, as well as changes that appear to have had relatively few impacts. Second, the major policy changes of the pre-emptive era do appear – by this rough analysis – to have had the strongest and clearest effects. While this era experienced the largest number of implementation difficulties, these difficult experiences appear as though they were probably related to the magnitude of the policy changes that Congress sought during this time period, a conclusion that is consistent with conflicts identified between public administrators and regulated audiences in past research (Bardach & Kagan, 1982). And third, the current experimental era appears, overall, to have the weakest estimated sets of policy impacts. And here, the operating logic appears to be the opposite, as Congress has generally sought only modest policy changes, and these changes have been implemented with relatively minimal difficulties.

Table 8-5 - Estimated Effects of Major Policy Changes on Impacts and Outcomes

	High and Clear	**Notable, but Uncertain**	**Weak or Unclear**
Pre-emptive Policies N=8	4 (50%) **Tech. Standards** **NPDES Permits** **Permit Enforcement** Prohibition Against $ for TMDL's	3 (37.5%) **WQBELs** Toxic Hot Spots Storm-water controls	1 (12.5%) **TMDLs – 72 Act**
Supportive Policies N=17	5 (29%) *Wastewater Grants1* **Wastewater Grants2** CWSRF *Req'd WQ Stds.* *WQ Std. Incentives*	8 (47%) *State Program Aid-1* **State Program Aid-2** *Tech. Assistance-1* **Tech. Assistance-2** *Model Laws* *Enf. Conferences – 2* Geographic Initiatives NPS-319	4 (24%) **Planning-Section 208** *Wastewater Loans* *Enf. Conferences-1* Strategic Management
Total Policies	11 (44%)	9 (36%)	5 (20%)

Italics – Supportive Era Policy Changes
Bold – Preemptive era Policy Changes
Plain Text – Experimental Era Policy Changes

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These dynamics suggest that implementation difficulties may be inversely related to the ambitiousness of the impacts and outcomes sought by Congress in its ex ante statutory directions, a finding that is at least not inconsistent with past implementation research (Mazmanian & Sabatier, 1983). Arguments over policy changes with little impact appear to be few, while those involved in policy implementation may argue vociferously in cases where impacts are likely to be great. And, conversely, difficulties in implementation – like those experienced during the preemptive era – may in fact mean that political actors, sensing true impact, may participate more actively during the course of the implementation process. Viewed in their totality, these observations suggest that there is indeed a potential disjuncture between the successful production of policy outputs and the creation of important policy effects.

When we measure policy outputs and impacts and outcomes, therefore, we are indeed measuring different things. Sometimes, the outputs we produce do not produce the impacts we expect, and the result is faithfully implemented but perhaps ineffective policy. And, even policies that produce the expected impacts may not produce the expected outcomes. While it does appear that federal policies during the supportive era facilitated stronger state programs, these (marginally?) improved state programs were not sufficient to keep the Cuyahoga River from catching on fire. And even though the national permitting program enacted in 1972 drastically reduced wastewater discharges to the waters of the United States, it did not result in fishable and swimmable waters throughout the US by 1983 – the outcome that Congress had sought.

Thus, as we look at the evolution of Congressional direction in water pollution control, we see a continuing process of largely predictable policy outputs, followed by less certain policy impacts, followed by highly uncertain policy outcomes. As Congress perceives changing impacts and outcomes, it then changes direction producing a new set of policy outputs. These outputs reverberate through the federal system, with the certainty of their implementation decreasing as implementation moves from the center to the periphery. However, as this analysis makes clear, the outputs at the state level – while perhaps less certain than outputs at the federal level – frequently remain consistent with statutory requirements, at least in terms of general direction. Thus, as was mentioned previously, this analysis does support the first two hypotheses outlined in Part I of this work. Statutory direction from Congress appears to structure the policy outputs of federal agencies (hypothesis 1), and the implementation of Congressional directives by federal agencies clearly influences the activities of state governments (hypothesis 2). These results, it should be noted, are decidedly more optimistic than much of the past implementation research in the top down tradition. They suggest that policy implementation difficulties – more often than not – stem from the difficult nature of the problems at hand, rather than from the shirking and slipping behaviors of public administrators.

However, as the discussion above makes clear, the historical analysis presented here only begins to address the issues that are critical to an understanding of Congress's statutory influence on policymaking and implementation in a federal system. Several big questions remain. They relate to the range of ways in which Congressionally directed policy outputs are implemented across the states, the effects of differing forms of federal intervention on these outputs, and – ultimately – their impacts and outcomes. The first two questions are addressed directly in the cross-sectional analyses that follow in Part III, and – hopefully – the answers provided there will contribute positively to future research aimed at addressing the last question in clearer and more systematic fashion. For, in the US federal system, we can only assess the impacts and outcomes of federal policies if we come to a firmer understanding of the range of policy outputs that influence them and the effects of Congress's statutory directions in producing the policy outputs that materialize. And it is to these tasks that we now turn in the contemporary analyses that follow.

PART III - CONGRESSIONAL CONTROL?: AN ANALYSIS OF CONTEMPORARY STATE PROGRAMS

9. FEDERAL STATUTORY DIRECTION IN WATER POLLUTION CONTROL

The analyses in the previous chapters demonstrated that federal agencies and state governments have generally responded to Congress's statutory directions in water pollution policy over time. However, these analyses used rather lenient criteria for state responsiveness. If the responsible federal agency and a significant number of states responded consistent with a Congressionally directed policy change in a reasonable amount of time, responsiveness to Congress's policy directions was assumed to have occurred. While this is an appropriate test for assessing *whether* federal agencies and the states generally respond to Congress's broad policy directions, it does not address the overall extent of compliance with Congress's direction, or illuminate and explain the variable nature of these state responses. Thus, even though the historical analyses presented in the preceding chapters provide sufficient evidence to conclude that concerns about runaway bureaucracy in the 1970's were at least overstated, they do not provide sufficient evidence for affirming the "Congressional Control" assertions that have been prevalent in the literature over the last two decades.

The chapters in this Part address these shortcomings in the historical analyses preceding them. They focus on the extent to which state water pollution policies are consistent with the ambitious goals and objectives outlined by Congress in the Federal Water Pollution Control Act (FWPCA), and the extent to which these policies vary across the states. They also attempt to assess state policy variations along two dimensions. First, they assess variations in state policy outputs in two sectors of water pollution policy that are subject to very different levels of ex ante statutory control – *non-point source* and *point source* water pollution policies. And second, they assess the extent to which variations in state policy outputs in these two different sectors are attributable to prevalent theories of state policy making. In so doing, they seek to provide an analytical foundation for assessing the influence of ex ante statutory directions on policy outputs under two different kinds of statutory structures and, in so doing, provide insights relating to water pollution policy devolution.

In an effort to achieve these broad goals, the chapters that follow focus on two central components of US water pollution control policy: (1) the level of *activism* reflected in contemporary state non-point source (NPS) water pollution policies and; (2) the *restrictiveness* of state point source water pollution policies. Activism and stringency are important because Congress emphasizes them in federal statutes for non-point source and point source pollution control, respectively. They also reflect two contrasting approaches that underlie federal-state relationships in water pollution control – one focusing generally on federal support for state programs and the other focusing on state adoption and implementation of policies directed at the federal level. States often argue that their programs are active and effective, and are undermined by federal regulations that force them to be stringent when other approaches are more appropriate or work more effectively. Some support for this position is offered in the chapters that follow. Advocates of strong federal controls, on the other hand, tend to argue that some state programs fail to address important water pollution problems adequately –particularly when strong state level political interests are involved. Stringent minimum federal requirements therefore provide a means for addressing deficiencies in state political systems. Some of the evidence presented in the chapters that follow also supports this contention. Sentiments about these contrasting views remain strong, as controversies over President Bush's water pollution policies and appointments suggest [1].

In an effort to improve our understanding of the issues underlying these controversies, the following chapters measure levels of state non-point source policy activism and point source policy restrictiveness and seek to explain the variations uncovered using existing theories of state policymaking processes. The measures used for assessing these state variations include both procedural and substantive elements of state water quality programs. Chapter 10 focuses on procedural and substantive measures of non-point source policy activism, while chapter 11 seeks to explain the variations in activism uncovered among state programs. Similarly, Chapter 12 focuses on procedural and substantive measures of point source policy restrictiveness, while chapter 13 seeks to explain the variations in restrictiveness uncovered. In each case, however, consistency with Congressional direction is assessed in terms of the extent to which states are active or stringent, respectively, because the extremely ambitious goals the Federal Water

Pollution Control Act (FWPCA) and other elements of Act make it clear that Congress intended that EPA and the States administer the law both actively and stringently. In general, the standard expectation is that the strong tools of federal policy used for point sources will lead to higher levels of "control," and relatively little state variability when compared to the "weaker" tools of control provided for non-point sources. However, the results of the analyses conducted do not adhere completely to this broad expectation.

To introduce these substantive chapters, what follows is an overview of the ambitious goals and objectives of the FWPCA, and an outline of the very different sets of federal policy tools authorized for point and non-point sources of water pollution. The idea here is to provide a foundation for the cross-sectional analyses of water pollution policy activism and stringency that follow in subsequent chapters.

9.1. The Federal Water Pollution Control Act: Goals and Objectives

Any fair reading of the FWPCA reveals a clear intention on the part of Congress to encourage and promote aggressive state water pollution control programs. In fact, as was mentioned in Part II, it was Congressional concern over the levels of effort undertaken by state governments that led to the introduction of the new and directive pre-emptive policy instruments that were authorized in the early 1970's. And, even though the language in the current Act reflects desires to respect state water pollution program prerogatives, it also encourages, supports, and even requires EPA to develop and foster strong *federal and state programs* through a variety of means.

A review of some of the actual language from the Act is instructive in these regards. Section 101a of the Act asserts a series of goals and objectives. Several of these goals and objectives are as follows:

> "The objective of this act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters";

> "it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985";

> "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in an on the water be achieved by July 1, 1983";

> "it is national policy that area-wide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State";

> "it is national policy that programs for the control of non-point sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through control of both point and non-point sources of pollution."

From these quotations, it should be clear that Congress was ambitious in its water quality goals, and that this ambitiousness is reflected not only in the goals themselves but in the rather specific language regarding the time frames in which they were to be achieved. It is also worth noting that Congress was specific regarding the applicability of the Act as a whole to both point source discharges and non-point sources of water pollution.

Congress was also clear about the central role of the states in these efforts, and about the Federal government's role in assisting them in building active and stringent programs. Again, several quotations from the Act itself are instructive.

> "It is the policy of the Congress to recognize, preserve, and protect the *primary responsibilities* (italics added) and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation and enhancement) of land and water resources, and to consult with the Administrator in the exercise of his authority under this Act. It is the policy of Congress that the States manage the construction grant program under this Act and implement the permit programs under Section 402 and Section 404 of this Act. It is further the policy of the Congress to support and aid research relating to the prevention, reduction, and elimination of pollution, and to provide Federal technical services and financial aid to State and interstate agencies and municipalities in connection the prevention, reduction, and elimination of pollution." (Section 101b).

Congress expected the States to take primary responsibility for water pollution control within their borders and also committed the Federal government to an ongoing role in fostering and encouraging these efforts. Several additional quotations from the act also shed further light on this latter point.

> "The Administrator (of EPA) shall encourage cooperative activities by the States for the prevention, reduction, and elimination of pollution, encourage the enactment of improved and, so

> far as practicable, uniform state laws relating to the prevention, reduction, and elimination of pollution; and encourage compacts between States for the prevention and control of pollution." (Section 103a)
>
> "The Administrator shall establish national programs for the prevention, reduction, and elimination of pollution and as part of such programs shall –
> (1) in cooperation with other Federal, State, and local agencies, conduct, and promote the coordination and acceleration of, research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent prevention, reduction and elimination of pollution;
> (2) encourage, cooperate with, and render technical services to pollution control agencies, institutions, and organizations, and individuals, including the general public ….. (Section 104a).

Thus, while the states were to be central players in water pollution control, the Federal government would have important roles in both fostering the development of state programs and in developing national programs to support and underlie them. Where the rubber was to meet the road, however, was in the Federal policy tools that Congress established to carry out these broad policy directions.

9.2. Tools of Water Pollution Control: Congressional Policy Design

The FWPCA is often used as an example of centralized federal domestic policy. It is also described as one with broadly delegated Congressional powers and nearly unlimited jurisdiction. Theodore Lowi, for example, states:

> "The whole universe is covered by EPA's jurisdiction. Since pollution can come from anywhere, we must naturally equip our agency with power to cover anything and everything. How can anyone be against clean air or water? And let us, indeed have it by 1976; and if not, then by 1986; if not then, at least let there be satisfaction that authority was exercised on behalf of the people. It is as though there were a trade off between pollution and the number of regulations concerning pollution. Congress knew nothing in the beginning and admitted it by mandating clean air and water to administrators entirely as they saw fit. And neither Congress nor the president has reviewed the substance of the thousands of standards and regulations emanating from EPA in order to determine whether there is any relation at all among regulations or between them and original legislative enactments." (Lowi, 1979, p. 120).

As Lowi's comments imply, the FWPCA is a procedurally oriented statute in that it authorizes a range of regulatory and financial assistance activities, specifies procedures to be taken in carrying them out, and authorizes the EPA Administrator to take actions to achieve the goals of the act based on specified procedural criteria [2].

There are, however, very significant *substantive* provisions in the Act that structure the procedural tools that are used to make water policy decisions. In spite of Lowi's comments above, a review of the actual statute reveals clearly that Congress envisioned substantively based jurisdictional limits on the federal authorities it granted to EPA. These limits, in turn, are reflected in differing forms of authorized federal influence over state water pollution control policies. The most significant of the substantive distinctions Congress made in the FWPCA is between point source discharges and non-point source runoff. Congress, it seems, sought to "control" administrative implementation differently, depending on the source of water pollution involved and the audiences to whom federal policies were to apply. While this should not be surprising given the varying strength of differing groups and interests in the legislative process (Walker, 1993), it does suggest that analyses of Congressional control and policy implementation should account for the differing kinds of policy tools Congress authorizes for accomplishing its goals because differences in the tools selected often reflect differing substantive policy choices regarding both the allocation of government resources and distributions of the burdens of compliance.

What follows is a comparative discussion of the specific policy instruments authorized by Congress for control over point and non-point sources of water pollution. As will become evident from the discussion, these instruments are quite different from one another and, consequently, they have contributed to ongoing controversies regarding the applicability of the two sets of instruments to differing pollution sources. Under the point source permitting authorities in section 402 of the Act, all point source discharges of pollutants to waters of the United States must be authorized through permits issued by either EPA or authorized State governments. These permit requirements provide the federal government with a clear regulatory handle on pollutant discharges that are designated as point sources. The same set of authorities, however, place limits on the substantive scope of the agency's permitting authority; non-point sources do not require federally sanctioned permits, and are therefore exempt from requirements for federally authorized permits.

A significant issue, therefore, is defining what is and is not a point source. The Act's operational definition of a point source is found in several provisions of Section 502 relating to general definitions. It is as follows:

> "The term "point source" means any discernable, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm-water discharges and return flows from agriculture." (S 502 14).

The end result of this and several other definitions in the Act [3] is that the direct regulatory authorities used by the National Pollutant Discharge Elimination System (NPDES) permitting program are confined to "point source discharges of pollutants to the waters of the United States." While this definition is a rather broad one, it also has some relatively clear limits. Agricultural discharges of various kinds are specifically exempted, and the act elsewhere exempts storm-water runoff from other kinds of operations (S 402 l 2) from NPDES permitting requirements. Clearly, the Congress – when it passed and amended the FWPCA – intended to exempt many or most of agriculture and some storm-water sources from regulation under the Act's federal permitting authorities. It also intended to exempt other kinds of activities from these particular regulatory authorities – most specifically, runoff from forestry operations, pollutant discharges to the soil, and a host of other potentially polluting land use related activities. Pollution from these sources does not occur in a manner consistent with the definitions above and is therefore outside the jurisdictional scope of the Act's NPDES permitting authorities. These sources are, therefore, designated, de facto, as "non-point" sources under the FWPCA.

The regulatory structures for point and non-point source water pollution also differ with respect to the audiences toward whom they are directed. Because Congress declared pre-emptive authority over "discharges of pollutants" to US waters*, its permitting policies in the area of point sources apply directly* *to any person or organization* that may be polluting in this manner. The Act's point source policies also apply to state governments insofar as they prohibit state policies more lenient than federal policies (S 510), and encourage states to prevent, reduce, and eliminate pollution within their jurisdictions and become authorized by EPA to administer the federal permitting program (S 101 b). By contrast, the *legislative mandates associated with non-point source water pollution apply solely to state governments*. The Act requires state governments to assess (319), plan for (S 208), and manage (319) non-point source water pollution in and around their borders, and it also provides for direct federal assistance in these regards. However, it does not authorize direct and ongoing federal regulation of non-point source water pollution sources.

From these discussions of the jurisdictional limits imposed on federal water pollution policies and the tools authorized to carry them out, one can deduce major differences in the intergovernmental relationships established by the two sets of authorities. For point sources, the basic structure is directive. It is one of partial pre-emption in which the federal government declares authority to regulate under the commerce and supremacy clauses of the constitution, and does so directly up to some defined minimum set of federal requirements. State governments are permitted to set additional requirements above the minimum national floor, but – as was noted above – they are not permitted to set more lenient requirements.

The EPA also provides substantial grant funding and technical assistance to states to support state point source water pollution efforts. The baseline funds provided for these purposes are drawn from the general program grants authorized by Section 106 of the Act. Funding for point sources also once included the billions of dollars that were spent for municipal treatment construction grants under Title II of the Act, and now include funds from the Shared State Revolving Fund allocation under Title VI. In the year 2002, the funds allocated to States under 106 amounted to $192.5 million, while the funding provided for projects under the SRF was $1.35 billion. While the Section 106 grants are provided broadly for state water pollution program operations, they have traditionally been used predominantly for point source water pollution efforts. And, while the 1987 Water Quality Act extended SRF funding eligibility to non-point source water pollution projects, only $189.1 million of these monies were used for non-point source projects in FY 2000 – about 5% of the funds used to provide assistance during that year (US EPA, 2001G) [4]. These larger grant sources are also supplemented by an array of federal technical assistance services oriented toward point source discharges, including training courses for NPDES permit writers and enforcement personnel, federal water pollution research, and training and technical assistance services for municipal governments (S 104 b 3 & S 109).

The federal-state relationship structured by the Act for non-point source water pollution is essentially supportive in nature. While it is based on direct statutory orders requiring state non- point source water pollution assessment and management planning efforts, these requirements are catalytic as opposed to coercive in nature (Gormley, 1989). More specifically, the required assessments and management plans must meet minimum requirements for EPA approval, but these minimum requirements are generally flexible and allow states to structure programs in a variety of different ways and still meet the statutory criteria. These rather minimalist orders, however, are backed by grant funds provided under Section 319 h of the Act, a federal grant program that lies at the heart of the federal non-point source water pollution control effort. States that fail to assess non-point sources of water pollution within their borders or that fail to submit acceptable management plans may not receive grants under Section 319 h. In addition, if states do not submit acceptable assessments and/or management plans, local governments within their jurisdiction may seek direct assistance for these activities from the EPA. While the 319 h grant program started small after its statutory inception in 1987, it has grown substantially in recent years. Funds appropriated by Congress now total $238 million annually [5]. Importantly, the non-point source water pollution control authorities do not include the pre-emptive federal powers associated with the point source program, so the authority of the federal government to address non point source water pollution problems on an ongoing basis does not include direct federal regulation of non point sources of pollution.

Table 9-1 below summarizes the previous discussion relating to the substantive decisions made by Congress in defining the regulatory jurisdictions of federal point source and non-point source water pollution control activities, and the intergovernmental relationship structures that underlie federal-state interactions in these areas.

Table 9-1 - Point and Non-Point Source Water Pollution Control: Statutory Structures

Statutory Element	Point Sources	Non-Point Sources
Jurisdiction		
Activities Subject to Federal Regulation	"Point source" discharges to "waters of the United States." - specifically excludes storm-water runoff from Agriculture, Agricultural return flows from irrigation, & certain other forms of storm-water runoff [S 502 (14) & S 402 (l)]	State planning, assessment & management of non-point source pollution programs (S 208 & S 319).
Targeted Audience(s) Subject to Federal Regulation	Primary Audience: Anyone creating a point source discharge. Secondary Audience: State Governments – prohibits more lenient rules & encourages participation in program administration, etc.	Primary Audience: State governments. Secondary Audiences: local governments; only upon their request in cases where state programs are not approved.
Intergovernmental Relationships		
Partial Pre-emption	Yes (S 510)	
Direct Order		Yes (S 319 a & b)
Inter-governmental Aid	Yes [S. 106 = $192.5 M(FY02)] [S. 601-606 = $1.35B(FY02)]	Yes [S 319 h = $238M(FY02)] [S 601-606 = $189.1M(FY00)] [S 208 Plans = minimal now, but once received substantial funding] [Agriculture & NOAA – substantial assistance, both to states and organizations & individuals]

These substantive requirements established by Congress in the FWPCA provide the institutional foundation for water pollution policymaking in the United States. Taken together, the objectives of the Act, the jurisdictions for the application of differing federal requirements, and the legal structures established to guide intergovernmental relationships structure water pollution policymaking and administration at both the federal and state levels. They define federal roles and activities, establish national directions and requirements for state programs, and serve to define state roles in the overall effort to achieve the nation's water quality goals. For point sources, the federal role is directive, the program elements involved are specific and detailed, and state governments are relied upon to play largely administrative roles. In many respects, point source water pollution control reflects a classic example of "command and control" federal regulation (Rosenbaum, 2002). By contrast, for non-point sources, the federal role is primarily supportive, the program elements are broadly defined, and state governments are relied upon to both make and administer policy. Each of these differences will now be discussed in turn.

The EPA's role(s) in point source water pollution is (are) outlined in detail in hundreds of pages of the Code of Federal Regulations (CFR) that are devoted to specifying the ways in which EPA and the States should administer the NPDES provisions of the Act. The Agency establishes national "end of pipe" technology based effluent standards, as well as water quality criteria that may be used by states in developing water quality standards for ambient waters within their jurisdictions. It also reviews and approves of water quality standards established by the states, and is responsible for overseeing state permitting and enforcement of the NPDES program in authorized states. In unauthorized states, the EPA administers the permitting and enforcement programs itself. In all of these areas, the Agency has clear regulatory decision-making authority, and therefore – by statute – plays a directive role in water policymaking and implementation. This strong and directive regulatory role is evidenced by the 200 + pages of federal regulations devoted to permitting, state program approvals, decision-making procedures, and standards development contained in the Code of Federal Regulations (CFR 40, Parts 122, 123, 124, 125, 129, & 131). While these regulatory activities lie at the center of the point source program, they are supplemented in important ways by numerous guidance documents and the funding of training and technical assistance efforts that are often targeted toward municipalities.

Largely because of these very directive regulatory efforts, the major program elements involved in point source water pollution regulation are quite specific and detailed. Part 123 of Volume 40 of the CFR includes detailed requirements for both federal approval of state programs and federal oversight after states have been authorized to issue NPDES permits within their jurisdictions. Under these regulations, states wanting authority to operate the federal program in their jurisdiction must submit descriptions of their proposed program for review and approval to EPA, and EPA may choose to approve or disapprove of submitted state programs based on a wide range of specified requirements. After approval, states are required to operate the program consistent with this approval, and the EPA maintains authority to veto individual permits, conduct enforcement activities within the states, and withdraw state NPDES authorizations. In many cases, the Part 123 state program regulations also cross reference basic requirements related to both permits and decision-making procedures.

For example, Part 122 of the 40 CFR specifies formats in which permits are to be issued, and processes for developing them. In general, permits consist of four major components: effluent limitations, monitoring and reporting requirements; special conditions; and standard conditions. The effluent limits are based on technology based standards issued in federal regulations (40 CFR, Parts 405-499), state water quality standards (40 CFR, Parts 122 & 131), or the professional judgment (40 CFR, Part 125) of the permit writer, depending on the availability of technology-based regulations and the condition of the receiving waters [6]. Typically the limits themselves are expressed as mass limits or concentrations over specified time periods (eg. 700 lbs/per day or 30 mg/litre monthly average). NPDES permittees are also required to monitor their effluent and report the results to the applicable permitting authority – the state or federal government, depending on whether the state has been authorized to manage the federal program. The special conditions portion of a permit may include a wide range of things, such as construction schedules for new treatment facilities, special studies, or best management practice requirements. The standard conditions portion of the permit includes primarily legal language relating to the duty to comply, the right of permitting authority to inspect and a range of other matters.

The process for permit issuance and re-issuance is also spelled out in some detail in regulation (40 CFR, Part 124). In general, it involves receipt of an application from a prospective wastewater discharger, review of that application for completeness, and the development of permit requirements – effluent limits, monitoring and reporting requirements, special conditions, and standard conditions. A Fact Sheet outlining the bases for the permit is also developed, and an opportunity is provided for public comment and input. If there is significant interest in the permit, a hearing may also be held to allow for the expression of differing views. After this process is completed, a final permit is issued. And, after a final permit is issued, evidentiary hearings may also be held before an Administrative Law Judge (ALJ), or an Environmental Appeals Board if the plaintiffs are unhappy with the decision of the ALJ. In some cases, the permit appeal may also be heard in federal court. This brief description of the process is based on the federal procedures. States may use slightly different approaches, but they are required to be at least as stringent with respect to public participation as the federal requirements [7].

The EPA's roles and program elements in the non-point source area differ from its roles and program elements in the point source area. The EPA's role in non-point source water pollution is primarily supportive rather than directive, and the federal program elements tend to be broad and general rather than specific and detailed. While the EPA has reviewed both assessments and management plans from state non-point source water pollution programs and determined whether or not to approve them, its primary focus has been on the issuance of guidance and technical assistance documents of various kinds. These include technical documents outlining approaches to non-point source water pollution management strategies, manuals reviewing successful NPS efforts that may be transportable to other locations, and guidance and memoranda specifying the criteria to be used in dispensing grant funds [8]. In contrast to the point source situation described above, only four or five pages of regulatory language in the Code of Federal Regulations focus on non-point source water pollution to any significant degree (40 CFR Part 130.5 on continuing planning & Part 130.6 on water quality management plans).

And, in contrast to the detailed and specific federal permitting procedures for point sources, the program elements used in non point source management are broad and general. While states were required to conduct assessments and develop management plans, the federal criteria for these activities are provided in statute and are rather general. For the assessments conducted under section 319 in the late 1980's and early 1990's, the states were required to identify waters within the state that would not be expected attain and maintain water quality standards without reducing non-point pollution loads, identify the categories of sources that contribute to these problems, describe the process to be used for identifying management practices, and describe current programs. The management program reports required by the same section of the statute were to identify best management practices to be undertaken, identify programs to accomplish the management practices, and provide a schedule of milestones. They were also to include an Attorney General certification of adequate authorities to carry out the program as defined by the state, and a list of sources of federal and other funding to be used in carrying it out [9]. While these elements may sound specific, they were "catalytic" in that they relied upon states to specify what was appropriate in their situation rather than relying on uniform federal mandates. They were also fundamentally supportive in that they relied on grant funds as the primary means by which the federal government sought to influence state policy outputs.

Largely because of these differing federal roles and variations in the specificity of federal program requirements, the roles of state governments also vary in point and non-point source water pollution control. In the case of point sources, states that are authorized to operate the federal program take on important administrative roles in implementing policies that are defined by EPA pursuant to the Act. They may also serve a policymaking role in setting more stringent standards than the federal program, but their latitude here is somewhat limited in the sense that major program changes are subject to EPA approval. Thus, in point source pollution, the states are first administrators, and then policymakers after baseline issues associated with administering the federal program are addressed.

The opposite is the case in non-point source water pollution. Here the states tend to be policymakers first, and administrators afterwards. While they may be prompted to address broad issues (such as whether to have a non-point source program at all) by review or grant related requirements communicated by EPA, they tend to be able to create policies for their state without too much detailed intervention from the federal government. There are, as was mentioned above, very few regulations specifically targeted toward non-point source water pollution at the federal level. What is more, to the extent that states choose to ignore federal requirements, the consequences of this action are not likely to be overwhelmingly bad. The federal government cannot step in and regulate directly, and the EPA's only regulatory recourse is to report to the Congress on the matter and/or reduce or eliminate the state's 319 grant allocation. And, as a practical matter, even these consequences are unlikely because EPA has little incentive in most cases to engage fights with state programs when it has little control over the outcome of the struggle – as would be the case in this situation. As a result, EPA tends to be reluctant to withdraw grant funds for non-point sources or to engage in bad mouthing state programs with Congress. Thus, while the potential sanctions are potentially consequential, they are not likely to be invoked. The federal policy tools for influencing state non-point source water pollution programs are hardly the equivalent of the direct and pre-emptive federal regulation that exists for point sources.

Table 9-2 below summarizes the preceding discussion, and outlines federal and state roles in point source and non-point source water pollution regulation in the United States.

Table 9-2 - Federal & State Roles in Point and Non-Point Source Water Pollution Control

Roles and Program Elements	Point Sources	Non-Point Sources
Federal Role	DIRECTIVE -Establish Minimum National Technology Based Standards. -Approve State Water Quality Standards that may serve as the basis for permit limits. -Issue permits and enforce permit requirements directly, & oversee state permits & enforcement. SUPPORTIVE - Grants to State Programs	SUPPORTIVE - Grants to State Programs Failure to achieve an accepted state assessment or management plan could lead to EPA assessments &/or management report for the state; EPA report to Congress on states' failure; EPA assistance to local agencies within the state, on their request; and/or potential withdrawal of 319 h grant funds
Federal Program Elements	SPECIFIC & DETAILED Adequate Resources/Authority Permits (federal or state) Enforcement (federal &/or state)	BROAD & GENERAL None, although management plans should include elements drawn from a list in S 319 b [9]
State Program Roles	LARGELY ADMINISTRATIVE State rules may not be more lenient than federal rules, and State Authorization to operate federal program is encouraged [S 510 & S 101]	POLICYMAKING States: -Assess NPS pollution (S 319a1) -Develop NPS Management Program & Report to EPA. -Implement programs and controls as they see fit.

9.3. Conclusion

To summarize, the FWPCA is quite ambitious in its goals and objectives, and clearly endorses the development of comprehensive and aggressive state water pollution control programs. In support of this endorsement, Congress provided the EPA with tools it could use to foster active and stringent state programs. Because of the aggressive language in the Act and the tight timetables it establishes, it seems clear that Congress envisioned compliance with its directions to mean the development of the most active and stringent state programs possible.

Toward these ends, however, Congress established differing statutory structures for point and non-point water pollution control programs. The structures differed in the range of activities subject to federal regulatory controls and in the target audiences subject to them. At least partially as a result, the specific intergovernmental relationships envisioned by Congress for point and non-point sources of water pollution also differ from one another. In general, federal regulatory authorities over point sources extend to both governmental and non-governmental actors that pollute surface waters through pipes and/or conveyances (although there are several specific exemptions), while federal regulatory authorities over non-point sources apply primarily to state government planning and management activities and do not extend to direct regulation of private sector activity on an ongoing basis. The strong pre-emptive foundation for federal point source water pollution controls also provides for a different set of intergovernmental relationships than do the state regulatory oversight foundations of federal non-point source water pollution policy. As a result, in general, the EPA's authorities in regard to point source discharges are directive, focused, and deep, while its authorities over non-point source pollution are generally supportive, broad, and shallow. While the two sets of provisions share a tie to the water quality goals of the act, the differing policy tools authorized have important implications for the nature of federal and state efforts to achieve the water quality goals of the Act.

While the discussion above overviews these differences in Congressional approach, the chapters that follow analyze the extent to which state water pollution programs have fulfilled Congress's expectations. In chapters 10 and 11, the focus is on whether states have fulfilled that act's mandates for active state non-point source water pollution control programs, while chapters 12 and 13 focus on point source permit restrictiveness. Chapters 10 and 12 review key statutory language relevant to state non-point source policy activism and point source permit restrictiveness, respectively, some basic steps that EPA and the states have taken in implementing this language in each case, and the measures used to evaluate state policy responses in these two areas. This introductory material is then followed by evaluations of the extent to which Congress's ambitious goals are reflected in state policies according to the measures established, and the extent to which these policies vary across the states. Chapters 11 and 13 then include quantitative analyses designed to assess the extent to which these policy variations are traceable to state responsiveness to broad influences such as the severity of the water problem within the state and/or public opinions concerning the environment on the one hand, and narrow economic influences that may be indicative of policy capture on the other hand. The results help enlighten us regarding the extent to which Congress's expressed statutory intentions are realized through state programs, the extent to which water policy outputs vary across the states, and the extent to which this variation can be explained by prominent theories of state policymaking.

10. SUPPORTIVE POLICY STRUCTURES: STATE NPS WATER POLLUTION POLICY ACTIVISM

This chapter assesses the extent to which states are implementing the active *non-point source* (NPS) water pollution programs that the Congress envisioned in the Federal Water Pollution Control Act (FWPCA). In so doing, it sheds light on the nature of state responses to Congressionally generated water pollution policy goals and mandates under a supportive form of federal policy structure. Because of the relatively low levels of federal intervention involved in non-point source water pollution control as compared with point source water pollution control, the analyses presented also provide a building block for assessing the potential impacts of federal intervention on state water pollution policy responsiveness. The end result should be an improved understanding of the dynamics of federal-state relationships in water pollution policy, and – hopefully – some informed guidance on appropriate adjustments in the area of water pollution policy devolution.

As is evident from the previous chapter, Congress established very ambitious goals for federal and state water quality programs, and these goals apply to non-point source water pollution. While Congress's goal that all waters in the United States be "fishable and swimmable" by 1983 remains unfulfilled, its continuing existence in statute serves as one of a number of reminders that Congress explicitly directed that federal and state water pollution programs actively seek to achieve that goal. Congress also stated explicitly that it expected EPA and the states to cooperate in the development of water quality plans (S 208) applicable to state waters, the development and implementation of active state non-point source water pollution programs (S 319), and in the administration of a federal-state grant program to support the state programs established (319h). As a result, over the last 30 years, the EPA has implemented a series of efforts intended to encourage active state NPS programs, and states have both responded to these efforts and initiated additional efforts of their own.

In spite of this broad historical movement toward greater activity, EPA and state compliance with Congressional mandates for fishable and swimmable waters has been a point of contention in many contexts. To re-capitulate briefly from Part II, federal and state efforts to develop 208 plans during the 1970's and 1980's can be criticized as largely paperwork efforts, and additional controversies have materialized since the passage of the 1987 Water Quality Act (WQA). Initial state efforts to build non point source water pollution programs have been criticized by some (Houck, 1999), and these criticisms have contributed to the creation of voluntary EPA-state efforts to "upgrade" state non-point source water pollution programs [1]. What is more, as states seek to implement "total maximum daily load" regulations established by EPA [2], deficiencies in current non point source water pollution control efforts are becoming even more evident.

This chapter presents evidence demonstrating both state compliance with Congress's direct orders and highly variable compliance with Congress's overall directive for the active state programs that are necessary to achieve the FWPCA's water quality goals. After providing a review of Congress's statutory directions and the means by which we assess state compliance with them, we assess the extent of state compliance with Congress's direct orders in Section 319 of the FWPCA. We find widespread – although somewhat tardy – compliance with Congress's desires as they relate to non-point source water pollution assessments, management plans, and grant program participation. However, we also find highly variable state efforts to comply with Congress's desire for truly active state NPS programs and policies. This variability extends to the extent to which states foster consideration of non-point source water pollution concerns in state and local decision-making, authorities for enforceable requirements relating to non-point source water pollution, and state expenditures on non-point source water pollution above and beyond the Section 319 grant program matching requirement. These findings are then compiled into an overall state NPS policy activism scale that allows comparisons among the states with regard to overall state NPS policy activism. The scale created demonstrates that there are wide variations in the aggressiveness of state NPS programs, and that these variations are accompanied by widespread compliance with

Congress's procedural directions. It also provides a summary measure of state efforts to comply with Congress's desire for active state NPS programs.

10.1. State Non-Point Source Water Pollution Control Activism

In the 1987 Water Quality Act, Congress ordered states to assess non-point source water pollution problems within their borders and develop management strategies for dealing with the problems they identified. However, while Congress was clear in its desire for active state non- point source water pollution programs, it refrained from outlining the specific measures that states should use in their non-point source management efforts. Thus, in spite of the use of direct order statutory provisions, the position that Congress enshrined in statute was quite consistent with the devolutionary mantra that was developing at the time; states were to be given substantial flexibility in building their own programs and in implementing them as they saw fit. Unlike most other areas of environmental policy, however, Congress invested more grant dollars in this area than it had in the past.

Assessing the literal compliance of state actions with Congress's directives is relatively easy. One need only determine whether the states developed and submitted acceptable assessments, management plans, and grant applications. This form of compliance is quite literal, and has more to do with procedure than with substance. If the states conducted the required assessments and management plans in a timely manner, they complied; if they did not do so, they were effectively shirking their responsibilities under the statute. If they complied with the two direct orders, they became eligible for grants, and were fully compliant with the procedural directives of the statute if they participated in the grant program.

This kind of simplicity, however, does not characterize evaluations of state compliance with Congress's desire for *active* state NPS programs. Assessing the fidelity of state non-point source water pollution programs with the ambitious goals of the FWPCA is not a clear-cut exercise. The primary difficulties in measuring activism relate to the multi-faceted nature of the concept of "activism," as well as the varying ways in which non-point source water pollution can affect water quality. Non-point source water pollution is a broad term that can encompass a range of pollution sources, and states, in turn, may choose to address these sources in different ways – any or all of which are both appropriate and consistent with Congress's desire for active state programs. These differing forms of legitimate state activism give rise to measurement problems, as we seek to assess the extent to which state programs fulfill Congress's directives and whether one state's policies are more or less active than another's.

Previous literature provides relatively little guidance in this effort. Indeed, very little academic literature has sought to develop explicit measures of non-point source water pollution policies at the state level, preferring instead to rely on broad rankings of water quality programs that draw on evaluations of a mix of procedural variables, policy outputs, and policy outcomes (Ridley, 1988; Hall & Kerr, 1992; Ringquist, 1993). Only Lowry's (1992) study makes any significant effort to measure state non-point source programs directly. He uses 1984 EPA data on the presence of mandatory program elements in state non-point source water pollution program efforts, and a ranking system that does not appear to account for budgetary allocations and is not – in any case – amenable to replication with current data. We are therefore left to our own devices to develop appropriate measures of a very multi-faceted concept.

To measure state NPS water policy activism appropriately, we need to conceptualize a range of ways in which state NPS programs may be active, and develop observable measures that provide viable indicators of these variations. Three forms of state activism are appropriate for the development of these specific measures, and they reflect differing aspects of NPS policy activism. First, states may be active by ensuring that decision-making processes within the state account for non-point source water pollution concerns. Here the observed phenomena are likely to be laws, policies, and/or practices that facilitate the consideration of non-point source water pollution concerns in state and local decision-making. A second form of activism involves assessing the degree to which states develop mandatory requirements that can be used to force particular groups and individuals to minimize the impact of their activities on non-point source water pollution. Here, the observable measures relate to the strength of the requirements imposed on potentially polluting target groups and the authorities granted to state agencies that enable them to impose requirements limiting non-point source water pollution from specific sources. Finally, and probably most importantly, active state programs are ones that spend substantial amounts of money to implement the authorities and responsibilities that they are granted. Here the observed measures relate to the budgetary allocations provided for non-point source water pollution control activities, above and beyond the matching funds required to receive Section 319 grants. The measures of state water pollution policy used here account for all three of these forms of activism, as well as literal compliance with Congress's direct orders as indicated above.

Fortunately, existing data sources enable the development of relatively recent measures of each of these conceptual components of NPS policy activism. The three measures of state NPS policy activism used here include:

1. the number of statutory approaches used in the state to ensure that non-point source water pollution concerns are addressed in state and local decision-making;

2. the strength of the state's enforceable authorities for non-point source water pollution control, and;

3. the extent to which states provide funding for non-point source water pollution control efforts.

These measures improve upon existing efforts to rate state non-point source water pollution programs because they are relatively recent, focused only on non-point source water pollution programs, and are grounded in clearly defined sets of data [3]. The measures share with past studies a reliance on meta-analytic approaches that draw from previous work done by others. They do not, however, rely heavily on general and broadly defined rankings provided by environmental advocacy groups, but rather draw from directly from EPA data and data developed by associations representing state government officials. More specific descriptions of these data are provided in the sections that follow and in the Appendices.

It is appropriate to recognize at the outset that these three goal-oriented measures of compliance with Congress's desire for active state NPS programs are drawn across a five-year time span, ranging from 1997 to 2002. Consequently, the measures developed provide a general sense of the extent of state NPS policy activism during that time period as a whole. They are not designed to provide an absolutely accurate description of the current state of affairs. It is entirely possible – even likely, for example, that some states have made substantial improvements in their programs since 1997 that are not fully accounted for by these indicators. Conversely, given recent state budget crunches, it is also quite possible that some states have rolled back their efforts due to budget constraints or other factors [4]. In spite of these potential concerns, these indicators do provide an overall sense of state non-point source water pollution control activism around the turn of the century – at least ten years after Congress enacted the section 319 non-point source program in 1987. State policies do change over time, but they are unlikely to have changed so quickly and completely that the range of data used here would become obsolete in five years or less. And even if they are obsolete in some cases, they nevertheless provide a relatively accurate measure of state compliance with Congress's non-point source water pollution control wishes around the turn of the 21st century.

With general thoughts in mind, let us now turn to a discussion of literal compliance with the Section 319 requirements, followed by a more specific discussion of each of the three measures of goal oriented activism discussed briefly above.

10.1.1. Procedural Compliance: State Implementation of the Federal 319 Program

Congress specifically ordered the states to take several actions when it passed Section 319 of the WQA in 1987. First, under Section 319 (a), Congress ordered the states to assess the waters within their borders and identify those waters that were unlikely to meet water quality standards due to non-point source water pollution. A report containing these state assessments was then to be submitted to the EPA Administrator for approval. While few states met the statutory requirement that these assessments be completed by August 1988 – only a year and a half after passage of the 1987 Water Quality Act (USEPA, 1992, p. 6), all fifty states had submitted assessments by 1992 (USEPA, 1992, p. 1). Thus, while many states were tardy in meeting the statutory requirements, all fifty states did meet these non-point source assessment requirements within several years of date on which the WQA was signed into law.

A second and similar line of state response is evident for the non-point source management plans required under Section 319 (b). Congress ordered that these management plans contain a state selected set of elements, including best management practices, programs to achieve non-point source water pollution improvements, implementation schedules, legal authorities for action, financing mechanisms, state expertise, and watershed by watershed application of the programs described. These management plans were to be submitted to the EPA Administrator for approval by January 1990. By roughly that date, EPA had fully approved 42 state and territorial programs and partially approved 12 others. By 1994, EPA had fully approved the remaining state programs (USEPA, 1994, p. 3). Again, while some states were tardy in meeting these requirements, all fifty states met the requirements within several years of the statutory deadline. One possible explanation for this relatively high level of (eventual) compliance was the Congressional requirement in 319 (h) that state eligibility for non-point source water pollution grants be predicated on EPA approval of the state's management plan.

And finally, because all fifty states submitted acceptable management plans, all have been eligible to receive 319 h grants for a number of years. For some time now, as a result, all 50 states have participated in the 319 (h) grant program, with the amount of grant funds received (in FY 2001) ranging from about \$1.65 million for Delaware to approximately \$12.3 million for California (USEPA, 2001F). Because these funds must be matched at a rate of 40% of total project costs, all fifty states are providing at least \$1.1 million (the amount that Delaware is required to spend in order to receive the EPA grant) in non-federal funds for non-point source water pollution control. In this sense, all 50 states are now involved in some minimal level of active effort to address non-point source water pollution within their borders, and this minimum level of activism is largely attributable to literal compliance with Congressional directions relating to the 319 h grant program. Congress required that states assess non-point source water pollution problems and develop management programs to address them, and that is pretty much what they have done.

Taken as whole, one can certainly view state responses to the section 319 law as significant efforts to comply with Congress's wishes. As Table 10-1 indicates, over \$2.5 billion has been allocated toward non-point source water pollution abatement since the inception of the 319 program, and over $1 billion of these monies have come from state matching funds. While this investment does not approach the massive investments made to address point source water pollution problems during the 1970's and 1980's, it is nevertheless a substantial investment. This investment, along with universal state participation, can only be viewed as consistent with Congressional intent and direction in this area – even if the states and EPA were somewhat tardy in meeting the timelines that Congress established.

Table 10-1 - Funding For State NPS Programs – FWPCA, Section 319h, 1990 – 2002
(Appropriations in millions)

Fiscal Year	Federal Funds*	State/Local Match**	Total 319 Funds***
1990	$38	$25.3	$63.3
1991	$51	$34	$85
1992	$52.5	$35	$87.5
1993	$50	$33.5	$83.3
1994	$80	$53.3	$133.3
1995	$100	$66.6	$166.6
1996	$100	$66.6	$166.6
1997	$100	$66.6	$166.6
1998	$105	$70	$175
1999	$200	$133.3	$333.3
2000	$200	$133.3	$133.3
2001	$237.5	$158.3	$395.8
2002	$237.5	$158.3	$395.8
Total	**$1551**	**$1034**	**$2585**

* Figures for 1990 through 1999 provided by EPA Staff in the summer of 2001 (USEPA, 2001F), and figures for 2000-2002 provided by EPA Staff at an EPA sponsored Workshop, Paying for Water Quality, in Washington DC, on March, 14 & 15, 2002 (USEPA, 2002B).
** State/local match funds derived from Federal expenditure figures, based on the 40% match requirement.
*** Total 319 funding figures represent the sum of federally budgeted dollars and required state match funding.

However, while this national investment in non-point source water pollution abatement is significant and important, it falls well short of the non-point source water pollution control investment needed to achieve the ambitious goals and objectives established by Congress in the early 1970's and reaffirmed in subsequent amendments. A 1996 estimate by EPA, for example, suggested that $9.4 billion was needed to address non-point source water pollution abatement needs (USEPA, 1997B). A subsequent study by EPA, the Environmental Council of the States (ECOS), and the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) suggests an annual "gap" of between $735 million and $960 million between current expenditure levels for water pollution control generally and the expenditures needed to "achieve the objectives of the Clean Water Act" (ASIWPCA, 2002, p. 7). And, a fair reading of this analysis suggests that this "gap" applies to both point and non-point sources of water pollution problems. Based on these analyses, it is clear that "literal" compliance with Section 319 requirements and grant recommendations is insufficient to meet the overall goals that Congress established in the Act. This difference makes an investigation of state efforts above and beyond the Section 319 program minimum requirements both interesting and important. For, based on the language in section 101 of the Act, Congress's clear hope and (perhaps naïve) expectation was that states would fill any "gap" between the minimum level of activity required for literal section 319 compliance and the achievement of Congress's established water quality goals [5].

10.1.2. Goal-Oriented Compliance: State NPS Policy Activism

Given the inadequacy of current funding levels in relation to the goals of the FWPCA, it is appropriate to investigate measures of state NPS policy activism above and beyond literal compliance with the Section 319 program. Consequently, each of the three measures of state NPS policy activism overviewed above will now be discussed in turn.

10.1.2.1. Legislation Facilitating Consideration of NPS Water Pollution Concerns

One measure of state compliance with Congress's expressed desire for active state NPS programs focuses on the extent to which they facilitate consideration of non-point source water pollution control concerns in state and local decision-making. The assumption here is that states which enact laws that favor the identification and resolution of non-point source water pollution control problems are more active than those states that do not. Fortunately, a relatively recent study of state watershed protection laws (Morandi et. al., 1998) provides a foundation for measuring just this kind of state NPS policy activism.

Based on telephone interviews with state agency personnel conducted in 1997, an EPA funded National Conference of State Legislatures (NCSL) study sought to identify the extent to which states relied upon differing legal mechanisms to address non-point source water pollution problems through watershed based efforts – a form of non-point source pollution control activity that is explicitly endorsed by Congress in Section 319 of the FWPCA [6]. While watershed management may appear to be a broader concept than non point source water pollution – and in some important respects it is, relatively independent regulatory structures for permitting point source wastewater discharges make "watershed management" a primary managerial rubric for efforts to address non-point source water pollution concerns. For, inherent in the concept is the need to address non-point source water pollution issues, as well as issues associated with permitting wastewater discharges. The NCSL identified five major state legislative approaches to encouraging watershed protection and non-point source water pollution control. These five approaches are now discussed briefly in turn, and data on the use of these differing legal forms of watershed protection are also presented.

The first approach identified by the NCSL study relates to the creation of statewide planning and program authorities for watershed management. These kinds of laws "authorize state agencies to develop a watershed management program that may rely on local governments for implementation" (Morandi et. al., p. 5). Clearly, if a state is to confront non-point source water pollution problems in a structured and rational way, providing some form of statewide authority for establishing and managing watersheds is an important step in the process. However, the NCSL study identified a total of only 15 states that had specifically developed this kind of authority, and these states are listed in Table 10-2 [7]. It is important to note, however, that the nature and strength of these planning and program authorities at the state level do vary. Some states, like New Jersey and Georgia, for instance, require state level planning and program activities, while others – such as Virginia and Texas – focus more on providing support for local planning and programs. Nevertheless, the fifteen states identified here share a common form of state NPS policy activism that emphasizes the importance of watershed protection activities specifically carried out by state and local government entities. They are more "active" in this sense than the 35 states that do not have these kinds of authorities.

The NCSL's second approach for facilitating consideration of non-point source water pollution concerns in state and local decision-making involves providing mechanisms for a wide range of local groups to address watershed related issues, even in the absence of required state and local government involvement. The NCSL study accounted for this kind of activism by inquiring as to whether state law specifically authorized the establishment of Local Watershed Councils. As defined by NCSL, these kinds of statutory approaches "encourage the formation of voluntary local watershed councils comprised of a wide range of interests to assess watershed conditions, develop plans and implement restoration projects" (Morandi et. al., 1998. p. 5). This kind of approach effectively empowers local watershed groups to address water pollution problems in the state stemming from non-point sources. In effect, they provide a recognized legal mechanism empowering groups and individuals to press their concerns about non-point source water pollution in state and local decision-making forums. A total of seven states utilized this kind of approach by the late 1990's, and these states are listed in Table 2. All else being equal, these seven states exhibited greater activism in empowering local watershed groups than the 43 states that did not have this kind of legislation.

A third form of state legislative approach evaluated in the NCSL study relates to the establishment of formal watershed districts for the management of watershed related concerns. These formal watershed districts differ from the voluntary watershed Councils discussed above in that they are established as formal government entities, and in the fact that they are established through the petitions of landowners rather than a broader array of potential interests. The NCSL study defines these kinds of statutes as those that authorize "landowners to petition a local government to hold an election to form a watershed district; if approved, the district is empowered to purchase land or rights of way, construct projects, issue bonds and raise mill levies; often pursuant to federal law providing financial assistance for dams and erosion control projects" (Morandi et. al., 1998, p. 5). By providing a formal mechanism for addressing watershed based concerns, these states are exhibiting a form of state NPS policy activism – even if it is a form that is implicitly focused more on the rights and needs of landowners than those of environmental and citizens groups seeking to protect local water quality for ecologically oriented reasons. A total of twenty-four states had this kind of legislative authorization, and these states are listed in Table 2. And once again, these 24 states exhibited a higher level of non-point source water pollution policy activism than the remaining 26 states.

Another approach to encouraging consideration of non-point source water pollution problems relates to the ways in which states impose controls and management measures on polluting activities within their jurisdictions. Historically, because the FWPCA required permits for point source discharges and did not require them for non-point sources, state agencies set up management mechanisms that dealt with point source permitting and non-point source water pollution measures separately. The end result has been a substantial focus on the issuance of NPDES permits, often accompanied by a neglect of non-point source contributions to water pollution problems. In recent years, some states have sought to address water pollution problems in a manner more consistent with the Congress's admonition that point and non-point source controls be integrated through watershed management mechanisms. However, as of 1997, NCSL identified only three states utilizing integrated permitting approaches – Florida, New Jersey, and Texas [8]. It is important to note in this context, however, that these integrated permit approaches vary in terms of their emphasis on non-point source water pollution control, with the New Jersey and Florida approaches placing more emphasis on non-point sources than the Texas approach [9]. Nevertheless, even in Texas, the effect of this kind of watershed-based approach to permitting is to highlight the overall condition of waters within a watershed and the impacts of multiple pollution sources. The net result of this kind of integrated process is therefore that a greater level of attention is paid to the contributions of non-point water pollution sources and their impacts on water quality. In this regard, these three states are facilitating consideration of non-point source problems to a greater degree than the remaining states, and therefore are also exhibiting a greater level of non-point source water pollution policy activism.

A final statutory approach to non-point source water pollution control identified by NCSL relates to ongoing state funding mechanisms for non-point source water pollution control projects. NCSL defines this kind of statutory approach as involving the legal creation of "a separate fund and dedicated source of revenue to provide financial assistance to watershed councils or landowners for watershed assessments, planning and restoration projects" (Morandi et. al., p. 6). These financing mechanisms vary with respect to authorized funding sources and funding eligibility requirements. For example, Wisconsin's program – probably the oldest such funding program in the country (enacted in 1978) – uses general-purpose revenues to fund water quality related projects in priority watersheds. Both watershed groups and landowners are eligible for funding under this program. By contrast, New Jersey's financial assistance program was first enacted in 1996, and it uses dedicated revenues from its Corporate Business tax to support the activities of local watershed groups. A total of nine states had some form of dedicated funding program authorized for non-point source water pollution activities in 1997, and the specific nature of these funding programs varied considerably. Viewed as a whole, however, these nine states can be viewed as more active in this respect than the remaining 41 states that did not have statutory financing mechanisms in place for non-point source water pollution control. It is important to note in this context, however, that this measure of activism relates to the establishment of dedicated statutory funding approaches, not the actual allocation of funds for non-point source pollution abatement efforts. The issue of budgetary allocations is addressed later, and is distinguished conceptually in this study from the establishment of dedicated funding sources.

Table 10-2 lists the states that have implemented each of the five approaches to non-point source water pollution control discussed above. In total, thirty-nine states had enacted at least one of these legislative approaches to watershed protection by 1997. By contrast, ten years after the enactment of Section 319 and the Water Quality Act of 1987, eleven states still had none of these five legal approaches to fostering consideration of non-point water pollution on their books. A handful of states – Florida, Maine, New Jersey, Oregon, and Washington – had enacted several of these kinds of legislative authorizations by that date. Given this variation, we suggest that those states that have enacted more approaches to watershed protection are more active than states that had enacted fewer such approaches.

Table 10-2 - State Watershed Legislation, by Approach: NCSL Study – 1998

Statewide Planning & Programs	Voluntary Watershed Groups	Formal Watershed Districts	Integrated Permitting	Funding Mechanisms
California	Idaho	Alabama	Florida	Florida
Connecticut	Michigan	California	New Jersey	Iowa
Georgia	Montana	Connecticut	Texas	Maine
Hawaii	New Jersey	Florida		Massachusetts
Kansas	Oregon	Idaho		New Jersey
Maine	Rhode Island	Illinois		New York
Massachusetts	Washington	Kansas		Oregon
New Jersey		Kentucky		Washington
North Carolina		Louisiana		Wisconsin
Oregon		Maine		
Pennsylvania		Maryland		
Texas		Minnesota		
Virginia		Mississippi		
Washington		Missouri		
Wisconsin		Nevada		
		New Hampshire		
		New York		
		Ohio		
		South Carolina		
		South Dakota		
		Tennessee		
		Vermont		
		West Virginia		
		Wyoming		

Adapted from Table 2 (page 6) and narrative descriptions in Morandi et. al., 1998.
* None of the above mentioned approaches were identified as operating in the following eleven states: Alaska, Arizona, Arkansas, Colorado, Delaware, Indiana, Nebraska, New Mexico, North Dakota, , Oklahoma, and Utah.

10.1.2.2. Legislation Providing Enforceable Mechanisms for NPS Control

Another form of compliance with Congress's desire for active state NPS policies relates to state regulatory enforcement authorities. While states have traditionally relied on financial and technical assistance to address NPS problems (ELI, 1997), some states have begun to rely more heavily on enforceable mechanisms to achieve NPS pollutant loading reductions. The use of enforceable approaches is therefore another form of state NPS policy activism that should be accounted for in our calculations because states that enact enforceable mechanisms are exhibiting greater levels of activism than those that do not, all else being equal.

Enforceable mechanisms come in a variety of forms, and – in a limited number of cases – they are counterbalanced by strong state laws that require state water pollution standards be "no more stringent" than applicable federal standards. In some cases, these enforceable requirements come in the form of state water pollution control laws that apply management controls to non-point as well as point source water pollution releases. In other cases, enforceable requirements come in the form of sectorally based standards for specific polluting industry sectors such as forestry, agriculture, or construction.

State water pollution laws vary widely in the extent to which they establish enforceable mechanisms to control non-point source water pollution releases. Some states – such as California and Maine – have strong enforceable water pollution provisions that apply to a wide range of non-point sources. These states may also require non-point source releases of pollutants to be approved in advance or be issued permits of some kind, somewhat like point sources are required to do under the federal law. Other state water pollution laws, however, have much more limited enforceable authorities for non point source water pollution discharges. In these states, there may be little or no authority for enforceable regulation of non-point source water pollution releases, or major exemptions for agriculture, silviculture, and/or other non-point water pollution sources that contribute significantly to water quality problems. North Dakota, for example, appears to fall into this latter – less active – category.

Even states with weak regulatory enforcement provisions in their water pollution laws may, however, have significant authority to regulate and enforce non-point source water pollution related requirements in particular polluting sectors of the economy. These sectorally based authorities may apply to forestry, agriculture, and/or land disturbing activities such as the construction of new buildings. These authorities may be administered by state agriculture agencies, forestry agencies, soil and water conservation districts, and/or local governments. They may also have procedural requirements associated with their application. For example, enforceable authorities within a soil conservation district may need to be approved locally prior to their application [10]. These authorities – like the enforceable authorities contained in water pollution laws, however, vary in both their scope and the likelihood of their application. Some states – like California, Maryland and Maine – appear to have strong authorities in a number of different polluting sectors, and which establish requirements prior to the commencement of polluting activities (logging, smaller animal feeding operations, etc.). Other states have very weak authorities that do not appear to add appreciably to the overall availability of enforceable authorities within the state for addressing non-point source water pollution concerns. Arizona, New Mexico, Arkansas, and Illinois, for example, appear to fall into this latter category.

A final consideration in assessing the strength of state enforcement mechanisms applicable to non point source water pollution control relates to the existence and strength of state "no more stringent" laws. In general, these laws prohibit states from enacting requirements that are more stringent than federal law. One recent study estimates that approximately one-third of the states have some form of "no more stringent" law in place (ELI, 1997), although the strength and applicability of these laws varies considerably. In two states – Idaho and South Dakota – "no more stringent" provisions written into law appear to effectively prohibit strong regulation and enforcement against non-point source water pollution sources. In other states, the provisions in place simply require different – and generally more cumbersome – procedures to be applied when proposed state regulations are more restrictive than existing federal law. Interestingly enough, many of these procedurally based provisions exist in states that score high by other measures of non-point source water pollution activism (Florida, Maine, etc.). It is not clear, therefore, that these procedural approaches necessarily have any appreciable impact on overall state NPS policy activism.

Fortunately, relatively recent studies published by the Environmental Law Institute (ELI) provide a means for developing estimates of the strength of state enforcement provisions relating to non-point source water pollution in these areas (ELI, 1997; ELI, 1998; ELI, 2000). Table 10-3 below provides a summary analysis of the strength of state enforceable non point source water pollution provisions, based on ELI's 1997 and 1998 studies of enforceable mechanisms for non- point source water pollution control. Based on information in these ELI reports, the table assigns strength ratings for state water pollution laws and sectorally based enforcement provisions, and also identifies the existence of **strong** no more stringent laws where they exist (Idaho and South Dakota). The total strength score in the second column reflects an assessment of the overall strength of enforceable provisions in the state's legal structure, based on separate estimates of the strength of state provisions in water pollution law, forestry law, agriculture law, and law relating to the movement of earth and construction. All four of these legal arenas is weighted equally, and assessments of the strength of each category of law are based on the existence and scope of enforceable provisions, the availability of ongoing mechanisms that provide a basis for prior approvals of pollutant releases and enforcement (permits, etc.), the existence of clear enforcement provisions, and the extent to which the respective statutes actually direct (rather than just allow) state agency actions [11]. In each case, the strength score is the sum of the four partial scores, except in Idaho and South Dakota where two additional points were subtracted to account for the strong "no more stringent" law provisions in these states.

Table 10-3 - Estimated Strength of Enforceable Laws:NPS Water Pollution

State	Total Strength	Water Pollution Law Score	Forestry Law Score	Agriculture Law Score	Earth Moving Law Score
Alabama	3	1	1	1	0
Alaska	3.5	2	2	.5	0
Arizona	3	2	0	1	0
Arkansas	2.5	1	.5	1	0
California	9	2.5	2.5	2	2
Colorado	2.5	1	0	1	.5
Connecticut	8	2.5	2	1.5	2
Delaware	6	1.5	1.5	1	2
Florida	6	2	1.5	1	1.5
Georgia	7.5	2.5	1.5	1	2.5
Hawaii	5.5	2.5	1	1	1
Idaho**	1	1	1.5	.5	0
Illinois	3	2	0	1	0
Indiana	4	1.5	0	.5	2
Iowa	5.5	1.5	0	2	2
Kansas	3.5	1.5	0	1	1
Kentucky	5.5	1.5	2	1.5	.5
Louisiana	3	.5	.5	1	1
Maine	9.5	2.5	2	2.5	2.5
Maryland	9	2	2	2.5	2.5
Massachusetts	4.5	1	2	1	.5
Michigan	6.5	1.5	1	2	2
Minnesota	6	2	.5	1	2.5
Mississippi	2.5	1	.5	1	0
Missouri	4	1.5	1.5	1	0
Montana	4	1	1	1	1
Nebraska	4	1	1	1	1
Nevada	5	1	2	1	1
New Hampshire	9	2.5	2.5	2	2
New Jersey	4.5	1.5	.5	.5	2
New Mexico	2	1.5	.5	0	0
New York	5.5	1.5	.5	2	1.5
North Carolina	8	1.5	1.5	2.5	2.5
North Dakota	3	1.5	0	1	.5
Ohio	5.5	1	1.5	1.5	1.5
Oklahoma	4	1	0	2	1
Oregon	7.5	1.5	2.5	2	1.5
Pennsylvania	7.5	1.5	2	2	2
Rhode Island	5	1.5	2	.5	1
South Carolina	6	2.5	1	1	1.5
South Dakota**	.5	1	0	1	.5
Tennessee	2.5	1.5	0	1	0
Texas	4.5	1.5	1	1	1

Table 10-3 (continued)

Utah	2.5	1	0	1	.5
Vermont	7	1.5	1.5	1.5	2.5
Virginia	6	1.5	1	1	2.5
Washington	7.5	2	2	2	1.5
West Virginia	2.5	0	1.5	1	0
Wisconsin	6	1.5	1.5	1.5	1.5
Wyoming	3	1.5	0	1	.5

* Total Strength Score = Water Pollution Law Score + Forestry Law Score + Agriculture Law Score + Earth Moving Law Score.
** The Total Strength Scores for Idaho and South Dakota were reduced by an additional 2 points to account for their strong "no more stringent" laws.

As can be seen clearly from Table 10-3, the strength of enforceable provisions in non- point source water pollution control varies considerably among the states. Total strength scores vary from a low of .5 (South Dakota) to a high of 9.5 (Maine). Clearly therefore, some states, such as South Dakota and Idaho, appear to have weak to non-existent enforceable authorities, while other states, such as California, Maine and Maryland, have rather strong ones. All else being equal, of course, those states with higher enforceability scores are more active than those states with lower scores.

10.1.2.3. State Budgetary Allocations for NPS Water Pollution Abatement

While statutory authorities fostering consideration of non point source water pollution concerns and enabling state enforcement of NPS standards are important, state funding is also of critical concern in any assessment of state NPS activism. In fact, some might argue that budgetary allocations are the single most important measure of state NPS activism. For, adequate budgetary resources are necessary for most other forms of state NPS policy activism, particularly the technical and financial assistance efforts that have long been the policy instruments of choice in the non-point source water pollution field.

As a result of these considerations, the third measure of state NPS water policy activism used in this analysis relates to state budgetary allocations for non-point source water pollution control. More specifically, this measure seeks to determine whether states are spending substantial state resources on non-point source water pollution control, above and beyond the required state matching funds for 319 (h) grant receipt. This, of course, is an appropriate measure of policy activism because state expenditures above and beyond the minimum amount needed to obtain federal 319 h grant funding reflect an extra effort to achieve the ambitious goals and objectives established by Congress in the FWPCA.

Measuring the extent to which states expend financial resources above the 319 (h) match amounts, however, is not an easy exercise. Many state administered programs (particularly those relating to agriculture) may have the effect reducing non-point source water pollution threats, even though they were not targeted for this purpose [12]. More importantly, the states do not currently track non-point source water pollution control related expenditures in comparable fashion, and the funding analyses conducted by the Council of State Governments (CSG) and the Environmental Council of the States (ECOS) since the mid 1980's do not separate non-point source related expenditures from other water pollution control funding. Consequently, there is no fully comparable and continuous level data on state NPS water pollution control expenditures currently available for use in our analysis.

Fortunately, however, several recent research efforts involving state and federal water pollution control personnel provide a foundation on which to assess state non-point source water pollution expenditures above and beyond the required 319 h matching funds (NASBO, 2000; ECOS, 2001A; USEPA, 2002A). The analysis provided here is based on a compilation of the results from three such sets of work, and provides a relatively good measure of state funding for non-point source water pollution control above and beyond the Section 319 h grant match amounts mentioned above. Based on a review of these research efforts, we can identify 25 states that have committed to spend significant non-federal dollars on non-point source water pollution control in recent years. These states are identified in Table 10-4 below. In all cases, according to at least one of the three research efforts noted above, these states have committed to the expenditure of at least ½ million dollars in state funds between 1998 and 2001, above and beyond the 319 h grant matching funds for the purpose of addressing non-point source and watershed based pollution problems affecting waters within and around their borders [13].

Table 10-4 - States With Major Identified Non-Point Source Expenditures

(Above and Beyond the 319h Grant Match)

California	Maryland	North Carolina
Connecticut	Massachusetts	Ohio
Delaware	Michigan	Oregon
Florida	Minnesota	Pennsylvania
Georgia	Missouri	Rhode Island
Illinois	New Hampshire	Vermont
Iowa	New Jersey	Virginia
Maine	New York	Washington
		Wisconsin

It is important to recognize, however, that the nature and magnitude of these actual funding efforts varies considerably. Some of these efforts are financed with state general funds (PA, WI), while others are financed through bonding initiatives (NY, CA) or other forms of dedicated funds of various kinds (NJ, OR). The overall level of effort also varies considerably, and ranges from less than $2 million (Mass, NH) to massive multi-million dollar bond issuance authorities approved in California and New York [14]. The exact nature of the non-point source water pollution abatement efforts funded also varies, although most of the state program expenditures authorized are designed to reduce non-point source pollutants such as nutrients and suspended solids through techniques such as the establishment of stream bank buffers and vegetation, improved agricultural and forestry practices, and land acquisition. Regardless of these variations, however, one can say that these states are seeking to fulfill Congress's stated goal of developing active state non-point programs to a greater degree than the other 25 states that appear to be spending substantially less on the non-point source water pollution abatement efforts.

10.1.2.4. State NPS Water Pollution Policy Activism – An Overview

The picture that emerges from the discussion above is relatively clear. The states have responded to the procedural requirements established through the 319 program, and this has resulted in a substantial increase in our nation's efforts to address non-point source water pollution problems. In this sense, states have complied with Congress's wishes, as expressed in statute. At the same time, however, state efforts to develop active programs vary greatly and, in general, have not met the ambitious expectations established by Congress.

In regard to procedural compliance, the states have responded – although with what critics might call "characteristic tardiness" – to Congress's supportive program design by fulfilling the assessment and program management requirements established by EPA, successfully seeking available grant funds, and providing the necessary matching funding. The overall results of Congress's mandates in this area have been expenditures on non-point source water pollution control efforts in the $2 to $3 billion dollar range over the last fifteen years – a significant investment by almost any accounting. These expenditures, in turn, have resulted in development and completion of a large number of successful non point source water pollution reduction projects – at least according to EPA (USEPA, 1994, 1997A, & 2002A).

Beyond this minimum level of procedural compliance necessary for states to receive federal monies, however, a far more mixed picture emerges. To gain a sense of this overall picture, it is useful to develop a summary measure of state NPS policy activism. The development of such a summary measure allows us to assess the overall extent of variation in NPS policy activism and – as was mentioned previously – it is also important for theoretical reasons. Congress's statutory direction in the FWPCA is clear with regard to its ambitious goals for water quality and its desire for active state programs, but it is basically agnostic with regard to the approaches states should take in addressing non-point source water pollution concerns. Decisions regarding whether states should take facilitative or mandatory approaches statutorily are left up to the states, as are decisions about appropriate levels of state and local funding above and beyond the Section 319 grant match. For this reason, it is not appropriate to rely solely on one indicator of activism to assess the extent to which states are responding to Congress's overall mandate. A fairer and more comprehensive approach takes account of the various forms of state activism that are permitted and encouraged under the FWPCA, and assesses overall activism across a range of measures. This kind of multi-indicator approach is taken in developing the non-point source activism scale outlined below.

At the outset, however, it is appropriate to recognize that the construction of scales involves an inevitable element of subjective judgment. The scale constructed here is no exception to that rule. Nevertheless, this scale is grounded in an effort to quantify several complementary and important forms of state policy activism in a way that provides a reasonable measure of the broad concept of non-point source water policy activism. The activism scores used are constructed on the basis of a 30 point scale which draws equal weight from the three indicators we have investigated – the number of facilitative approaches used to encourage decision-making relating to non-point source water pollution control, the strength of the state's enforceable statutory provisions relating to non-point source water pollution, and the expenditure of substantial funds on non-point source water pollution control.

Each of these three indicators of state water pollution policy activism is weighted equally, with a total of 10 possible points for each indicator. The overall activism score is therefore the sum of the points assigned for each of these three indicators of state NPS policy activism. For the facilitative approaches indicator, each state is assigned 2.5 activism points for each legislative approach it has enacted. Only New Jersey receives the full 10 possible points, while the eleven states that had not enacted any of these approaches by 1998 receive 0 activism points for this indicator. The enforceable statutory mechanism score itself was developed on a ten-point scale, so it is used directly in the allocation of points for that particular indicator. The dichotomous indicator for substantial expenditures on non-point source water pollution control is also weighted on a 10 point scale, with those states expending substantial resources receiving the full 10 activism points and states without substantial budget expenditures receiving zero activism points. While this may seem like something less than a refined approach, it is important to remember that most efforts to address non-point source water pollution problems involve technical and financial assistance of differing kinds, and this requires money. Even mandatory approaches to non-point source water pollution control require substantial investments to communicate about applicable requirements and to monitor and enforce compliance. In addition, the indicator used here requires the finding of significant expenditures – in excess of $500,000 – to receive the 10 point allotment, so very small expenditures do not get a state into this category. In short, if a state is not spending significant funds on non point source water pollution control, it probably isn't being very active. On the other hand, if substantial state budgetary allocations are made, it is symptomatic of at least a minimum level of state NPS policy activism.

Table 10-5 – State NPS Water Pollution Policy Activism:

An Overview of State Performance

States	Activism Score*	Facilitative Approaches**	Major Dollars***	Enforceable Law Score
Maine	27	7.5 (3)	10 (Yes)	9.5
Oregon	25	7.5 (3)	10 (Yes)	7.5
Washington	25	7.5 (3)	10 (Yes)	7.5
New Jersey	24.5	10 (4)	10 (Yes)	4.5
California	24	5 (2)	10 (Yes)	9
Florida	23.5	7.5 (3)	10 (Yes)	6
Connecticut	23	5 (2)	10 (Yes)	8
Maryland	21.5	2.5 (1)	10 (Yes)	9
New Hampshire	21.5	2.5 (1)	10 (Yes)	9
Wisconsin	21	5 (2)	10 (Yes)	6
New York	20.5	5 (2)	10 (Yes)	5.5
North Carolina	20.5	2.5 (1)	10 (Yes)	8
Georgia	20	2.5 (1)	10 (Yes)	7.5
Pennsylvania	20	2.5 (1)	10 (Yes)	7.5
Massachusetts	19.5	5 (2)	10 (Yes)	4.5
Vermont	19.5	2.5 (1)	10 (Yes)	7
Michigan	19	2.5 (1)	10 (Yes)	6.5
Minnesota	18.5	2.5 (1)	10 (Yes)	6
Virginia	18.5	2.5 (1)	10 (Yes)	6
Iowa	18	2.5 (1)	10 (Yes)	5.5
Ohio	18	2.5 (1)	10 (Yes)	5.5
Rhode Island	17.5	2.5 (1)	10 (Yes)	5
Missouri	16.5	2.5 (1)	10 (Yes)	4
Delaware	16	0 (0)	10 (Yes)	6
Illinois	15.5	2.5 (1)	10 (Yes)	3
Texas	9.5	5 (2)	0 (No)	4.5
Kansas	8.5	5 (2)	0 (No)	3.5
South Carolina	8.5	2.5 (1)	0 (No)	6
Hawaii	8	2.5 (1)	0 (No)	5.5
Kentucky	8	2.5 (1)	0 (No)	5.5
Nevada	7.5	2.5 (1)	0 (No)	5
Montana	6.5	2.5 (1)	0 (No)	4
Idaho	6	5 (2)	0 (No)	1
Alabama	5.5	2.5 (1)	0 (No)	3
Louisiana	5.5	2.5 (1)	0 (No)	3
Wyoming	5.5	2.5 (1)	0 (No)	3
Mississippi	5	2.5 (1)	0 (No)	2.5
Tennessee	5	2.5 (1)	0 (No)	2.5
West Virginia	5	2.5 (1)	0 (No)	2.5
Indiana	4	0 (0)	0 (No)	4
Nebraska	4	0 (0)	0 (No)	4

Table 10-5 (continued)

Oklahoma	4	0 (0)	0 (No)	4
Alaska	3.5	0 (0)	0 (No)	3.5
Arizona	3	0 (0)	0 (No)	3
North Dakota	3	0 (0)	0 (No)	3
South Dakota	3	2.5 (1)	0 (No)	.5
Arkansas	2.5	0 (0)	0 (No)	2.5
Colorado	2.5	0 (0)	0 (No)	2.5
Utah	2.5	0 (0)	0 (No)	2.5
New Mexico	2	0 (0)	0 (No)	2

* Activism Score = Facilitative Statutory Approaches + Major $'s + Enforceable Law Score (Kronbach's alpha = .5715[15]).

** Facilitative Approaches – The number of approaches is shown in parentheses, and the score shown equals that number times 2.5.

*** Major $'s – The Yes or No in parentheses indicates whether or not the state made major expenditures (> $500,000) on non point source pollution control above and beyond the required 319 program matching funds.

As Table 10-5 shows, the state NPS policy activism scores vary widely among the states, with overall scores ranging from 2 (NM) to 27 (Maine). Based on this range, it appears that Congress's admonitions about achieving high levels of water quality through active state programs have been vigorously pursued in some cases and hardly recognized in others. To borrow a phrase used by several scholarly observers of center-periphery relationships in environmental management (Lester, 1994; Sbragia, 1996), some states are "leaders" in the area on non point source water pollution control, and other states are "laggards."

The map shown in Figure 10-1 below depicts the levels of non-point source policy activism outlined in Table 10-5 in visual fashion. Like the figures above, it shows wide variation

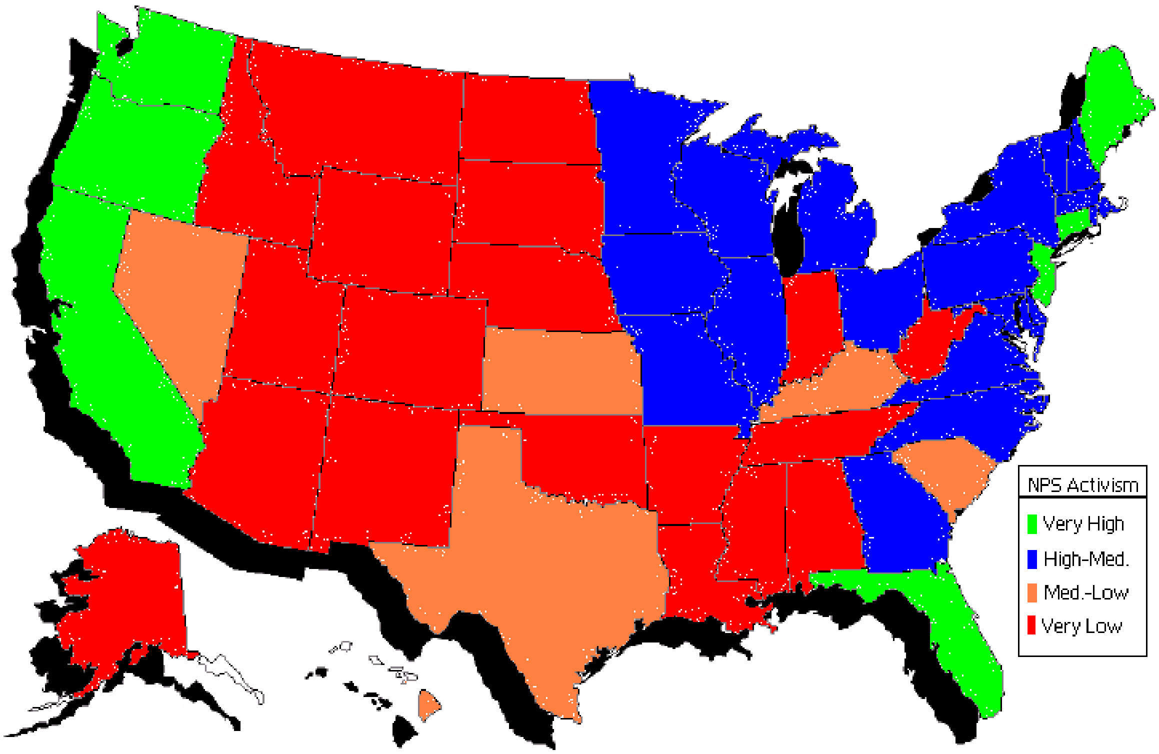

Figure 10-1: State Non-Point Source Policy Activism

in NPS policy activism among the states. In general, the most active state NPS programs appear to be on the coasts and – to a slightly lesser extent – in the upper Midwest and Northeastern states. By contrast, those states that are less active appear to be in the Great Plains and Rocky Mountain Regions as well as in portions of the South.

In broad terms, while the evidence presented here suggests that the federal 319 program has fostered substantial compliance in procedural terms and has established some baseline minimum level of investment among the fifty states, it also demonstrates wide variations in goal- oriented compliance among the states. States such as Maine, Oregon, Washington, New Jersey, California, and Florida have actively pursued the nation's fishable-swimmable goal through efforts to minimize non point source water pollution. While even these efforts will need to be re-doubled and improved to accomplish Congress's goals in the FWPCA, they far exceed the efforts taken by the laggards – states such as New Mexico, Arkansas, Colorado, Utah, North Dakota, and South Dakota that have shown, at best, minimal independent effort to address non-point source water pollution concerns.

10.2. Conclusion

What does this analysis suggest about Congress's ability to influence domestic water pollution policy at the state level through statutory direction? Several points are worth emphasizing in this regard.

First, the analysis makes it clear that, when combined with significant monetary inducements and direct orders from Congress, supportive policy structures appear to generate significant state action --- at least in procedural terms. All 50 states conducted the assessments and management program development activities required by Congress in the FWPCA within reasonable amounts of time, all things considered. While a number of state responses were late relative to the statutory deadlines established, this tardiness is probably attributable as much to the ambitiousness of the deadlines themselves as to foot-dragging efforts on the part of the states. All 50 states have also participated in the 319 h grant program, and their willingness to do so has led to a $2.585 billion dollar investment in non-point source water pollution control in this country between 1990 and 2002. These actions suggest clearly that the states have at least sought procedural compliance with Congress's directions, and that these efforts appear likely to have had significant substantive effects. These results square quite well with the results of the historical analyses provided in previous chapters. They do not, however, address the wide substantive variations in state NPS policy activism that are also uncovered in this analysis.

The analyses of goal-oriented compliance and state policy activism outlined above provide a much different picture of state responses to Congressional direction. While none of the states appear as active as Congress's language in the FWPCA suggests they should be, the analysis makes it clear that there is wide variation in the extent to which the states pursue the FWPCA's fishable and swimmable goal through active non-point source water pollution programs. States vary greatly in their adoption of laws to encourage the consideration of non- point source water pollution concerns in state and local decision-making. They vary greatly in the extent to which they have enacted enforceable provisions for non-point source water pollution control. And they also vary considerably in the extent to which they have invested substantial state funds in order to achieve non-point source water pollution loading reductions. Using the state NPS policy activism scores developed in this chapter as a guide, we see that states like New Mexico, Utah, Arizona, and Colorado appear to have done very little to address non-point source water pollution in their states beyond simply operating the federal 319 program. By contrast, it is apparent from this analysis that states like Maine, New Jersey, Florida, Washington, California, and Oregon have made substantial efforts, above and beyond the minimum requirements of the federal 319 program. Between these two extremes, of course, lie many different gradations of NPS policy activism that vary among the remaining states.

And finally, the data and analyses presented in this chapter do not yield simple and far-reaching conclusions regarding the adequacy of Congressional control in water pollution policy under supportive federal policy structures. While the analysis clearly suggests that Congress's decision to establish both direct orders for non-point source water pollution policy and a major funding program had substantial influences on domestic policies relating to non-point source water pollution control at the state level, it is equally evident that goal-oriented compliance varies considerably among the states. Thus, in non-point source water pollution control, we are quite some distance from a runaway bureaucracy, but we are also far from uniform Congressional policy control. Many state programs appear to be little more than shells built with federal monies, and further and deeper Congressional involvement is likely to be necessary to make them much more than that. If Congress's goals are used as the standard of compliance, it is clear that procedurally based orders and (significant but) limited federal monetary investments are insufficient to bring about uniform goal oriented compliance across the states.

11. EXPLAINING VARIATIONS IN STATE NPS POLICY ACTIVISM

How do we explain the substantive variations in state NPS policy activism presented in the previous chapter? While the discussion in Chapter 10 addresses the nature and extent of variability in state NPS policy activism, it does not address the sources of this variation. The sources of variation are important, however, because they provide insight into the dynamics underlying the "slipping and shirking" behaviors (McCubbins, 1985) that lead to incomplete compliance with the goals and directions established by Congress in statute. Knowledge of the sources of variation can also yield insights that are relevant to normative debates over the legitimacy of the slipping and shirking behaviors in the first place. If straying from a Congressionally established goal occurs as a result of legitimate differences in needs and preferences, then it is quite arguably a legitimate response to Congressional directions that are predicated on state involvement in the federal policy process. Conversely, if slippage or shirking occurs as a result of undue influence by powerful economic minorities at the state level, then it would be hard to justify this variation on similar grounds. In between these two extremes, of course, are many multi-source explanations that may provide more "nuanced" insights regarding both Congressional influence through statute and policy devolution.

As was noted in Part I of this work, potential sources of variation in state NPS policy activism can be lumped into at least three broad categories, each of which reflects a major theoretical approach to explaining policy differences among the states. In one category lies those sources of policy variation that actually reflect differences in public preferences and needs among the states – a "responsive" policy model that has been emphasized by Erickson et. al. (1993) generally, and by Lester (1994) and Bacot & Dawes (1997) for environmental policy. State responses to these sources of variation reflect the proper operation of state political systems, and suggest legitimate grounds for state variation in the implementation of Congressionally established policies. Two of the clearest sources of variation of this kind are public opinion relating to the environment and the relative severity of water pollution problems among the states. States with few water quality problems can legitimately argue a lesser need to respond aggressively to Congressional directions in non-point source water pollution control than states with severe water pollution problems. Likewise, an argument can be made that states in which the public has very little concern about the environment should be able to construct less active policies than states in which environmental concerns are widely held – particularly given the strong role accorded to states in the FWPCA. Similar – although admittedly a bit weaker – arguments can also be made in regard to political culture and party control of state government, as these differences are often viewed as legitimate reasons for federal forms of government and the regional policy differences that this form of political system seeks to enable. While all of these arguments may be viewed as suspect where "fundamental rights" are involved, they do have a clear and justifiable foundation in the federal structure of our governmental system and in the FWPCA itself. For this reason alone, it is important to determine if widespread preferences and needs are the driving forces behind state policy variation in non-point source water pollution control. Greater levels of policy devolution may very well be advisable if there is evidence that states are becoming highly responsive to the needs and preferences of their people.

A second category of potential sources of policy variation deals with the influence of interest groups within state political systems, and it has roots in both pluralist and elitist models of the policy process. Here the primary concern advanced in variable forms by Stigler (1971), Stewart (1977), Peterson (1995), and others relates to the strength or predominance of economic interests that may affect state water pollution policies, and their ability to exercise undue influence in state policymaking processes. However, the counterbalancing influences of strong environmental groups and groups with an economic stake in clean water (tourism, for example) are also potentially important in this "group based" conception of the water pollution policy process. In the area of non-point source water pollution control, those groups with strong economic interests most frequently relate to agriculture, forestry, fishing, and the construction industries. If these groups exercise undue influence in reducing NPS policy activism, then the argument for strong federal involvement is strengthened – as there is a demonstrated need for a counterbalance to concentrated economic power at the state level. Consequently, if this kind of concentrated interest effect is prevalent, then the argument for devolution is weakened. Conversely, however, if strong environmental and/or tourism interests also foster more active policies, then more pluralist conceptions of the policy process may prevail and Congress may still want to consider devolutionary policies that can be implemented in ways that maintain and/or strengthen the role of these interests in state policymaking processes.

A final category of potential sources of state NPS policy activism relates to the differing capacities of state governments to develop and implement NPS policies. This "capacity" based model of the policy process has roots in both economic theories of state policymaking advanced by Dye (1967), and more recent institutionally based conceptions of government capacity advanced by Bowman and Kearney (1986 and 1988). In general, capacity based theories suggest that state economic and institutional variables are likely to have a significant impact on the development and implementation of state policies. For example, in water pollution control, if wealth drives non-point source water pollution policy variation as traditional economic theories of state policymaking suggest, then we would expect to find that wealthier states enact more active state NPS programs, and that poorer states would be less active in this area. Similarly, in water pollution policy, a variable of institutional concern relates to the institutional form of the agency administering the state's water pollution programs. As was noted previously, there is reason to expect that health agencies which have wide ranging responsibilities for health related matters may be less aggressive in their approaches to water pollution concerns than agencies in which environmental matters are the central concern. And finally, as was noted previously, a line of literature has also developed over the several decades suggesting that high levels of state legislative professionalism may also impact state policymaking, and this line of thinking has also been applied to environmental and water pollution policies (Ringquist, 1993).

The strength of capacity based explanations for NPS activism also has implications for Congressional control and policy devolution. For example, Congress may be able to improve its statutory control of policy implementation by taking steps to build the financial capacities of poorer states. In addition, if certain institutional arrangements foster active policies that coincide with Congressional goals, then it may very well be appropriate for Congress and the federal government to take account of state institutional arrangements when structuring policies at the federal level. In general, however, if we find strong influences stemming from state capacity based concerns, they may say less about whether there should be more or less devolution, and more about the specific forms that devolution should or should not take. For, if differences in state capacities have substantial effects, then it would seem appropriate for Congress to place greater emphasis on capacity building in its design of federal water pollution policies.

11.1. Sources of State NPS Policy Activism: Quantitative Analyses

The quantitative analyses provided here proceed in five stages. The first three stages consist of ordinary least squares (OLS) regression analyses of each of the three sets of explanations for variations in overall state NPS water policy activism as described in Chapter 10. The models estimate the strength of "responsiveness," "group based", and "capacity based" models of state NPS policy activism, respectively. In the fourth stage, variables from these three partial (and under-specified) models are then integrated into a larger model in order to provide further insight into their relative importance in explaining overall state water policy activism. And then, because causal processes underlying the varying components of the overall activism scale constructed in Chapter 10 may differ somewhat from one another, the fifth part of the analysis provides brief analyses of the likely sources of variation underlying each of the three components of the activism scale – the strength of NPS enforcement authorities, the number of NPS watershed approaches used, and whether the state spends substantial sums of money on non- point source water pollution control, respectively.

This final set of quantitative analyses is then followed by a discussion that evaluates the quantitative results presented in the previous sections. In general, this discussion suggests that variations in state NPS policy activism have roots in all three state policymaking theories evaluated, although the variables drawn from responsiveness based theories generally appear to have weaker *direct* effects on state NPS policy activism than do the environmental group strength and the economic and institutional variables drawn from group and capacity based theories. The discussion therefore suggests that the strength of environmental groups in the state and variable state capacities should be of particular concern in future efforts to alter federal and state roles in NPS water pollution policy.

11.1.1. Variations in State NPS Policy Activism: A Responsive State Explanation

Ideally, state political systems respond to broad-based needs and preferences within their borders. The regression results displayed below seek to evaluate the extent to which state NPS policy activism is traceable to variations in public opinion relating to the environment, the need for strong water pollution policies (water pollution problem severity), political culture, and recent Democratic Party influence in the states' political systems. The specific variables used as indicators of these conceptual influences are public opinion relating to environmental spending (Norrander, 2001), the percentage of impaired or threatened waters indicated by the states' recent 305 b report submissions to EPA (USEPA, 2000A), Elazar's political culture designation for each of the states (as outlined by Gray & Jacobs, 1996), and the extent to which the Democratic Party controlled major policymaking institutions in state government (Governorship, Upper House, Lower House) during the 1990's. More detailed explanations of these variables are provided in the Appendices.

For each of these potential sources of policy variation, the analysis evaluates specific expectations regarding state NPS policy activism. Elections provide mechanisms for ensuring that legislators and executive branch officials are accountable to the public within a state, and therefore provide an incentive for these officials to develop and implement policies that are consistent with public opinion. We would therefore expect NPS policy activism to increase with increases in public concern over the environment. State governments also seek to respond to the particular problems that are prevalent within their borders, and are likely to address these problems when they are viewed as serious. We would therefore expect state NPS policy activism to increase with the need for strong water pollution policies, as evidenced by measures of the severity of water pollution problems in the state. State NPS policy activism can also be expected to differ according to political culture. States in the northern part of the country with moralistic political cultures can be expected to have more active NPS policies than other states. By contrast, southern states with traditional political cultures are expected to be less active in their NPS policies. And finally, because of the vocal involvement of the Democratic Party in environmental issues and past research (Lester, 1980; Calvert, 1989), we might also expect states dominated by Democrats in recent years to have more active NPS programs than states in which Republican control of state governmental institutions has been more common.

The results displayed in Table 11-1 below evaluate each of these expectations. A dummy variable representing coastal vs. non coastal states is incorporated into the model in order to control for any effects of the Coastal Zone Management Amendments and Re-authorization Act of 1990 (CZARA), which provides funding and support for non-point source program development in coastal states. A control variable is also added to represent the proportion of land in the state that is owned by the federal government, since large federal land holdings effectively remove substantial portions of the natural environment from state policy control, and would therefore tend to reduce state incentives to engage in active non-point source water pollution policy efforts. The inclusion of these control variables allows us to interpret the results with less concern that they will be skewed by the additional efforts of coastal states resulting from CZARA and the effects of large federal land holdings in the states.

Table 11-1: A Statistical Assessment of the "Responsive States" Model for State NPS Policy Activism

Variable	Initial Model: Coefficients (Standard Error)	Initial Model: Beta	Initial Model: P-Values (2-tailed)	Revised Model: Coefficients (Standard Error)	Revised Model: Beta	Revised Model: P-Values (2-tailed)
Coastal State	6.016*** (2.348)	.371	.009	5.061*** (2.014)	.311	.016
Federal Land %	-7.09E-02*	-.185	.151	-6.17* (.046)	-.160	.188
Moralistic Culture	5.373**(2.561)	.315	.042	6.055*** (2.012)	.353	.004
Traditional Culture	-3.070 (2.541)	-.180	.234	--	--	--
Public Opinion: Environmental Spending	28.345** (12.577)	.316	.030	35.804*** (12.694)	.397	.004
% of Waters Impaired	-7.39E-02 (.041)	-.221	.076	---	---	---
Democratic Party Control	6.564E02(.127)	.070	.706	---	---	---
	Adj.R2=.400			Adj.R2=.387		
	F=5.567***			F=8.736***		

* Significant at the .10 level, one-tailed test
** Significant at the .05 level, one-tailed test
*** Significant at the .01 level, one-tailed test

The results of these models provide empirical support for explanations of state NPS policy activism that are based on the premise that differences in policies are traceable to the varying preferences among the states, but not to the need for strong water pollution policies because the sign of the need variable is not in the expected direction. However, the remaining signs in the model are in the predicted directions, and the model as a whole is statistically significant as well. Four of the seven variables in the model show some level of significance, with the public opinion variable showing strong effects. The moralistic political culture variable also shows strong and statistically significant effects in the predicted direction, as states with cultural patterns associated with active governance appear to yield more active non-point source water pollution control programs. Democratic Party control of the institutions of governance and traditional political cultures appear to influence state NPS activism in the predicted directions, but their direct effects on activism as a whole appear to be relatively weak and statistically insignificant. As a result, these variables – along with the need variable discussed above – are omitted in the revised model to create a more parsimonious explanation of variations in state NPS policy activism.

The revised model shows a slight improvement over the initial model, revealed by a comparable adjusted R2 value, and continued statistical significance for a more parsimonious model. The public opinion and moralistic political culture variables remain the strongest predictors of NPS policy activism in this revised model, while the two control variables also remain important elements of the model. Taken together, the results of these analyses provide support for the impact of public opinion and moralistic cultural patterns on state NPS activism. The results are not, however, so strong that they suggest a complete explanation for either variations in state NPS policy activism or selective straying from Congress's statutory mandate for active non-point source water pollution control efforts. For this reason, it is also useful to evaluate variables drawn from other theories of state policymaking.

11.1.2. Variations in State NPS Activism: A Group-Based Explanation?

Past scholarship has suggested that water pollution policymaking and implementation is largely an exercise in bargaining and negotiation among affected parties (Hunter & Waterman, 1996; Ingram, 1977). While the major concern from the standpoints of both Congressional control and program adequacy relates to economic interests that may be affected by non-point source water pollution policies, environmental group strength and the importance of the tourism industry to the state's economy should also be accounted for when evaluating the impacts of group strength on state NPS policy activism.

Table 11-2 evaluates expectations for variations in state NPS policy activism that are rooted in group based explanations of the non-point source water pollution policymaking process. If undue influence from narrow economic interests in state policymaking processes is a major and systematic concern, we might expect to find evidence that increases in the proportion of a state's economy devoted to farming, forestry, fishing, and construction lead to decreases in state NPS policy activism. Conversely, if environmental groups or the size of the tourism industry are critical to enabling the creation of active state programs, we should find evidence that the increases in the strength of these groups leads to increases in NPS activism. And, as with the analysis above, control variables for coastal vs. non-coastal states and the proportion of land in the state owned by the federal government are also introduced in order to account for these additional sources of variation in state NPS policy activism.

Table 11-2 - A Statistical Assessment of Group-Based Explanations for State NPS Policy Activism

Variable	**Initial Model: Coefficient (SE)**	**Initial Model: Beta**	**Initial Model: P-Values (2-tailed)**	**Revised Model: Coefficient (SE)**	**Revised Model: Beta**	**Revised Model: P-Values (2-tailed)**
Coastal State	6.368*** (1.726)	.391	.001	6.562*** (1.523)	.403	.000
Federal Land %	-.548E-02* (.042)	-.142	.195	-6.37** (.036)	-.165	.084
Percent of GSP: Farming, Forestry, & Construction	-8.424 (39.369)	-.024	.832	---	---	
Environmental Group Strength	2.760*** (.455)	.603	.000	2.796***(.421)	.611	.000
Tourism Strength (% GSP)	-7.190 (17.568)	-.044	.684	--	--	--
	Adj R2=.571			Adj R2=.588		
	F=14.056***			F=24.278***		

* Significant at the .10 level, one-tailed test
** Significant at the .05 level, one-tailed test
*** Significant at the .01 level, one-tailed test

The model above provides empirical support for group based explanations of NPS activism, but perhaps in somewhat unexpected fashion. The signs for four of the five variables in the model are oriented in the predicted directions, but the results for the tourism variable suggest that state NPS policy activism decreases with increases in the proportion of the states' economy that is devoted to tourism – a result that is contrary to our theoretical expectations. In addition, one of the weakest performing variables in the model measures the strength of non-point source water polluting industries in the state. The proportion of Gross State Product (GSP) devoted to these industries does exert influence on NPS activism in the predicted direction (eg. reducing it), but its effects appear to be relatively weak and insignificant when key control variables are accounted for in the model. By contrast, the effects of environmental group strength are both significant and strong according to this model. When added to the two control variables in the revised model, these three variables alone appear to account for over half of the variation in state NPS policy activism. While these data alone are not conclusive, they do suggest that the impacts of industry capture in non-point source water pollution control are not as widespread as some have suggested (Houck, 1999) – at least in a statistical sense as it applies to overall policy activism. This finding is at least partially consistent with other scholarly work (Ringquist, 1993; Lowry, 1992), as it too fails to find evidence of capture related concerns in quantitative analyses. At the same time, however, this model also suggests that there is value in viewing state policymaking based on group based explanations, and that environmental group strength is a particularly important variable to be concerned about in relation to overall state NPS policy activism.

11.1.3. Variations in State NPS Activism: A Capacity Based Explanation?

State politics scholars have focused attention on the growth of state capacities and the positive impacts that they have had on state political systems over the last thirty to forty years (Dye, 1967; Bowman & Kearney, 1986 & 1988). As was noted earlier, this optimism regarding state capabilities has also been applied to environmental policies (John, 1994; Graham, 1999). Less focus, however, has been placed on variations in state capacities, and their impacts on state policy differences (but see Graham, 1999).

The regression model presented below tests the impacts of variable economic and institutional capacities on state NPS policy activism. More specifically, it tests, first, whether NPS policy activism is traceable to variations in state economic capacities, as measured by per capita income. The expectation here, of course, is that state NPS policy activism will increase as per capita income increases. The model also tests administrative capacity as measured by whether the state's environmental programs are managed by an environmental or natural resources agency vs. a health-based agency. Recent literature has found statistically significant differences between these two agency forms on water pollution enforcement (Hunter & Waterman, 1996), and this result should not be surprising given the secondary importance placed on environmental issues in agencies whose primary concerns relate to human health. The model also tests the effects of legislative professionalism on state NPS policy activism using Squires' (1992) legislative professionalism scores. And finally, as with the previous models evaluated, control variables reflecting coastal vs. non-coastal states and the percentage of land in the state owned by the federal government are added to account for these potential sources of variation in NPS policy activism. The results of this modeling effort are shown below.

Table 11-3 - A Statistical Assessment of Capacity Based Explanations for State NPS Policy Activism

Variable	Initial Model: Coefficients (SE)	Initial Model: Beta	Initial Model: P-Values (2-tailed)	Revised Model: Coefficients (SE)	Revised Model: Beta	Revised Model: P-Values (2-tailed)
Coastal State/Non Coastal	3.712** (1.910)	.228	.05	4.639** (1.856)	.285	.038
Federal Land %	-8.23E-02** (.042)	-.213	.054	-8.26E-02** (.041)	-.214	.051
Health/Non Health Agency	6.669** (2.873)	.246	.025	6.238** (2.932)	.233	.023
Per Capita Income	1.178 *** (.000)	.455	.001	1.228E03*** (000)	.472	.000
Legislative Professionalism	3.119 (7.233)	.055	.668	--	--	--
	Adj. R2 = .456			Adj. R2 =.466		
	F= 9.205***			F=11.672***		

* Significant at the .10 level, one-tailed test
** Significant at the .05 level, one-tailed test
*** Significant at the .01 level, one-tailed test

The initial capacity based model explaining state NPS policy activism performs pretty well. All of the variables operate in the predicted directions, and only the legislative professionalism variable fails to achieve statistical significance. In a revised model that omits legislative professionalism, the signs of all four remaining variables are in the predicted directions, and all are statistically significant. The overall model is also significant, and it – like the group based model that precedes it – explains a significant proportion of the observed variation in state NPS policy activism. Economic capacity clearly appears to contribute to NPS activism, and there is also evidence here that the administrative form of the agency may contribute to it as well.

11.1.4. An Integrated Model

Given the promising performance of all three of the partial models shown above, it makes sense to merge them to arrive at an overall model that seeks to explain variations in state NPS policy activism. This model can then contribute to our understanding of the major sources of variation in NPS policy activism. And these sources of policy variation, in turn, provide a foundation both for evaluating the reasons why states may stray from Congressional direction and for determining how devolutionary policies might be constructed to minimize the negative effects associated with these straying behaviors. To construct an integrated model, variables from the three previous models are combined to create an initial integrated model. Based on the results of this model, several poorly performing variables are then removed in order to arrive at an improved model specification. The results of the initial model are presented in Table 11-4 below, as are the results from the revised model specification [1].

Overall, the initial integrated model improves upon each of the previous partial models, as it explains about two-thirds of the variation in state NPS policy activism. Several points about these results are worth emphasizing. First, of the variables drawn from the responsiveness model, only the moralistic culture variable retains its significance in the integrated model. This suggests that the activist government notions that are implicit in moralistic political cultures appear to be operative in explaining NPS activism even when control variables for group strength and state capacities are added.

A second point relates to the poor performance of the public opinion variable that is also drawn from the (partial) responsiveness model. While it performed well in the partial model presented earlier, it now performs poorly after controls for per capita income and environmental group strength are added. In some ways, this is not surprising because of the established theoretical relationship between wealth and environmental interest (Inglehart, 1977), and the relatively high levels of statistical correlation between these independent variables [2]. At the same time, however, it does suggest that state policymaking processes are not merely matters of responding to dominant opinions and concerns, as some strong devolutionists would have one believe. Rather, state policymaking processes reflect the interplay among variables associated with state level preferences, dominant groups, and state capacities.

Third, unlike several variables drawn from the policy responsiveness model, key variables from the group based and capacity based models maintain both strength and consistency in this more fully specified model. The environmental group strength, economic capacity, and institutional capacity variables all remain related to state NPS policy activism in this model, while the performance of the other group and capacity based variables (farming industry strength, tourism industry strength, and legislative professionalism) remains relatively poor. And finally, both of the control variables – the coastal state dummy variable and the variable reflecting the proportion of land in each state owned by the federal government continue to perform well in this integrated model. Based on these results, a revised model is constructed by eliminating the poorly performing variables drawn from all three sets of theoretical explanations for state policymaking processes.

The revised model performs as well as the initial model, and in more parsimonious fashion. It continues to explain about two-thirds of the variation in state NPS policy activism, and it does so with a reduced number of variables. It continues to suggest that moralistic political culture affects state NPS policy activism, while also re-enforcing the continued importance of the group and capacity based variables discussed above. The strength of environmental groups in the state continues to be an important variable in explaining variations in state NPS policy activism, as do the per capita income and the agency form variables drawn from capacity based theories of the state policymaking process. Taken as a whole, this final integrated model suggests that variables from responsiveness, group based, and capacity based theories of state policymaking all explain portions of the variation in state NPS activism, even as it also suggests that group dynamics and state capacities may be more important than is commonly recognized by practitioners and others who contribute to the current devolutionary policy mantra that so heavily influences contemporary policy debates.

Table 11-4 - An Integrated Model: NPS Activism

Variable	**Initial Model: Coefficient (SE)**	**Initial Model: Beta**	**Initial Model: P-Value (2-tailed)**	**Revised Model: Coefficient (SE)**	**Revised Model: Beta**	**Revised Model: P-Value (2-tailed)**
Coast/Non-Coast Control	5.554*** (1.595)	.341	.001	5.252 *** (1.485)	.323	.001
% of land owned by Feds	-9.58E02** (.035)	-.248	.009	-9.052E02*** (.034)	-.235	.010
Responsiveness						
Moralistic Culture	3.429** (1.752)	.202	.057	3.740** (1.645)	.221	.028
State Opinion – Environment	-6.535 (11.857)	-.072	.584	--	--	--
Groups		.				
Environmental Group Strength	1.882*** (.595)	.411	.003	1.748*** (.538)	.382	.002
Capacity						
Per Capita Income	6.893E04** (.000)	.265	.037	6.35E-04** (.000)	.244	.041
Health/Non-Health Agency	6.988*** (2.348)	.258	.005	7.140*** (2.315)	.263	.004
	AdjR2=.661			Adj. R2=.667		
	F=14.66***			F=17.34***		

* Significant at the .10 level, one-tailed test
** Significant at the .05 level, one-tailed test
*** Significant at the .01 level, one-tailed test
Note: The results of this model do not change significantly when all 13 variables used in the previous models are included, rather than just those variables that proved to be effective predictors in the previous partial models (the variables shown above).

11.1.5. A Useful Tangent: Analyzing Components of State NPS Policy Activism

Central to social scientific analysis is the construction of measures that reflect theoretical concepts that are important to the subject of inquiry. The scale of NPS policy activism used here seeks to measure a broad concept of flexible activism that is implicit in Congress's statutory directions relating to non-point source water pollution in the FWPCA. In the FWPCA, Congress is clear in its desire for active state programs, but it is equally clear that states should have latitude in the forms of activism they choose to pursue. The quantitative analyses conducted thus far are therefore tied to this broad concept of state NPS policy activism. The scale of NPS policy activism used consists of three components, each of which reflects a particular form of activism and therefore a narrower concept than the one that Congress specified in statute. Because each particular form of activism may carry its own peculiar policy dynamics, it is useful to analyze each of these three components separately, and compare the results to the overall integrated model presented in the previous subsection. Because the interest here is in comparisons with the fully integrated model, all thirteen variables from the partial models are included in the models whenever possible [3].

Table 11-5 below presents the results of a regression analysis that seeks to explain variations in state enforceable authorities applicable to non-point source water pollution. It mirrors the overall integrated model of state NPS policy activism in finding that the strength of environmental groups in the state is an important determinant of the strength of enforceable authorities available to states in addressing non-point sources of water pollution. It also mirrors the overall integrated model in its finding that coastal state status is also a good predictor of strong NPS enforceable authorities. This is not surprising if one believes in the importance of federal influence on state policymaking because mandatory program elements are a component of the NPS programs required of coastal states under CZARA. The strength of the Democratic Party variable in this model, however, contrasts with the overall model, and this at least implies that partisan control of major governing institutions at the state level may be particularly important in imposing costs on various constituencies – in this case, constituencies like farmers, foresters, and the construction industry which have typically supported Republican Party candidates.

Table 11-5 - An Integrated Model: Strength of NPS Enforceable Authorities

Variable	Initial Model: Coefficient (SE)	Initial Model: Beta	Initial Model: P-Values (2-tailed)	Revised Model: Coefficient (SE)	Revised Model: Beta	Revised Model: P-Values (2-tailed)
Coast/Non-Coast Control Variable	1.711*** (.637)	.385	.011	5.252*** (1.485)	.286	.001
% of land owned by Feds	-1.647E-02 (.016)	-.157	.307	--	--	--
Responsiveness Model:						
Moralistic Culture	1.231* (.831)	.268	.148	--	--	--
Traditional Culture	3.472 (2.463)	.204	.168	--	--	--
State Opinion -- Environmental Spending	-7.801 (4.337)	-.318	.081	--	--	--
% of Waters Impaired	-1.279E-02 (.011)	-.140	.247	--	--	--
Democratic Party Control	5.427E-02* (.035)	.212	.130	7.946E02*** (.030)	.275	.016
Groups Model:		.				
NPS Industry Strength	-9.938 (18.271)	-.100	.590	--	--	--
% of GSP – Tourism	7.012 (6.620)	.159	.297	--	--	--
Environmental Group Strength	.812* (.233)	.655	.001	.756*** (.135)	.631	.000
Capacity Model:						
Per Capita Income	1.604E-04	.229	.273	--	--	--
Legislative Professionalism	-.495 (2.190)	-.032	.822	--	--	--
Health/Non-Health Agency	.527 (.843)	.072	.536	--	--	--
	Adj. R2=.474			Adj. R2=.497		
	F=4.32***			F=16.83***		

* Significant at the .10 level, one-tailed test
** Significant at the .05 level, one-tailed test
*** Significant at the .01 level, one-tailed test
Note: The moralistic culture variable drops below the one-tailed significance level when the remaining variables are removed from the model.

Overall, this model suggests a set of policy dynamics for the establishment of enforceable programs that may differ slightly from those for the broader concept of policy activism. For the important variables here appear to be related to group dynamics and the role of political parties. And, while political parties have generally been characterized in this work as instruments of popular influence, they also aggregate interests from within their own constituencies and may also be particularly willing to impose costs on interests outside of their constituencies. This appears as though it may be the case in explaining enforceable authorities for non-point source water pollution control. Moralistic political cultures also appear to facilitate strong enforceable authorities, as it meets one-tailed test criteria for significance in the fully specified model. However, when the model is streamlined, this variable loses its significance.

Table 11-6 below presents the results of an OLS regression analysis that seeks to explain variations in the number of watershed protection approaches used by the states. Like the integrated model explaining overall NPS policy activism and the model explaining enforceable authorities, this model suggests that coastal states that are subject to CZARA requirements tend to employ more watershed approaches than non-coastal states. This model is also consistent with the integrated model for overall NPS policy activism in its finding that moralistic political culture, per capita income, and the form of the administering agency are important determinants of the number of watershed approaches used. However, the effects of the administrative form variable appear weak, and its p-value drops below loose criteria for significance when the model is streamlined to remove variables with poor predictive characteristics. Notably, the model does not reveal that either the strength of environmental groups or the extent of Democratic Party control are important determinants of the number of watershed approaches used.

Table 11-6 - An Integrated Model: The Number of NPS Watershed Protection Approaches

	Initial Model			Revised Model		
Variable	**Initial Model: Coefficient (SE)**	**Initial Model: Beta**	**Initial Model: P-Value (2-tailed)**	**Revised Model: Coefficient (SE)**	**Revised Model: Beta**	**Revised Model: P-Value (2-tailed)**
Coast/Non-Coast Control Variable	.846*** (.333)	.459	.016	.614*** (.245)	.332	.016
% of land owned by Feds	-1.018E-02 (.008)	-.235	.229	--	--	--
Responsiveness Model:						
Moralistic Culture	.938 ** (.435)	.492	.038	.554** (.242)	.288	.027
Traditional Culture	.521 (.446)	.270	.250	--	--	--
State Opinion -- Environmental Spending	-1.708 (2.268)	-.168	.456	--	--	--
% of Waters Impaired	-7.806E-03 (.006)	-.206	.178	--	--	--
Democratic Party Control	-1.528E-02 (.018)	.-.144	.410	--	--	--
Groups Model:		.				
Industry Strength	.913 (9.557)	.022	.924	--	--	--
% of GSP – Tourism	3.539 (3.463)	.193	.314	--	--	--
Environmental Group Strength	.2.864E-02 (.122)	.056	.816	--	--	--
Capacity Model:						
Per Capita Income	1.321E04** (.000)	.454	.088	7.740E-05** (.000)	.262	.053
Legislative Professionalism	-.749 (1.145)	-..117	..518	--	--	--
Health vs. Non Health Agency	.655* (.1.145)	.216	.146	--	--	--
	Adj. R2=.162			Adj. R2=.238		
	F= 1.71			F=6.09***		

* Significant at the .10 level, one-tailed test
** Significant at the .05 level, one-tailed test
*** Significant at the .01 level, one-tailed test
NOTE: This model is presented in OLS form. Efforts to develop a comparable model using multi-nomial logit resulted in disruptive multi-collinearity problems, apparently due to the large number of independent variables and relatively small sample size.

These findings suggest that the policy dynamics of innovation in watershed protection approaches differ somewhat from the dynamics of enforceable authorities. While the model seeking to explain enforceable authorities appeared to rely on group dynamics based explanations, the model here suggests that multiple approaches to watershed protection may find foundation in state capacities and a political culture that is susceptible to government activism. While these variables were important in the overall NPS policy activism model they did not appear to be particularly important in explaining variations in enforceable authorities.

Table 11-7 below presents the results of a binary logistic regression analysis that seeks to identify important variables in predicting whether a state will expend substantial state resources on non-point source water pollution programs above and beyond the Section 319 grant program match. Because logistic regression models are particularly susceptible to limitations on the ratio of independent variables to cases, the initial model is limited to variables that performed well (WALD > 2) in predicting major state non point source water pollution expenditures in three partial logistic regression models that were designed around responsive, group-based, and capacity-based theories. The five variables included in the initial model in Table 11-7 were drawn from among the better performing variables that were included in those partial models.

The initial model performs reasonably well in predicting states that have undertaken major non point source water pollution expenditures above and beyond the Section 319 grant program match. It also identifies three variables that are particularly good predictors of major non-point source water pollution expenditures, and these variables are retained in the revised model. This revised model retains the statistical significance of the initial model and results in correct predictions in 88% of the cases. The strongly performing variables retained in this model are the coastal state control variable, the percentage of land owned by the federal government control variable, and the strength of the environmental groups in the state variable. These results suggest that the dynamics of policy making relating to non-point source expenditures are different than the dynamics of watershed control approaches, and somewhat similar to the strength of non- point source water pollution enforcement authority model. This revised model highlights the importance of the environmental group strength variable as does the enforcement authorities model, and does not emphasize the importance of moralistic culture and per capita income as does the watershed approaches model. The strength of environmental groups in the state, it appears, is important in predicting the likelihood of major non point source water pollution expenditures and the strength of enforceable authorities applicable to non point source water pollution even though the results in Table 11-6 suggested that it had little impact in fostering a wide range of watershed protection approaches.

Table 11-7 - An Integrated Model: Major State NPS Policy Expenditures

Variable	Initial Model: Coefficient (SE)	Initial Model: P-Value (2-tailed)	Revised Model: Coefficient (SE)	Revised Model: P-Value (2-tailed)
Coast/Non-Coast	3.82 ** (1.921)	.047	2.482 ** (1.081)	.022
Federal Land %	-.134 ** (.065)	.041	-.071 ** (.033)	.034
Responsive Model				
Public Opinion – Environmental Spending	-21.012 (15.665)	.180	--	--
Groups Model				
Environmental Group Strength	2.058 ** (.901)	.022	1.777 *** (.538)	.001
Capacity Model				
Per Capita Income	.001 (.001)	.238	--	--
% Predicted Correctly	86%		88%	
R2 (Negelkerke)	.800		.772	
Chi Square	45.858		43.235	
Significance	.000		.000	

Dependent Variable = Documented state expenditures above and beyond the 319 program match exceeding $500,000 (1997-2002 time period). States with this level of expenditure are coded “1”, and states without this level of expenditure are coded “0”.
* Significant at the .10 level, one-tailed test
** Significant at the .05 level, one-tailed test
*** Significant at the .01 level, one-tailed test

Table 11-8 compares the strongest predictor variables across varying measures of state non-point source water pollution program aggressiveness. While the table reveals that the variables that enable strong predictions of the component measures comprising NPS policy activism are broadly similar to the variables predicting activism in the overall scale, it also reveals some differences. The similarities lie in the fact that all of the best predictors of overall activism are reasonably strong predictors of at least one of the components of the scale. This is true in all cases, except perhaps in the case of the agency form variable which is only a weak predictor of the number of watershed approaches utilized. The most significant difference is that the Democratic Party variable, which does not appear to be important in predicting overall activism, does appear to be important in predicting the strength of enforceable authorities. Otherwise, however, the important variables explaining each component of activism are the same as those which are found to be important in predicting overall activism.

Table 11-8 - Strong Predictor Variables of State NPS Policy: By Model/Variable Type

Variable Type	Overall State NPS Policy Activism (Scale)	Enforceable Authorities Component	Watershed Approaches Component	Major NPS Expenditures Component
Control Variables	Coast/Non-Coast Federal Land %	Coast/Non-Coast	Coast/Non-Coast	Coast/Non-Coast Federal Land %
Responsiveness Model Variables	Moralistic Culture	Democratic Party Control *Moralistic Culture	Moralistic Culture	N/A
Group-based Model Variables	Environmental Group Strength	Environmental Group Strength	N/A	Environmental Group Strength
Capacity-based Model Variables	Income, pc Health/Non-Health Agency	N/A	Income, pc *Agency Form	N/A

* These two variables are relatively weak – but still statistically significant -- predictors of the dependent variable in question, and they fail to maintain significance after the model is streamlined by removing poorly performing variables.

Consequently, when viewed as a whole, these results suggest that there is substantial overlap among the likely causal factors underlying the various components of the activism scale, even as they also demonstrate some variation across components. This result should not be surprising given the relatively – although not overwhelmingly – high level of inter-item correlation among the components of the scale (Kronbach's alpha = .5715). In particular, these results emphasize the importance of the coastal control variable and the strength of environmental groups variable in predicting aggressive state actions in dealing with non-point source water pollution. They also suggest that a variety of other factors – a moralistic culture, a high level of wealth, and the proportion of land owned by the federal government are strong enough predictors of individual components of activism to retain importance in the overall scale.

11.1.6. Some Additional Considerations and Implications

Contrary to what some quantitative analyses may lead one to believe, the "numbers" do not always speak clearly and correctly for themselves. Often, decisions regarding how to define particular variables and how to manipulate them quantitatively have substantive implications that are not fully reflected in quantitative results. The discussion that follows provides an interpretation of the models explaining overall activism, tempered by results drawn from the component models and qualitative insights and reasoning.

If one were to interpret the results of the overall activism models quite literally, the results are reasonably straightforward. They would go something like this. The most important single determinant of NPS activism is the strength of environmental groups within the state, thus confirming the importance of group based explanations of policy outputs. State economic and institutional capacities are also important in determining levels of state NPS activism, as is the presence of a (moralistic) political culture that is conducive to government activism. In addition, coastal states are more active in the non-point source area than are non-coastal states, thus providing yet another piece of evidence that federal programs (CZARA, in this case) do indeed influence state water pollution policies. And finally, the results are also consistent with the suggestion that the widespread ownership of land in a state by the federal government reduces state incentives to enact active programs for non-point source water pollution control. By contrast, the final results of the integrated activism model also suggest that the need for strong water pollution programs (eg. water pollution problem severity), public opinion, Democratic Party control, polluting industry strength, the size of the tourism industry, and legislative professionalism have relatively little to do with state NPS activism. While there is truth in this rather literal interpretation, the component models presented above and qualitative considerations provide further insights in relation to the variables discarded to create the final integrated model and the relative strength of the variable coefficients remaining in the final integrated model.

First, and unfortunately, we need to be cautious about drawing strong conclusions regarding the influence of water pollution problem severity based only on the analyses presented here. While the percentage of waters impaired measure (USEPA, 2000A) used in this analysis reflects the judgments of water quality professionals in each of the fifty states and is – for that reason – the best measure currently available, it is far from a perfect and comparable reflection of water pollution problem severity among the states. The methodologies used by the states to quantify water quality impairments vary, and the measures used here reflect overall percentages and may therefore not fully reflect the importance of very severe problems in particular circumstances.

Consequently, while the analyses here do suggest clearly that state implementation of federal policies is far more complex than simply adapting federal mandates to state level problem situations (as some strong devolutionists might have one believe), they are not sufficient to discard the concept of state responsiveness to particular problem situations altogether. In addition, the strong performance of the coastal control variable may also reflect a sensitivity to problem severity as well as federal programmatic directives, since coastal states – like the federal government – may also have recognized strong non-point source water pollution policy needs stemming from their coastal location even in the absence of CZARA. Overall, what is needed here are better aggregate measures of water quality at the state and national levels, and – unfortunately – our analyses will likely need to be subject to at least a some caveats on this issue until such a time as these kinds of improved measures are developed and widely utilized. In the meantime, however, our inability to establish a systematic relationship between problem severity and state NPS activism does raise questions about the foundations upon which devolutionary efforts are based.

Second, it is probably not wise to dismiss the importance of industry strength in state non-point source water pollution policy altogether, despite its relatively weak performance in this statistical modeling effort. The primary dependent variable in this analysis is *activism*; it is not the extent to which *states actually impose costs on industry by enforcing mandatory requirements*. To be sure, the activism scale constructed above does account for the strength of enforceable requirements in the state, but the existence of the requirements themselves does not mean that they are applied and enforced on a regular basis. Indeed, interviews and exchanges conducted during the course of this work suggest that the actual enforcement of non-point source requirements is inconsistent at best. And, while the industry strength variable did not perform strongly in the multi-variate component analysis relating to enforceable program requirements, there is a statistically significant bi-variate correlation of -.382 (.05 level) between the strength of the state non point source water pollution enforcement authorities and the percentage of the state economies devoted to farming, forestry, and construction. The inclusion of the coastal control variable may account for some of this discrepancy, as it may sap the strength of the industry strength variable because coastal states tend to derive less of their economic strength from farming, forestry, and construction than non-coastal states [4]. There is also evidence in some state statutes that dominant industries have been successful in gaining key exemptions of various kinds that minimize the likelihood that they would actually have to comply with stringent mandatory requirements [5]. Thus, while industry strength probably is a weak predictor of state NPS policy activism in an aggregate statistical sense, this does not mean that it is un-important altogether. Indeed, it may be a critical variable in certain instances, even though its aggregate statistical performance is not strong.

Third, while it seems likely based on this analysis that public opinion on the environment is not the primary driving force behind state NPS activism, it is worthwhile to recognize that it – along with (a moralistic) political culture – may contribute to the overall context in which active state NPS programs develop. Prior research has established a relationship between public opinion and state policymaking (see, for example, Erikson, et. al., 1993), and studies have also tied public opinion to the overall strength of state water quality regulation (Ringquist, 1993). However, these latter analyses have tended to use broad measures of liberalism & conservatism, rather than public opinion on the environment specifically. When viewed in a more general context, it appears likely that public opinion operates in broad contextual fashion and in relation to other variables (environmental group and state capacity variables, in particular) in contributing to NPS activism, even if its direct effects are relatively weak when important control variables are accounted for in the integrated model of state NPS policy activism used here.

And finally, while the results suggest clearly that environmental group strength matters, its influence may be somewhat overstated by the model results. It is quite difficult to clearly separate the influence of public opinion and political culture from the propensity of the citizens to join environmental groups --- the measure of environmental group strength used here. Environmental group strength is correlated in statistically significant fashion with public opinion on the environment (.5), moralistic political culture (.29), and per capita income (.58). While these correlations are within acceptable bounds for the modeling effort undertaken, they are likely to introduce some competition for explained variance among the variables. The result may be inefficient coefficient estimates that result in somewhat inflated estimates of the impact of environmental group strength on state NPS policy activism. In addition, there are theoretical reasons to focus on the correlations between wealth and environmental group strength (Inglehart, 1977), and the correlations with public opinion on the environment and environmental group strength as well. It may therefore be that the overall impact of the wealth and public opinion variables would increase if indirect effects were taken into account in assessing the overall strength of the explanatory variables in the models. For the same reasons, it may be that the relative importance of the environmental group strength variable would subside in this scenario. Thus, while the environmental group strength variable appears clearly to be an important one, its importance in the final integrated model may be somewhat overstated relative to other variables in the model when the overall results are viewed in holistic fashion.

With these considerations in mind, what does this analysis suggest about the sources of variation in state NPS policy activism? It suggests that strong environmental groups are an important factor contributing to NPS policy activism, and that their strength – in turn – may have roots in public opinion, political culture, wealth, and perhaps other contextual influences. It also suggests that the economic and institutional capacities of the states are of importance in determining the extent to which states build active state NPS programs. And finally, the analysis also suggests quite clearly that state NPS water pollution policies are not merely the product of need and democratic influence, as some strong devolutionists might have one believe. Nor does it appear that they are the primary result of industry capture, as some in the environmental movement might suggest. Rather, the proportion of the citizenry that is affiliated with environmental groups and the relative capacities of the states appear to be of notable importance in determining the extent to which states undertake active non-point source water pollution programs. And, these suggestions, in turn, have implications for our evaluation of Congress's ability to influence state policies through statute, and for our assessment of the nature and desirability of water pollution policy devolution.

11.2. Conclusion

What does this analysis suggest about the reasons why states may stray from Congress's statutory directions? What does it say about the appropriateness of policy devolution in non-point source water pollution control?

The analysis here suggests that several state level factors are at work in producing variations in state NPS water pollution policies, and therefore variations in compliance with Congress's statutory directions. First, high rates of membership in environmental groups appear to facilitate the development of the active state NPS water pollution programs envisioned by Congress, and low rates of environmental group membership appear to produce the opposite effects. Variable state capacities also appear to be quite important. Richer states and states with environmental and natural resource agencies carrying out their water pollution programs appear to be more active than poorer states and states whose water pollution programs are administered by health agencies, although the component analyses above do introduce some reason for reservation about the effects of agency form on NPS policy activism. And finally, moralistic political cultures that are conducive to government activism also appear to facilitate NPS policy activism, while Democratic Party control of state governmental institutions also appears as though it may foster stronger NPS enforcement authorities -- even if its effects may be too weak to impact overall activism.

By contrast, the quantitative analyses presented here suggest that public opinion on the environment, the strength of non-point source polluting industries within the state, tourism industry strength, traditional political culture, and legislative professionalism are relatively weak predictors of state NPS policy activism – and therefore are not likely to foster substantial slippage from Congressionally mandated policy directions. However, caveats are appropriate in several of these cases. While industry strength appears to have little impact on state NPS policy activism in an aggregate statistical sense, information uncovered during the course of this analysis suggests that the story might be somewhat different if the focus was on particular instances of influence or possibly the *enforcement* of mandatory non-point source water pollution control programs. For this reason, it seems pre-mature to dismiss concerns about the undue influence of strong economic interests in non-point source water pollution control entirely – a qualitatively based finding that differs at least partially from past quantitative analyses (Lowry, 1992; Ringquist, 1993). In addition, while public opinion relating to the environment does not fare well in the integrated statistical analyses conducted, it may nonetheless be an important contextual variable that contributes to high rates of environmental group membership. Thus, while the analysis makes it clear that state water pollution policy processes are not transparent translators of public will, it would, I think, be premature to conclude that public opinion is unimportant altogether.

This multi-faceted explanation for variations in state NPS policy activism does not yield simple and clear conclusions regarding the adequacy of Congressional control in this policy area, or the appropriateness of further policy devolution. While the analysis clearly suggests that Congress's decision to establish both orders for state action and a major funding program had substantial influences on domestic policies relating to non-point source water pollution control, it is equally evident that goal-oriented compliance varies considerably among the states as a result of several state specific factors. Thus, in non-point source water pollution control, we are quite some distance from a runaway bureaucracy, but we are also far from uniform Congressional policy control. Many state programs appear to be little more than shells built with federal monies, and further and deeper Congressional involvement is likely to be necessary to make them much more than that. If Congress's goals are used as the standard of compliance, it is clear that procedurally based orders and (significant but) limited federal monetary investments are insufficient to bring about uniform goal-oriented compliance across the states. Rather, based on this analysis, it appears that variable political cultures, environmental group strength, and variable state capacities prevent *consistent* implementation of highly active non-point source water pollution control programs.

Nuanced explanations are also required to interpret the implications of this analysis for policy devolution. The failure to identify systematic inverse relationships between polluting industry strength and state NPS policy activism provide some support for policy devolution in water pollution control. Furthermore, while the apparently strong influence of environmental groups on state NPS policy activism does not directly support the case for devolution, it does suggest that there may be counter-balances to concentrated economic influence in non-point source water pollution control policymaking in states with strong environmental groups. However, other findings raise serious questions about the appropriateness of policy devolution. The failure to identify clear influences of water pollution problem severity on state NPS policy activism raises questions about the appropriateness of further policy devolution, as does the failure to identify strong and continuing relationships between policy preferences and state NPS policy activism when key group based and capacity based variables are controlled for. And finally, the influence of variations in state economic and institutional capacities on state NPS activism give rise to legitimate concerns about policy devolution because they suggest that state NPS policy activism is inherently limited by the variable capabilities of the states.

While one might interpret these conclusions as nothing more than a call for further research, this interpretation would be overstated. While further research is clearly appropriate in some areas, the results of this analysis do suggest several points of guidance for further devolutionary efforts in US water pollution control policy. For example, if the concern of Congressional policymakers is achieving more consistency in state NPS activism, then it would seem advisable for them to consider actions that build the strength of environmental groups in state non point source water pollution policy. While the existing 319 grant program may be an appropriate means for building environmental group strength because watershed based groups are a potential beneficiary of these funds, other avenues of statutory support might also be explored. Congressional policymakers should also look more seriously at systematic attempts to build economic (and perhaps institutional) capabilities in laggard states. However, while inadequate economic capabilities have been widely mentioned as a constraint on state environmental program strength (Graham, 1999; Lowry, 1992), Congress – to my knowledge – has done little to act on this insight. Thus, even though the analysis in this chapter raises serious questions about unbridled policy devolution, it has yielded insights that may be useful in structuring any further devolution that may occur. While it is likely that state capacities are increasing as much of the literature on state policymaking suggests, this analysis makes it clear that variations in both capacities and group dynamics continue to affect state policymaking related to non-point source water pollution control. And this, I would contend, is something we can and should write to Congress about.

12. PREEMPTIVE POLICY STRUCTURES: NPDES PERMIT RESTRICTIVENESS

This chapter focuses on a segment of water pollution policy in which Congress has been directive in preempting state powers and seeking "street level" fidelity to its wishes – the control of point source wastewater discharges. The analyses presented here look at state adherence to point source permitting processes outlined by Congress, and the restrictiveness of state permits issued under the auspices of the federal National Pollutant Discharge Elimination System (NPDES) program. In so doing, they seek to assess the extent to which states are implementing the restrictive *point source* water pollution controls that Congress envisioned when it enacted the NPDES program into law. This kind of assessment is valuable because it illuminates the nature of state responses to preemptive Congressional anti-pollution mandates. The analyses in this Chapter also provide another building block for improving our understanding of the dynamics of federal-state relationships in water pollution policy, and – hopefully – some informed insights relevant to appropriate next steps relating to water pollution policy devolution.

As is evident from discussions in previous chapters, Congress established very ambitious goals for state water quality programs in the Federal Water Pollution Control Act (FWPCA), and these goals were clearly intended to apply to point source water pollution. Congress's goal that all waters in the United States be "fishable and swimmable" by 1983 remains unfulfilled twenty plus years after the date established for it to be achieved. While non-point sources are now the most prevalent sources of water pollution inhibiting the achievement of this goal, the continuing existence of serious water quality problems that are traceable to point source wastewater discharges serves as a reminder that Congress explicitly directed EPA and state water pollution programs to establish restrictive requirements through the NPDES program. This mandate remains as applicable now as it did thirty years ago when the NPDES program was established; indeed, as the NPDES title makes clear, Congress specifically directed EPA and the states to impose requirements restrictive enough to *eliminate* discharges to the waters of the United States by 1985 – another objective of the FWPCA that remains unfulfilled. Over the last 30 years, however, the EPA has implemented a series of progressively more restrictive requirements for control of point source water pollution, and states have responded to these efforts in varying ways.

As is suggested above, this chapter assesses state compliance with Congress's procedural and substantive mandates relating to point source wastewater discharges. It begins with a brief review of Congress's directions for NPDES permitting, and a general description of how EPA and the states have implemented these directions. It then discusses procedural compliance with Congress's directives, and describes the extent to which states have included restrictive requirements in permits issued to major dischargers. The objective here is to understand variations in the level of state compliance with Congress's statutory wishes in point source water pollution control. This improved understanding, in turn, should provide a basis for assessing the implications of the variations identified for Congressional control of the policymaking process and the devolution of authorities to the states.

The evidence presented in this chapter leads us to somewhat mixed conclusions. At the procedural level, a vast majority of states have been consistent with Congress's conceptions of their implementation responsibilities under the NPDES framework, and are now issuing permits to wastewater dischargers. At the same time, however, six states have chosen to steer clear of the permitting roles that Congress asked them to play in the FWPCA and additional states are showing reluctance to add supplemental NPDES related authorities. In addition, many states that have accepted responsibility for administering the NPDES program are having difficulties keeping the permits they issue updated as Congress requires in statute. On a more substantive level, the states are quite variable in the extent to which they include restrictive requirements on toxicity and conventional pollutant discharges in the permits they issue, and some of the states that make most frequent use of restrictive NPDES permit requirements may surprise observers of state policymaking. They are quite different, for example, than the active states in non-point source water pollution control identified earlier in this work. With these broad conclusions in mind, let us now turn to an overview of EPA and state efforts to implement the point source permitting provisions of the FWPCA.

12.1. The Federal Permit Program and State Implementation

The 1972 FWPCA prohibited the discharge of pollutants to the waters of the United States, except in compliance with a permit issued pursuant to the Act. Over time, Congress envisioned that ever more restrictive regulation of pollutant discharges would lead to the elimination of point source discharges altogether, hopefully by 1985 --- the date specified in the law as the target date for this "zero discharge" goal. While it is abundantly clear that EPA and the States have failed to achieve this goal, it is also clear that substantial efforts and resources have been expended in order to implement the point source provisions of the Act. This section is an overview of some of these efforts and the resource investments that have accompanied them. This overview is followed by a description of the statutory criteria that are used in this chapter to assess state fidelity to Congress's directions regarding point source water pollution controls.

Pursuant to its (partial) pre-emptive authorities specified in the FWPCA, EPA and the states have implemented a large and growing permitting program for point source water pollution discharges in the United States over the past 30 plus years. The EPA undertook feverish efforts to develop and implement this permitting program in the 1970's. Federal efforts focused initially on developing regulations that established both technology based standards and procedures for enabling the issuance of federally recognized permits by both the federal government and the states. In spite of continuing court challenges to these efforts by environmental groups, by the end of 1974, EPA and the states had issued about 14,000 permits (Mintz, 1995, p. 27) and this number grew to well over 50,000 by the mid 1980's.

To implement the technology-based standards, the EPA has developed regulatory "effluent guidelines" for major industry categories, including municipal sewerage discharges. The Agency has developed these regulatory guidelines for over 50 industry categories (USEPA, 2002D), and it also provides training to wastewater permit writers around the country on developing NPDES permits using these technology based regulatory guidelines. Ambient water quality standards (WQS) and "best professional judgment" (BPJ) are also covered in this training, and may also be used to develop specific permit requirements. In addition, permit application procedures have also been developed, and EPA has required that NPDES permits include a series of specific elements. The specific elements to be included in each permit are effluent limitations, monitoring requirements, standard conditions, and special conditions. By law, all point source dischargers of pollutants to the waters of the United States must be issued a permit containing these elements as appropriate, and these permits are to be re-issued every 5 years. As noted previously, these and many other specific requirements relating to the NPDES program, are enunciated not only in the statute, but also in several hundred pages of the Code of Federal Regulations (40 CFR, Parts 122-124).

Early permitting efforts in the 1970's focused on conventional pollutants, although environmental groups successfully litigated to require the development of effluent guidelines addressing toxic pollutants as well (O'Leary, 1993)[1]. These requirements gained a stronger statutory foundation in 1977, and permitting efforts applicable to toxic pollutants gained momentum in the following decades. Broader efforts to ensure that NPDES permits were restrictive enough to enable the achievement of fishable and swimmable waters also generated both increased attention and controversy in the 1980's and 1990's. The 1987 Water Quality Act (WQA), for example, required states to identify and develop clean up strategies for waters that remained polluted by toxic substances. In addition, the WQA and the widespread recognition of the contributions of wet weather runoff to polluted waters has led to increased efforts to regulate stormwater runoff and runoff from large animal feeding operations through NPDES permits. In the coming years, EPA estimates suggest that these additional point source regulatory efforts will substantially increase the number of permits issued (USEPA, 2001D) [2].

All of these efforts have led to a steadily increasing level of attention being paid to the ability of existing point source controls to ensure fishable and swimmable waters during the late 1980's and 1990's. And this, in turn, has led to a continually increasing focus on the importance of addressing non-point source water pollution, along with water pollution stemming from point sources. An important result of all of these efforts has been a series of continuing controversies surrounding Section 303 of the FWPCA, and EPA's implementation of that section through its Total Maximum Daily Load (TMDL) program.

These controversies have focused on the relationship of TMDLs to the restrictiveness of NPDES permits and the contributions of non-point sources to water quality problems, as well as the overall quality of surface waters throughout the country. These controversies reached their zenith between 2000 and 2002, as the Clinton administration issued more stringent TMDL regulations in 2000, which were subsequently denied funding by Congress in the summer of 2000 and proposed for withdrawal by the Bush administration in December, 2002.

In spite of these recent and continuing controversies, it is widely agreed that the EPA and state and local governments have expended substantial resources through the years to operate the NPDES permitting system and manage point source water pollution discharges. Unfortunately though, precise accountings of the resources expended are difficult to come by. The EPA's Cost of Clean Report, a widely cited report on the costs of water pollution control, estimates total annual (1990) expenditures on clean water to be in the range of $54 billion (EPA, as cited in Freeman, 2000, p. 195). However, this figure includes private as well as public sector costs, and does not differentiate among federal, state, and local expenditures, nor between point and non point source expenditures. And, even Freeman's widely cited cost benefit analyses of the FWPCA do not include specific cost estimates for point source water pollution control (Freeman, 1990 and 2000).

However, working with EPA and the states, ASIWPCA has developed a preliminary estimate of annual state expenditures for water quality management that can be used a basis for developing estimates of state level expenditures on point source water pollution control. Drawing on data from multiple states, they estimated that the states as whole expend between $722 million and $805 million annually on water quality management, and that federal grant funds cover about 31% of these expenditures (ASIWPCA, 2001C and 2002). They further estimate that about 37% of state expenditures are devoted specifically to permitting and compliance activities. This figure is by far the largest spending category contained in the ASIWPCA study, but it still underestimates the true expenditures associated with point source water pollution control at the state level. This is because other spending categories included in the ASIWPCA study are devoted largely to point sources (Data management, State Revolving Fund expenditures, etc.), but are not tabulated as such. Nevertheless, using these very conservative ASIWPCA estimates, state point source permitting and compliance expenditures can be estimated roughly to fall in between $267 to $298 million annually.

We do, however, have reasonably good estimates of federal EPA grants to states for water pollution control activities over time, and a large proportion of these funds have been devoted to point source water pollution control. Table 12-1 below outlines federal funds provided to states for both ongoing state water quality program management and wastewater treatment plant construction. The water quality management funds are provided pursuant to Section 106 of the FWPCA and are given to each state every year to fund the operation of their water quality programs. The treatment plant construction funds are provided (at least eventually) to local units of government to assist them in constructing needed treatment works for municipal sewerage systems. Until 1990, these funds often came in the form of grants to localities; since that time, however, most of these funds have been used to leverage funds on the state level that could then be used to provide low interest loans to local governments for water quality related infrastructure improvements. While neither of these funding sources is now limited solely to point source related projects, both sources of funds have traditionally been used heavily in this area, and continue to be used heavily in this area today.

As can be seen readily from the data in Table 12-1 below, the EPA has made substantial investments in point source water pollution control over the years – investments that far exceed those for non-point source water pollution control. While the vast majority of these funds – over $72 billion across three decades – have come in the form of subsidies for municipal wastewater treatment construction, over $2 billion has also been provided to state agencies for water quality program management during this same time period. While these investments have been significant ones for point source water pollution control, most observers would agree that they have not been sufficient for full implementation of the FWPCA. Indeed, the ASIWPCA/EPA study noted above estimates that "the gap" in funding to fully administer FWPCA requirements to be in the range of $735 to $960 million annually (ASIWPCA, 2002).

In this context, how are we to assess state fidelity with federal NPDES related requirements, and Congress's clear desire for restrictive permits that underlies them? The federal regulations and policy documents implementing the NPDES program are voluminous, and in many cases include highly specific requirements and recommendations that may or may not be important when viewed in larger context. One recent EPA issued self-assessment tool for state wastewater permit programs, for example, included 40 pages of *summarized* requirements for state NPDES programs (USEPA, 2001I). In spite of their volume, however, some of these regulations and recommendations have a clear basis in statute and are important in assessing overall state compliance with Congress's desires. These statutory directives include the recommendation that the states obtain authorization to administer the NPDES permit program, the associated requirement that they issue permits, and the requirement that permits be re-issued every five years. Data are available relating to these procedural elements of the NPDES program, and scholars studying water pollution control have drawn on these data in the past to inform their analyses (Goggin et. al., 1990; Lowry, 92; Ringquist, 93; & Hunter and Waterman, 96). This analysis will do the same, using updated data from the early 21st century.

Table 12-1 - EPA Grants to States for Point Source Water Pollution Control: 1971-2002, in millions

Year	Program Management Grants – Section 106*	Municipal Treatment Plant Construction**	Total
1971	10	-	10
1972	15	-	15
1973	20	2000	2020
1974	50	3000	3050
1975	45.6	4000	4045.6
1976	44.4	9000	9044.4
1977	50	1480	1530
1978	52.4	4500	4552.4
1979	52.4	4200	4252.4
1980	48.7	3400	3448.7
1981	51.2	3200	3251.2
1982	51.2	2400	2451.2
1983	54.2	2430	2484.2
1984	54.3	2430	2484.3
1985	61.3	2400	2461.3
1986	62.1	1770	1832.1
1987	72.1	2361	2433.1
1988	62.1	2300	2362.1
1989	67.1	1880***	1947.1
1990	72.6	1980***	2052.6
1991	81.7	2080***	2161.7
1992	81.7	2380***	2461.7
1993	81.7	2480***	2561.7
1994	81.7	1300***	1381.7
1995	81.7	1235***	1316.7
1996	79.9	1348.5***	1428.4
1997	80.7	625***	705.7
1998	95.5	1075***	1170.5
1999	115.5	1350***	1465.5
2000	115.5	1350***	1465.5
2001	171.9	1347***	1518.9
2002	192.5	1350***	1542.5
Totals	$2,256.7	$72,651.5	$74,908.2

Source: All figures drawn from the ASIWPCA Worldwide web site, www.asiwpca.org. Figures for 1971-2000 were retrieved on June 29, 2001 (ASIWPCA, 2001A and B). Figures for 2001- 2002 were retrieved on January 4, 2003 (ASIWPCA, 2003).

* Section 106 grants are provided by EPA to the states for management of their water quality programs. While they are not targeted specifically for point source water pollution control management activities, they are often used for this purpose.

** Municipal Treatment plant construction funds include both the Construction Grants program administered between 1973 and 1990 and the Shared Revolving Fund (SRF) program enacted in 1987 and currently operating.

*** During these years, SRF funds could be used for non-point source water pollution control projects, although a relatively small proportion of them have been used for this purpose --- generally less than 10 percent (USEPA, 2001H)..

However, in the end, the zero discharge goal in the FWPCA and the restrictive permits that are necessary to achieve it are substantive rather than a procedural matters. Unfortunately, existing scholarship has done little to address the need for more substantive measures of compliance with Congress's directives for restrictive point source water pollution control requirements. Indeed, none of the above studies has included any direct measure of the restrictiveness of state water pollution permits. The major reason for this omission lies in the nature of the permits themselves. They are highly complex documents that rely on site-specific characteristics to determine their content. There are also literally thousands of permits, so any effort to develop an appropriate and comparable set of substantive criteria would represent a voluminous effort, particularly since the permits themselves are housed in locations throughout the country. There is no central repository of NPDES permits available for national review and oversight, or for academic study for that matter!

To address these concerns, this analysis uses permit data provided by the states and submitted to EPA through its Permit Compliance System (PCS) database in order to develop measures of permit restrictiveness. The measures used address both toxic and conventional pollutants. They also account for facets of restrictiveness that are associated with limits on effluent quality and monitoring that is required to assess compliance with those effluent limits, and – potentially – special conditions requiring the construction of new treatment facilities or the conduct of a toxicity reduction evaluation (TRE). While the measures used do not provide a comprehensive picture of state permit restrictiveness, they do assess the restrictiveness of controls over both toxic and conventional pollutants and do so in a way that is traceable to statutory requirements established by Congress. In so doing, the measures used here add to, and improve upon, existing measures of federal and state water quality programs.

Before evaluating state administration of the NPDES program according to these substantive criteria, however, it is important to gain a sense of the extent to which the states have followed through on Congress's procedural directions. If states are to administer the restrictive permit programs envisioned under the act, they must first gain authority to do so. And second, they must issue permits authorizing and restricting discharges and re-issue them when they expire. Consequently, the discussion now turns to an assessment of state compliance with these two sets of procedural expectations established by Congress in the FWPCA.

12.1.1. Procedural Compliance: State Implementation of the NPDES Permit Program

In Section 101 of the FWPCA, Congress clearly expressed its desire that state governments administer the NPDES permit program. Congress stated explicitly in Section 101 that it "is the policy of Congress that the States manage the permit program(s) … under Section 402 … of the Act". And, in Section 402, Congress outlined procedures for EPA review of state program authorizations. These procedures provide generally for the delegation of federal permitting authorities to the states in cases where the states have developed adequate legal authorities and program implementation capabilities (See FWPCA, Section 402 (b) for the details). In general, under the partial preemption provisions of the Act, authorized state permit programs have to be at least as stringent as the federal program, but they also have latitude to impose requirements more stringent than those passed by Congress and implemented by EPA.

Initially, federal law called for an overall authorization for state administration of the NPDES program. After the 1977 amendments to the FWPCA, however, EPA regulations were amended to create additional categories of NPDES authorization. These additional categories were for the issuance of permits to federal facilities and for "pretreatment" programs requiring that industrial wastes released to public sewerage systems be treated prior to discharge. Authorized states were then required to add these authorities to their existing set of regulatory authorities (USEPA, 1986). A fourth category of authorities was also added to enable states to issue one permit covering many similar discharges within a circumscribed geographic territory. This authority, referred to as "General Permit" authority, allowed states to issue permits for large categories of similar dischargers as a group, rather than requiring individually issued permits for every discharge. This authority enabled more "cost effective" forms of permit issuance because it allowed one permit to be issued covering a large number of dischargers. In the 1990's, yet another authority was added, this one relating to the proper disposal of "bio-solids" (eg. sewerage sludge) emanating from wastewater treatment processes.

The information presented in Table 12-2 overviews the status of NPDES program authorizations for all fifty states. It includes data on the number of authorizations each state has received, as well as specific information on the types of authorization that each state has obtained. In total, forty-four states had sought and received federal NPDES permitting authority by 2001, and all of these states also obtained authority to issue general permits. Most of these "authorized" states also sought and obtained authority relating to pretreatment requirements and federal facilities, but a number of states are still "non-compliant" in this regard. Only four states have sought and obtained authorization to operate the bio-solids management program within their jurisdictions (TX, UT, OK, WV). The remaining six states (indicated in capital letters in Table 12-2) -- Alaska, Arizona, Massachusetts, Idaho, New Hampshire, and New Mexico – have not yet received NPDES authorization.

Table 12-2 - State NPDES Administrative Authorities

State	#of Authoriza-tions	Overall NPDES Authority	Pretreatment	General Permits	Federal Facility	Bio-solid
Alabama	4	Y	Y	Y	Y	N
ALASKA*	0	N	N	N	N	N
ARIZONA	0	N	N	N	N	N
Arkansas	4	Y	Y	Y	Y	N
California	4	Y	Y	Y	Y	N
Colorado	2	Y	N	Y	N	N
Connecticut	4	Y	Y	Y	Y	N
Delaware	2	Y	N	Y	N	N
Florida	3	Y	Y	Y	N	N
Georgia	4	Y	Y	Y	Y	N
Hawaii	4	Y	Y	Y	Y	N
IDAHO	0	N	N	N	N	N
Illinois	3	Y	N	Y	Y	N
Indiana	3	Y	N	Y	Y	N
Iowa	4	Y	Y	Y	Y	N
Kansas	3	Y	N	Y	Y	N
Kentucky	4	Y	Y	Y	Y	N
Louisiana	4	Y	Y	Y	Y	N
Maine	4	Y	Y	Y	Y	N
Maryland	4	Y	Y	Y	Y	N
MASSACHUSETTS	0	N	N	N	N	N
Michigan	4	Y	Y	Y	Y	N
Minnesota	4	Y	Y	Y	Y	N
Mississippi	4	Y	Y	Y	Y	N
Missouri	4	Y	Y	Y	Y	N
Montana	3	Y	N	Y	Y	N
Nebraska	4	Y	Y	Y	Y	N
Nevada	3	Y	N	Y	Y	N
NEW HAMPSHIRE	0	N	N	N	N	N
New Jersey	4	Y	Y	Y	Y	N
NEW MEXICO	0	N	N	N	N	N
New York	3	Y	N	Y	Y	N
North Carolina	4	Y	Y	Y	Y	N
North Dakota	3	Y	N	Y	Y	N
Ohio	4	Y	Y	Y	Y	N
Oklahoma	5	Y	Y	Y	Y	Y
Oregon	4	Y	Y	Y	Y	N
Pennsylvania	3	Y	N	Y	Y	N
Rhode Island	4	Y	Y	Y	Y	N
South Carolina	4	Y	Y	Y	Y	N
South Dakota	4	Y	Y	Y	Y	N
Tennessee	4	Y	Y	Y	Y	N

Table 12-2 (continued)

Texas	5	Y	Y	Y	Y	Y
Utah	5	Y	Y	Y	Y	Y
Vermont	3	Y	Y	Y	N	N
Virginia	4	Y	Y	Y	Y	N
Washington	3	Y	Y	Y	N	N
West Virginia	5	Y	Y	Y	Y	Y
Wisconsin	4	Y	Y	Y	Y	N
Wyoming	3	Y	N	Y	Y	N
Totals		44	33	44	39	4

Source: USEPA, 2001B.
* The states shown in capital letters have not yet received NPDES authorization.

In reviewing state program authorizations, it is important to remember that states are not literally required to seek and obtain NPDES related program authorizations. Congress encouraged them to do so in the Act, and states may find advantages in receiving authorization that come in the form of reduced federal involvement in water quality matters within their borders. They are not, however, required to seek authorization by either statute or regulation. Nevertheless, the vast majority of states – 88% – have sought and obtained NPDES permitting authority, even if five of them have failed to obtain federal facilities permitting authority and 11 have failed to obtain pretreatment authority. And, for the recently established bio-solids program, very few states have sought authorization to administer the federal program. Clearly, while most states now administer the NPDES program within their borders as Congress had hoped, there is also reluctance evident among some of the states.

Another way to view state responses to Congress's desire that they obtain authority to administer the NPDES program is to look at the speed with which they responded to opportunities to gain NPDES program authorizations. California was the first state to obtain NPDES permitting authority in May of 1973, and by the end of 1975 another 27 states had joined it in gaining this authority (USEPA, 1986, p. 1-7). There were therefore a number of states that apparently viewed water quality management as their responsibility, and sought authority to fulfill their statutorily designated roles quite quickly – even if they were now required to answer to federal policymakers to a greater degree than they had previously. A number of additional states, however, have taken longer to seek and gain NPDES permitting authority. The first twenty-eight authorities were granted well within three years of the passage of the 1972 Act, but it took another twenty-seven years to extend authorization to the additional sixteen states that now have it. Clearly, these latter states were more reluctant to take on administration of the federal permitting program than the former states, and the six states that still do not have these authorities – Massachusetts, New Hampshire, New Mexico, Arizona, Idaho, and Alaska – are exercising greater reluctance still.

The data in Table 12-3 illustrate variations in the rates of authorization among the states. The second column lists the number of months it took for each state to obtain authorization to administer the *overall* NPDES program within their state, and – reflecting the burst of initial activity in the 1970's mentioned above – it shows relatively quick efforts on the part of the over half of the states to gain overall NPDES authority. The mean time period for receiving this broad authority was 73.4 months, and the median was just under two years (23.5 months). The data in the third column suggest that the states were generally slower to seek supplemental permitting authorities for federal facilities, pretreatment, and general permitting authorities than they were in seeking overall NPDES authority. The figures shown in this column indicate that the mean number of months across all of the states for gaining the four major NPDES related administrative authorities (Overall NPDES, Pretreatment, Federal Facilities, and General Permitting) was 97.3 months, while the median time was 79 months. The pattern in these average figures is therefore similar to, although weaker than, the pattern indicated for delegation of overall NPDES authorities. In both cases, the median is less than the mean, suggesting a pattern of response in which a subset of states seek to gain authority relatively quickly, and are then followed in piecemeal fashion by other states seeking the new authority [3].

Table 12-3 - State Timetables for Receiving NPDES Related Authorization (in Months), NPDES Authorized States Only*

State	NPDES Overall**	Average of All Four Major Authorization Categories***
Alabama	77 months	50 months
Arkansas	162	103
California	1	53
Colorado	22	139
Connecticut	4	69
Delaware	11	168
Florida	264	222
Georgia	13	43
Hawaii	18	49
Illinois	53	83
Indiana	20	99
Iowa	63	54
Kansas	13	125
Kentucky	124	64
Louisiana	279	219
Maine	332	272
Maryland	16	80
Michigan	5	56
Minnesota	13	23
Mississippi	12	54
Missouri	17	25
Montana	13	81
Nebraska	13	46
Nevada	28	104
New Jersey	107	77
New York	29	110
North Carolina	29	64
North Dakota	25	130
Ohio	10	60
Oklahoma	282	215
Oregon	4	9
Pennsylvania	61	109
Rhode Island	136	75
South Carolina	25	53
South Dakota	247	187
Tennessee	55	78
Texas	304	244
Utah	170	110
Vermont	10	113

Table 12-3 (continued)

Virginia	22	73
Washington	6	114
West Virginia	108	48
Wisconsin	9	25
Wyoming	20	107
Totals		
Average (Mean)	**73.4**	**97.3**
Median	**23.5**	**79**

Source: USEPA, 2001B.

* The table does not include Alaska, Arizona, Idaho, Massachusetts, New Hampshire, and New Mexico --- states that have not received any form of NPDES permitting authority.

**The first column lists the number of months it took for the state to obtain authorization to administer the overall NPDES program. California, which received its authorization in May of 1973, was the first state to receive NPDES authorization, and the months it took for the other states to receive overall NPDES program authority are measured in reference to California. The mean number of months was 73.4 and the median was 23.5. Obviously, states with lower numbers in this column were quicker to seek and receive authorization than were the states with larger numbers.

*** The second column lists the average number of months it took for the state to receive NPDES related authorizations, across the board. In this case, the time elapsed from the first state authorized until the indicated state received its authorization was measured for each of the four major categories of authorization (NPDES, Pretreatment, Federal Facilities, and General Permits), and a mean was then calculated. The bio-solids program authorizations were excluded here because only a few states have sought this form of authorization in the relatively short period in which it has been available (since about 1996). The mean time for this column is 97.3 months, and the median time is 79 months. Again, states with lower numbers in this column have been quicker to seek and receive authorizations than states with larger numbers.

These average figures, and Table 12-3 as a whole, illustrate the substantial variation that has existed in state efforts to gain authorities to operate the federal NPDES permitting program within their jurisdictions. Some states, such as Oregon, Minnesota, Wisconsin, and Missouri, have been quite quick to seek and obtain NPDES related authorities as they have become available. Other states, such as Oklahoma, Texas, Florida, and Maine, have generally been slower to seek and receive NPDES permitting authorities. And, of course, the handful of states that are not included in the table – Alaska, Arizona, Idaho, New Mexico, Massachusetts, and New Hampshire – remain unauthorized to administer the NPDES program at all, and therefore demonstrate the greatest reluctance of all.

12.1.2. Procedural Compliance: Permit Issuance and Re-issuance

A second set of procedural criteria that may be used in assessing state fidelity to Congress's direction in the FWPCA relates to the issuance of permits, and their timely re-issuance. Congress, in Sections 301 and 402 of the FWPCA expressly prohibited the discharge of pollutants to the waters of the United States, unless a permit had been issued for that discharge by EPA or an authorized state. Consequently, state programs authorized to administer the NPDES program within their borders are required by the Act to issue permits for acceptable discharges of pollutants to the "navigable" waters of the United States, and – under Section 402 of the Act – these permits must be re-issued every five years. The following discussion overviews state activities in the area of NPDES permit issuance and re-issuance, and assesses the extent of state compliance with Congress's intentions as specified in the FWPCA. In general, the data presented show that the states have been issuing permits as is required, but they are often slow – although to varying degrees – in their efforts to re-issue permits after expiration.

Table 12-4 presents data on the number of discharging facilities permitted through the NPDES program, by state. The first three columns relate to the issuance of *individual* permits. These are permits that are issued to *particular discharging facilities*, such as a municipal sewerage system or an industrial enterprise that discharges wastewaters from its production operations to navigable surface waters. The figures in the first column reflect the total numbers of individually issued permits in each state. The next two columns divide these individually issued permits into two categories. The first category of permits are called "majors", because they are considered by EPA (and the states) to be larger facilities that have significant (or "major") potential to affect water quality adversely. The second column specifies the number of "minor" facilities by state. While these minor facilities also discharge wastewater to waters of the United States – and are therefore required to obtain an NPDES permit, they are not generally considered to present as large a risk to water quality as those permits that are designated as "majors." This categorization of individually issued permits does not appear in the FWPCA, but rather has been developed by the EPA as a mechanism for establishing priorities for permit issuance, compliance assessment, and enforcement activities in the context of limited resources. The fourth column of the table shows the number of discharging facilities covered by general permits. As discussed above in reference to state program authorizations, these permits enable state and federal agencies to issue one permit covering a class of facilities within a particular geographic area. For example, general permits have been used in California, Louisiana, and Florida to permit numerous off-shore oil exploration facilities under one permit.

Table 12-4 - Facilities Permitted Under the NPDES, By State

Authorized States	Total Individual Permits	Individual Major Permits	Individual Minor Permits	General Permits	Total Facilities
Alabama	1590	191	1399	85	1675
Arkansas	840	111	729	301	1141
California	915	236	679	1259	2174
Colorado	462	98	364	595	1057
Connecticut	244	115	129	0	244
Delaware	65	24	41	0	65
Florida	526	232	294	483	1009
Georgia	1117	233	884	94	1211
Hawaii	66	24	42	406	472
Illinois	2051	280	1771	595	2646
Indiana	1335	178	1157	302	1637
Iowa	1713	125	1588	0	1713
Kansas	1249	58	1191	0	1249
Kentucky	1971	125	1846	4655	6626
Louisiana	1633	241	1392*	3376	5009
MAINE****	350	94	256	11	361
Maryland	652	102	550	468	1120
Michigan	691	181	510	849	1540
Minnesota	873	85	788	304	1177
Mississippi	1826	86	1740	150	1976
Missouri	2759	146	2613	1919	4678
Montana	172	43	129	150	322
Nebraska	645	56	589	8	653
Nevada	78	10	68	0	78
New Jersey	631	167	464	183	814
New York	2479	359	2120	480	2959
North Carolina	1535	246	1289	1791	3326
North Dakota	129	26	103	288	417
Ohio	2833	289	2544	299	3132
Oklahoma	572	95	477	127	699
Oregon	360	77	283	589	949
Pennsylvania	4962	387	4575	941	5903
Rhode Island	133	25	108	7	140
South Carolina	680	191	489	530	1210
South Dakota	349	29	320	223	572
Tennessee	1378	162	1216	341	1719
Texas	3178	549	2629	387	3565
Utah	114	33	81	80	194
Vermont	143	34	109	77	220

Table 12-4 (continued)

Virginia	1428	142	1286	2147	3575
Washington	460	80	380	1427	1887
West Virginia	1549	93	1456	1323	2872
Wisconsin	880	134	746	2500	3380
Wyoming	1109	26	1083	184	1293
Total Permitted Facilities in Authorized States	**48,725**	**6,218**	**42,507**	**29,934**	**78,659**
Unauthorized States					
ALASKA	200	46	154*	1080**	1280
ARIZONA	179	44	135	0	179
IDAHO	190	43	147	96**	286
MASSACHUSETTS	658	142	516	178	836
NEW HAMPSHIRE	246	61	185	38	284
NEW MEXICO	178	34	144	46	224
Total Permitted Facilities in Unauthorized States	**1651**	**370**	**1281**	**1438**	**3089**
Grand Totals* **	**50,376**	**6,588**	**43,788**	**31,372**	**81,748**

Source: EPA Permit Issuance Forecasting Tool (PIFT), given by EPA staff to the author, Winter, 2001.

* For minor facilities in these four states (WY, LA, ID, AK), minor permits that were listed in PIFT as not having been actually issued were excluded from the totals. These include 64 for Wyoming, 2,278 for Louisiana, 78 for Idaho, and 120 for Alaska.
** Alaska and Idaho are the only states that list "major" permits that were covered under general permits (18 and 20, respectively).
*** These totals are clearly underestimates of the total number of facilities permitted nationally, as they do not account for currently issued storm-water discharges or expected increases in permit issuances in future years to regulate additional storm-water discharges and wet weather run-off from additional categories of Concentrated Animal Feeding Operations (CAFO's).
****Maine is capitalized here to reflect the fact that the data presented are from late 2000, just before it received its NPDES authorization in January of 2001.

Table 12-4 also differentiates between permits issued in authorized states, and those issued by EPA in unauthorized states. It shows clearly that states now issue the vast majority of NPDES permits – well over 90% by these numbers, although no attempt is made to account for any permits that were issued by EPA in authorized states. These latter numbers are not readily available, and are – in all likelihood – extremely small, as they would only be likely to occur through EPA objections to specific permits and the failure of the state to remedy the issues that led the EPA to object. This process occurs rather infrequently. In addition, the table does not recognize the fact that EPA and unauthorized states may coordinate their efforts, even in the absence of formal authorization.

One thing should be quite clear from Table 12-4, however – the EPA and the states are issuing NPDES permits, just as they are required to do under the FWPCA. In fact, they are issuing these permits in large numbers. According to these rather conservative figures, a total of over 80,000 discharging facilities are currently permitted under the NPDES program, and over 50,000 of these facilities do so under individually issued permits. However, the actual number of facilities covered by permits is understated by these numbers, because they exclude facilities currently covered under storm-water related general permits and they do not account for the increasing number of wet weather related discharges that are likely to become subject to permitting requirements in the coming years (USEPA, 2001D). As a result, while it is clear that the states are issuing permits as they are required to do, it is – at least at this point – less certain how many additional permits they will need to issue in coming years in order to fulfill the regulatory requirements issued by EPA pursuant to the Act. The universe of discharges requiring an NPDES permit is clearly growing, but – as yet – it does not seem clear how big it will be.

One thing that is certain, however, is that the states and EPA are not re-issuing NPDES permits as quickly as they are required to do under the FWPCA. Table 12-5 provides data on the proportion of facilities covered by NPDES permits that have not been re-issued within the five-year time frame required by the Act. The first column lists the percentage of individual major permits that have expired – and therefore have not been re-issued in timely fashion, while the second column provides figures on the total percentage of facilities that are operating on expired permits. These latter figures include major dischargers, minor dischargers, and facilities covered under General Permits.

Table 12-5 - Percent of NPDES Permitted Facilities With Expired Permits, By State

Authorized States	Individually Permitted Major Facilities	All Permitted Facilities
Alabama	16.23%	9.79%
Arkansas	20	6.7
California	33.47	14.26
Colorado	44.9	15.23
Connecticut	26.96	53.3
Delaware	33.33	21.54
Florida	6.46	3.86
Georgia	1.72	.58
Hawaii	41.66	3.6
Illinois	23.21	26.27
Indiana	45.51	14.42
Iowa	17.6	39.29
Kansas	18.97	24.26
Kentucky	4	.97
Louisiana	58.58	18.31*
MAINE**	20.2	37.9
Maryland	13.73	25.63
Michigan	20.44	19.55
Minnesota	48.23	35.43
Mississippi	5.81	10.83
Missouri	28.08	13.89
Montana	51.16	23.91
Nebraska	62.5	36.75
Nevada	70	38.46
New Jersey	41.92	26.66
New York	3.62	11.12
North Carolina	19.51	5.29
North Dakota	0	0
Ohio	25.95	33.45
Oklahoma	26.32	18.17
Oregon	67.53	18.76
Pennsylvania	27.13	13.87
Rhode Island	36	69.3
South Carolina	26.18	11.07
South Dakota	27.59	12.76
Tennessee	9.88	2.97
Texas	37.7	15.6
Utah	6.06	6.19
Vermont	8.8	10
Virginia	4.93	.7
Washington	41.25	11.76

Table 12-5 (continued)

West Virginia	49.46	22.98
Wisconsin	10.45	3.11
Wyoming	3.85	.15*
Authorized States -- Mean % Permits Expired	**26.97%**	**17.92%**
Standard Deviation	**18.8**	**14.94**
Median	**26.08**	**14.34**
Unauthorized States		
Alaska	13.04	27.73*
Arizona	6.82	11.73
Idaho	44.19*	52.8*
Massachusetts	31.69	36.2
New Hampshire	27.87	34.5
New Mexico	41.17	60.27%
Unauthorized States – Mean % of Facilities with Expired Permits	**27.46%**	**37.21%**
Standard Deviation	**14.97**	**17.45**
Median	**29.78**	**35.35**
Grand Totals		
Mean Permits Expired	**27.03%**	**20.23%**
Standard Deviation	**18.25**	**16.34**
Median	**26.64%**	**15.42%**

Source: USEPA, 2001J.
All permits = majors + minors + facilities covered by general permits – "permits not issued" in PIFT.
* The figures for LA, AK, ID, and WY are calculated to exclude "permits not issued" in EPA's Permit Issuance Forcasting Tool (PIFT).
**Maine is capitalized here because the data presented are for a time period just prior to its receipt of NPDES authorization.

It is clear from the figures above that neither the vast majority of states nor EPA are re-issuing permits in a timely fashion across the boared, at least as defined by Congress in the statute. Of the authorized states listed above, only North Dakota has re-issued all of its individually issued NPDES permits in timely fashion. To be sure, however, there is variation among the states in the proportion of their permits that have expired. Some states, such as Virginia, Wyoming, Kentucky, and Georgia, have kept the proportion of their permits that have expired quite small – less than 5% in these cases. However, other states show large permit backlogs. These states include Rhode Island, Nevada, Nebraska, and Minnesota, all of which have permit backlogs in excess of 30% for both major and non-major facilities.

Even EPA has not kept up with the ongoing workloads associated with ensuring compliance with the five-year permit re-issuance requirement contained in Section 402 of the Act. Three of the six states in which EPA has responsibility for issuing permits have ongoing backlogs in excess of 30% for both major and non-major facilities, and the Agency's overall average backlog figures are higher than those for the states as whole. It is also worth noting that the EPA appears to make greater and more consistent use of the major-minor distinction for prioritization of permit re-issuance than do the states as a whole. In the six unauthorized states where NPDES permits are issued by EPA, the mean rate of expired major permits (27.46 %) is lower than the rate of expiration for other kinds of permits (37.21 % of all permitted facilities are expired), while the opposite is the case for permits issued in authorized states. In these states, a mean of 26.97% of major permits are expired, while a mean of only 17.92% of non-major permits are expired. The states, it seems, are using criteria other than the federally designated major/minor distinction to prioritize their permit re-issuance activities [4].

If we are to look at the procedural criteria for state NPDES program compliance as a whole, a mixed picture of state compliance with Congress's mandates emerges. Most states (88%) have now responded to Congress's call for state administration of the NPDES permitting program, but it has taken literally 30 years to reach this level of state commitment to the program. And, even with this amount of time, six states are still not authorized, and about a dozen other states are reluctant to take on the full range of authorizations available. The slow pace at which states are now responding to the opportunity to obtain authorization to manage the federal bio-solids program is clear evidence that state responses to opportunities for federal authorization are far from automatic.

At the same time, however, it is clear that the authorized states are responding to the primary requirement of the NPDES program – the need to issue permits in order to restrict discharges to waters of the United States. The states have issued literally thousands of water quality discharge permits, and these permits now provide baseline water quality protection for water bodies throughout the country. Conversely, however, the states are having quite a bit of difficulty in keeping up with the ongoing need to re-issue these permits in timely fashion. On average, the states have backlogs of 26.97 % for major facilities, and 17.92 % for all permitted facilities. The EPA's average permit backlogs of 27.46 % and 37.21 % for major dischargers and all permitted facilities, respectively, tell a similar story. These kinds of permit backlogs violate Section 402 of the FWPCA, and represent a failure on the part of EPA and the States to adhere to Congress's wishes. Alternatively, however, one could argue legitimately that these backlogs represent justifiable responses to the failure of Congress to provide sufficient resources for full implementation of the NPDES program, as the recent ASIWPCA GAP study makes clear (ASISPCA, 2002).

With this mixed picture in mind, let us now investigate the extent to which states have sought to include restrictive requirements in the NPDES permits that they issue. In passing the FWPCA, Congress was concerned not only about the issuance of permits, but also about moving the country toward the Act's zero discharge goal.

12.1.3. Substantive Compliance: The Restrictiveness of NPDES Permits

While procedural fidelity with Congress's wishes is a pre-condition for full state compliance with Congress's directives for implementing the NPDES program, serious and long term reductions in point source pollutant loadings are likely to require the issuance of restrictive NPDES permits. The discussion that follows outlines two criteria for assessing NPDES permit restrictiveness, both of which are based on the extent to which the states have established more stringent permit conditions than are required under federal technology based standards. It also analyzes the extent to which the states issue restrictive permits according to these criteria. The analysis suggests that there are wide variations in permit restrictiveness among the states for both whole effluent toxicity (WET) and conventional pollutants.

12.1.4. Criteria for Assessing NPDES Permit Restrictiveness:

In concept, the "restrictiveness" of an NPDES permit could refer to a number of different things. It could refer to the extent of required pollutant reductions, or the nature of the burdens imposed by permit requirements on those who must comply with them. It could also refer to provisions placed in any of the four major components of an NPDES permit: the effluent limitations, the monitoring requirements, the special conditions, and/or the standard conditions. And, restrictive provisions included in these sections of a permit could vary depending on the types of pollutants to be controlled, the specific sources from which they emanate, the type of permit issued, and other site-specific circumstances. While it is important to recognize this wide variation in the circumstances surrounding the universe of permit provisions that could be assessed, it is also important to understand the need to develop criteria that apply to permits in all states in order to facilitate useful comparisons among the states. This "feasibility" requirement restricts the choice of criteria for measuring permit restrictiveness quite considerably.

The criteria used in this analysis to assess state NPDES permit restrictiveness were developed with these complexities in mind. Stated simply, they seek to assess the extent to which the states have moved beyond federal technology-based requirements to impose more restrictive permit conditions that are based on water quality related considerations. The criteria used include measures that reflect both the extent of required pollutant reductions and the potential burdens imposed on the dischargers involved. They focus primarily on the effluent limitations contained in the permit, but also include components that reflect potential burdens related to monitoring requirements and even treatment system construction or toxicity reduction evaluation requirements that may be included in the special conditions portion of an NPDES permit. They also include measures dealing with both toxic pollutant discharges and the release of conventional pollutants. And, to assure some minimum level of comparability across the states, they focus on the extent to which *individually issued major permits* include requirements that are more restrictive than the requirements contained in EPA's technology-based effluent guidelines.

To understand the measures used, it is important to recognize that NPDES permits can be based on technologically feasible minimum requirements that are included in federal regulations, and/or water quality related considerations. In general, NPDES permits must be at least as restrictive as applicable federal technology based standards, but permits should be more restrictive in cases where greater pollutant loading reductions are necessary in order to achieve ambient water quality standards in the receiving waters. Indeed, the FWPCA (Section 303 and others) requires not only pursuit of the zero discharge goal, but also that EPA and the states set more restrictive permit requirements in cases where existing technology based standards are insufficient to assure the achievement of water quality standards. These water quality standards may be based on numerical criteria that define acceptable pollutant concentrations, or the FWPCA's general prohibition against "toxics in toxic amounts" (FWPCA, Section 101). The failure of the states and EPA to impose requirements on point and non-point source pollutant discharges that are sufficient to achieve water quality standards on a nationwide basis is at the core of the current controversy surrounding Total Maximum Daily Loads (TMDLs), and is also the foundation upon which the measures used here are built.

This analysis employs two measures of permit restrictiveness. One measure relates to controls on toxic pollutants, and the other relates to effluent limits imposed to control discharges of conventional pollutants. As was mentioned previously, early NPDES permitting efforts by EPA and the states focused primarily on conventional pollutants. Two of the most important of the conventional pollutants included in these efforts were total suspended solids (TSS), and bio-chemical oxygen demand (BOD). Over time, and with some prompting by environmental groups (O'Leary, 1993), EPA and the states placed greater emphasis on including toxic pollutant limits and requirements in NPDES permits. There was also an increasing emphasis on dealing with both the potential interactive effects among toxic pollutants (as they might actually occur in ambient waters) and the need to impose effluent limitations for conventional pollutants that were more restrictive than the federally established technology based standards. The results were new forms of controls on toxic pollutants, and progressively more stringent permit requirements for standard conventional pollutants such as TSS and BOD. These new and more restrictive permit requirements, however, are not applied uniformly across the country, and these specific variations in permit restrictiveness provide the foundation for the measures used here.

The first measure of permit restrictiveness used in this analysis relates to toxic pollutants. While the 1977 Clean Water Act amendments required EPA and the states to place greater emphasis on the control of toxic substances in wastewater discharges, many of the controls developed pursuant to these amendments were created primarily to address specific toxic substances on a chemical-by-chemical basis. Indeed, the amendments themselves required controls on 65 chemicals (O'Leary, 1993, p. 31). Over time, however, concerns about overall water quality and the potential for interactive effects among chemicals increased. The result was an increased effort by EPA to develop controls and monitoring methods that accounted for interactive effects among chemicals.

During the 1980's, EPA's Office of Water – working with state governments and water quality experts – developed protocols for monitoring and imposing permit limits on "whole effluent toxicity" (WET) (EPA, 1985). Stated simply, controls on WET involve mixing wastewater effluent in predetermined concentrations with ambient water, and exposing organisms to these waters to determine whether the organisms die or experience other deleterious effects. If the organisms die or experience deleterious effects, the effluent is deemed to be "toxic" and therefore in violation of the FWPCA's statutory prohibition against water quality that contains "toxics in toxic amounts" (Section 101 a (3)]. These results may then trigger a "toxicity reduction evaluation" (TRE) to identify the substances causing the toxicity and make treatment, management, or production process changes to reduce the toxic effects identified.

Since the mid 1980's, the EPA has issued updates to its WET guidelines (EPA, 1991) and has recommended widespread inclusion of WET requirements in NPDES permits (EPA, 1996), in spite of the fact that fulfilling WET related monitoring requirements is expensive relative to other forms of effluent monitoring [5]. These WET permit requirements can take the form of either effluent limits – concentrations of effluent with ambient water that lead to acute or chronic toxic effects, or monitoring requirements that would be likely to trigger additional requirements if toxic effects are discovered. The first measure of state permit restrictiveness used here reflects the extent to which the states are using

WET monitoring and/or WET related permit limits, and is operationalized as the proportion of major permits issued in the state that include WET requirements.

The second measure of permit restrictiveness used here relates to controls on TSS and BOD, two important conventional pollutant parameters. Fortunately for our purposes, EPA's technology-based effluent limitations for *municipal* wastewater treatment facilities apply uniformly and in relatively comparable fashion across the entire country. This is not the case for the technology based standards applicable to industrial facilities because of the relatively high degree of economic specialization in the United States, the variable forms that technology based limitations take in differing industrial categories, and differing production circumstances within industrial categories. As a consequence, for conventional pollutants such as BOD and TSS, there are comparable measures of permit restrictiveness available for municipal treatment facilities, but similarly comparable measures do not appear to be available for industrial dischargers.

For municipal sewerage facilities, the standard federal technology based requirements include uniform concentration limits on both TSS and BOD. For both of these pollutants, the uniform technology based standards are established on the basis of 30-day average values and 7-day average values, and the uniform limits imposed are identical for both pollutants (USEPA, 1996, p. 76). In general, thirty-day average concentrations of TSS are not to exceed 30 milligrams per liter (30 mg/l), and seven-day average concentrations are not to exceed 45 mg/l. The same effluent concentration value limits also apply to the required measures of BOD. The "in general" qualification used above refers to the fact that there are a several forms of "exceptions" and "variances" that can be used to provide municipalities with more lenient limits --- and, based on the data provided by EPA for use in this study, these adjustments in technology based limits appear to be used with some regularity [6].

As a result of these uniform concentration standards, EPA and the states are not to issue municipal permits with concentration limits more lenient than these average values, unless specific conditions allowing exceptions to these limits are met. EPA and the states are, however, required to issue permits with more stringent concentration limits on TSS and BOD in cases where greater pollutant loading reductions are necessary to achieve compliance with water quality standards. For BOD and TSS, this means that applicable permit limits should be lower than 30 mg/l for the 30-day average limits and lower than 45 mg/l for the 7 day average limits. The specific measure of restrictiveness relating to conventional pollutants used here is the proportion of major NPDES municipal permits that have concentration limits for TSS and/or BOD which are more restrictive than these technology based concentration limits. This is an appropriate measure of state permit restrictiveness because it reflects an effort on the part of states to set limits necessary to achieve long term water quality goals, even if these more restrictive limits impose costs that exceed those that would be required under the uniform federal technology-based standards. These additional costs may come in the form of construction and operation of additional treatment facilities that may be required in the special conditions portion of an NPDES permit.

Overall, these two measures of permit restrictiveness provide good and workable estimates of the extent to which the states are willing to move beyond federally required technology based standards, and impose costs on dischargers in order to achieve additional reductions in point source pollutant loadings (particularly given the other measurement options available). Let us now turn to an analysis of the extent to which the states have implemented these kinds of restrictive permit controls, using data submitted by the states and maintained in EPA's Permit Compliance System (PCS) database.

12.1.5. State Variations in NPDES Permit Restrictiveness

An investigation of NPDES permit requirements using information from EPA's PCS database reveals substantial variations in permit restrictiveness among the states. This variation occurs for both toxicity and conventional pollutants, and among both municipal and industrial dischargers. At bottom, the data suggests that states differ in the extent to which the NPDES permits they issue include restrictive provisions that actually pursue the zero discharge goal established by Congress in the FWPCA.

12.1.5.1. Whole Effluent Toxicity (WET) Requirements in Major Permits:

There is substantial variation in the extent to which the states and EPA have implemented requirements relating to "Whole Effluent Toxicity" (WET) in the major permits they issue. Table 12-6 presents data on the proportion of major permits with WET requirements for the forty-four states in which state agencies issue NPDES permits. The table also provides separated data for the six states in which NPDES permits are issued by EPA. The first column of the table lists the proportion of all major permits in each state that include WET requirements. The two columns that follow provide the same information for major industrial and major municipal permits, respectively. And, for ease of interpretation, the states are arranged in the table according to the extent to which they use WET requirements in the major permits they have issued.

Table 12-6 - Whole Effluent Toxicity (WET) Requirements by State:

Percentages of Major Permits

Authorized States	All Major Permits	Major Industrial Permits	Major Municipal Permits
Arkansas**	**98.1%**	**97.4%**	**98.5%**
North Carolina	**97.8**	**96.7**	**98.6**
Oklahoma	**97.8**	**96.7**	**98.3**
Wyoming	**96.2**	**100**	**93.3**
Connecticut	**94.6**	**89.4**	**98.5**
Maine	**94.3**	**82.6**	**98.4**
Utah	**93.9**	**100**	**92**
South Carolina	**93.4**	**91.4**	**95.1**
Texas	**92.3**	**86.8**	**95.2**
North Dakota	**91.7**	**100**	**87.5**
New Jersey	**88.3**	**85.9**	**89.9**
Rhode Island	**88**	**50**	**100**
Colorado	**87.7**	**93.1**	**85.5**
Louisiana	**87.6**	**84.1**	**92.7**
Florida	**84.7**	**80.8**	**88.9**
Tennessee	**81.6**	**62.5**	**89.1**
South Dakota***	77.8	83.3	76.2
Missouri	63.7	62.2	64.4
Alabama	60.9%	69.1%	56%
Kansas	58.2	46.2	61.9
Hawaii	55.6	50	66.7
Montana	53.5	72.2	40
Indiana	53	31.3	65.8
Ohio	28.9	12.9	37.6
Mississippi	24.4	36.4	17
Nebraska	*17.9*	*4*	*29*
*California****	*16.5*	*13.3*	*18.3*
Georgia	*12.6*	*0*	*16.8*
West Virginia	*10.7*	*18.5*	*0*
Nevada	*10*	*0*	*14.3*
Illinois	*4.36*	*2.5*	*5.2*
Oregon	*1.4*	*4.2*	*0*
Washington	*1.2*	*2.6*	*0*
Pennsylvania	*.3*	*0*	*.4*
Iowa	*0*	*0*	*0*
Kentucky	*0*	*0*	*0*
Maryland	*0*	*0*	*0*
Michigan	*0*	*0*	*0*
Minnesota	*0*	*0*	*0*

Table 12-6 (continued)

New York	*0*	*0*	*0*
Vermont	*0*	*0*	*0*
Virginia	*0*	*0*	*0*
Wisconsin	*0*	*0*	*0*
Delaware	*0*	*0*	*0*
State Totals*			
Mean State %'s	*45.9%*	*43.3%*	*47.1%*
Standard Deviation	*40.6%*	*40.1*	*41.6*
Median State %	*53.25%*	*41.3%*	*48%*
Unauthorized States			
NEW HAMPSHIRE	**91.5**	**76.5**	**97.6**
MASSACHUSETTS	**86.4**	**71.7**	**93.6**
NEW MEXICO	69.7	37.5	80
ARIZONA	50	17.6	72
ALASKA	*6.7*	*4.2*	*9.5*
IDAHO	*2.38*	*0*	*3.6*
EPA Totals*			
Mean EPA %'s	51.1%	34.6%	59.4%
Standard Deviation	38.9	33.3	42
Median EPA %	59.85	27.45	76
Grand Totals*			
Mean %'s	46.6	42.3	48.6
Standard Deviation	40	39.6	41.4
Median	53.25	37.15	58.95

Sources: Data on the number of major industrial and municipal permits with WET requirements was provided by EPA from its PCS database in Fall, 2001. Data on the total number of major permits (overall, industrials, & municipals) were drawn from Caplan, 2002. Caplan's data were also provided by EPA from its PCS database in Fall, 2001.
* Totals represents averages of the state percentages, not overall average figures across all states.
** **Bold** States – States with very high levels of WET controls (> 80% of majors have WET requirements).
*** Plain type States – States with medium levels of WET controls (between 20% and 80% have WET requirements)
*****Italics* type states – States with low levels of WET controls (< 20% of majors have WET requirements).
NOTE: Unlike the other 47 states, the % figures for major industrial and major municipal facilities for California, Vermont, and Wisconsin are based on the number of major municipal dischargers identified through a separate PCS run conducted in the fall of 2001. The use of these separate figures was appropriate because the Caplan 2002 data does not include figures for these three states.

Across all states, the average proportion of major permits with WET requirements is 46.6%, and the standard deviation of 40% demonstrates the wide range of state use of WET requirements. In general, the states either make substantial use of WET requirements in their major permits or they do not. The range of the percentage of major permits with WET requirements extends from 0% in ten states to about 98% in Arkansas, North Carolina, and Oklahoma. In total, 16 states (shown in **bold**) include WET requirements in over 80% of the major permits they issue. Conversely, 19 states include WET requirements in less than 20% of the major permits they issue (shown in *itali*c type face), and – as noted above – this figure includes 10 states that have issued no permits with WET requirements at all. Only 9 states include WET requirements in a large range between 20% and 80% of the major permits they issue (plain type face).

Similar variations are evident when one views major industrial and major municipal permits separately. Overall, the mean state percentage of major industrial permits with WET requirements is 42.3%, while the mean percentage of major municipal permits with WET requirements is 48.6%. The percentages of permits with WET requirements vary from 0% to 100% for both of these categories of major dischargers. And, the standard deviations for these categories of dischargers are 39.6% and 41.4%, respectively – again attesting to wide variations among the states in the extent to which they use WET requirements. The median percentages for utilization of WET requirements are 37.15% and 58.95% for major industrial permits and major municipal permits, respectively. Those figures suggest that, on a nationwide basis, major municipal dischargers appear to be somewhat more likely to have WET requirements than major industrial dischargers.

Table 12-6 also suggests some differences in the ways in which EPA and authorized states utilize WET requirements in permits, although the differences in the use of WET requirements is not statistically significant according to a difference of means test. Overall, EPA makes slightly greater use of WET requirements than do the states. Across all major permits in the six unauthorized states in which EPA is responsible for issuing NPDES permits, the average percentage of major permits with WET requirements is 51.1%, while the comparable average among the forty-four authorized states is 45.9%. However, while

EPA is more likely to include WET requirements in major municipal permits than are the states as a whole (59.4% vs. 47.1%), it is slightly less likely than the states to include WET requirements in major industrial permits (34.6% vs. 43.3%). There are also variations in the extent to which EPA Regional Offices make use of WET requirements when they are responsible for issuing permits. Among the six unauthorized states, two states have WET requirements in over 80% of permits (MASS & NH), two have them in less than 20% of major permits (AK & ID), and the remaining two have percentages that lie in between these two values (AZ, NM). Overall, however, the differences between EPA and State permitting practices dealing with WET requirements do not appear to be that large in comparison to the differences in practices among the states.

12.1.5.2. Conventional Pollutant Limits in Major Municipal Permits

Table 12-7 shows that there is also great variation in state use of restrictive limits on conventional pollutant parameters (BOD or TSS) in major municipal permits. In all, the proportion of major municipal permits with restrictive limits on BOD and/or TSS varies from 0 to 100%. Some states, such as Illinois, Utah, Texas, and North Dakota include restrictive limits in virtually all of the major municipal permits they issue, while other states include such stringent limits less than 5% of the time (HA, NE, WY, IA, MT). The mean state average percent of major municipal permits with stringent limits on TSS or BOD is 41.4%, and the standard deviation of 32.4% attests once again to the wide variation among the states for this measure of permit restrictivenss. The median proportion of major municipal permits with limits below the technology based standard for TSS and/or BOD is 38.4%.

Table 12-7 - Permit Restrictiveness* for Conventional Pollutant Parameters in Major Municipal Permits: The Prevalence of Restrictive* Bio-Chemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) Limits in NPDES Permits in the Fifty States

Authorized States	**# of Major Municipal Permits****	**# of Low BOD &/or TSS Limits**	**% of Low Conventional Pollutant Limits**
Illinois	190	190	100
Utah	25 (24)	24	100
North Dakota	16	16	100
Delaware	8	8	100
Texas	354	352	99.4
Ohio	189 (182)	151	83
Oklahoma	62	51	82.3
Georgia	124	96	77.4
Florida	108 (85)	59	69.4
Oregon	48 (47)	25	68.1
Indiana	115	78	67.8
Virginia	82 (76)	50	65.8
Kentucky	73 (71)	46	64.8
Alabama	120	77	64.2
Arkansas	69	43	62.3
Louisiana	94 (92)	52	56.5
Maryland	56 (45)	24	53.3
Michigan	100 (45)	23	51.1
Mississippi	59 (55)	28	50.9
New Jersey	99 (97)	49	50.5
Minnesota	57 (56)	27	48.2
South Carolina	101	46	45.5
Tennessee	101 (100)	40	40
South Dakota	21 (19)	7	36.8
Rhode Island	19	7	36.8
Kansas	42 (41)	14	34.1
Missouri	101 (99)	30	30.3
Nevada	7	2	28.6
Wisconsin	87 (86)	23	26.7
California	163 (146)	34	23.3
Connecticut	65	10	15.4
Washington	44	5	11.4
New York	228	16	7.0
Maine	64 (60)	4	6.7
Colorado	79 (76)	4	5.3
Montana	25	1	4
Vermont	28	1	3.6
Iowa	98 (80)	2	2.5
Hawaii	6	0	0

Table 12-7 (continued)

Nebraska	31	0	0
Wyoming	15	0	0
North Carolina	139 (0)	NA	NA
Pennsylvania	272 (8)	3	NA
West Virginia	44 (2)	1	NA
State Totals			
Mean %			**45.6 % *** **
SD			**32.2**
Median			**46.85 %**
Unauthorized States			
Massachusetts	94 (90)	37	41.1
New Hampshire	42 (39)	5*	12.8
New Mexico	25	3	12
Idaho	27	3	11.1
Alaska	21	0	0 %
Arizona	25	0	0
EPA Totals			
Mean %			**12.83 % *** **
SD			**15.05**
Median			**11.55 %**
Grand Totals			
Mean %			**41.4 %**
SD			**32.4 %**
Median			**38.4 %**

* "Restrictive" permit limits for conventional pollutants are defined here as permits that have at least one effluent limitation that is below the applicable technology based standard. See the appendix on data coding procedures for a more detailed explanation of the procedures used in making this determination.
** This column contains data on total numbers of major municipal permits, by state. The figures in parentheses show the number of permits with usable data in PCS on permit limits for BOD and TSS. In total, there were 24 states in which the data for at least one permit was insufficient; however, in most of these states, the number of permits with missing data was quite small. Nevertheless, because there were extremely large numbers of permits with insufficient data for North Carolina, Pennsylvania, and West Virginia, the summary data in the last column indicates "NA", and these states are excluded from subsequent analyses. See the appendix on data coding procedures for a more detailed explanation of the procedures used in determining whether there is usable data on permit limits for BOD and TSS.
*** The difference in mean use of restrictive conventional pollutant limits between permits issued by EPA Regions and the states is statistically significant at the .05 level.

Table 12-7 above also differentiates between permits issued in the forty-four states that have received NPDES permitting authorization, and the six states that do not have this authority. In so doing, it illuminates a discrepancy between the extent to which the States as a whole and EPA include restrictive limits on BOD and TSS in major municipal permits. The mean percentage of state issued major municipal permits with restrictive limits on conventional pollutants (TSS and/or BOD) is 45%, while the corresponding figure for the six states in which EPA is responsible for issuing NPDES permits is 12.83%. This difference in means is statistically significant at the .05 level. The median figures show a similar discrepancy, with a median proportion of restrictive state issued permits fixed at 46.85% and a median proportion of restrictive EPA issued permits of 11.55%. Based on these figures, it appears that the states as a whole are more inclined to impose restrictive water quality based permit limits on conventional pollutants for major municipal dischargers than are the EPA Regions as a whole.

12.2. Conclusion

What do all of these analyses suggest about state implementation of Congressionally directed controls on point source wastewater dischargers? From the standpoint of procedural compliance, it is clear that a number of states sought to follow through quickly on Congress's wish that the states operate the federal NPDES program in the early to mid 1970's, and they were then followed by a trickle of states with similar intentions in subsequent decades. With time, therefore, most states have now fallen into line consistent with Congress's directions, even if several states are still reluctant to pursue overall NPDES authority, and a number of additional states have failed to obtain the full range of authorities. In addition, the states have also made substantial efforts to issue NPDES permits, and – because of their efforts in this area --- they have clearly replaced EPA as the dominant regulators of point source wastewater discharges in the country. But the states continue to have difficulty keeping up with the federal statutory requirements associated with this responsibility, as evidenced by the substantial permit re-issuance backlogs remaining in many states. The states can take some solace, however, in the fact that EPA itself is facing similar problems in the six states in which it remains the primary permitting authority.

Significant variability in the restrictiveness of the permits issued by the states is also evident. More specifically, the states (and EPA) vary widely in their use of both WET requirements in major permits and in the extent to which they include restrictive limits on conventional pollutants in the major municipal permits they issue. Contrary to the expectations of some advocates of command and control policy structures, therefore, it appears that the uniform procedures and processes established in the federal program do not necessarily translate into uniformity in policy outputs at the state level. However, it is not yet clear how to explain these variations, and it is to an effort to undertake this task that we now turn in Chapter 13.

13. EXPLAINING VARIATIONS IN STATE PERMIT RESTRICTIVENESS

While the discussion in the previous chapter demonstrated substantial variability in the restrictiveness of NPDES permit requirements among the states, it did not address the sources of this variation. The sources of variation are important, however, because they provide insight into the dynamics underlying the "slippage and shirking" behaviors (McCubbins, 1985) that lead to incomplete compliance with the goals and directions established by Congress in statute. Knowledge of the sources of variation can also yield insights that are relevant to normative debates over the legitimacy of the slippage and shirking behaviors in the first place. If straying from Congressionally established goals and directions occurs as a result of legitimate differences in needs and preferences, then it is quite arguably a legitimate response to Congressional directions that are predicated on state involvement in the implementation of federal policy. However, if slippage or shirking occurs primarily as a result of undue influence by powerful economic minorities at the state level, then it would be hard to justify wide variations in state policy outputs. In addition to these traditional and polar opposite explanations, of course, are a range of other potential explanations that can provide more "nuanced" insights regarding both Congressional influence and policy devolution.

To address these issues, it is appropriate to determine the extent to which variations in point source permit restrictiveness are attributable to variations in state needs and policy preferences (the responsiveness model), economic and institutional capabilities (the capacity model), and the strength of various groups in the policymaking process (the groups model). Each of these theories of the state policy process has different implications for both Congressional influence on policy implementation and the appropriateness of further policy devolution. In the case of NPDES permitting, however, it is also appropriate to investigate the influence of top down bureaucratic pressures on permit restrictiveness because of the strong preemptive oversight tools that Congress has made available to EPA in the NPDES permitting process. The FWPCA is clear regarding the desirability of restrictive permits, and Congress has also adopted extensive administrative procedures to accompany its command and control policy instruments in order to help ensure that (appropriately) restrictive permits are issued. As was noted previously in this work, these procedural requirements include state program delegation processes, provisions ensuring opportunities for notice and comment, ongoing EPA authorities to oversee state NPDES permit issuances, as well as other specific processes outlined in both statute and regulation. The quantitative "top down" analyses in this chapter focus particularly on the program authorization process because it represents a clear and important opportunity for federal influence, and is also subject to quantifiable measurement.

The analysis in this chapter proceeds in two major stages. The first stage focuses on explaining variations in permit requirements relating to whole effluent toxicity (WET) in major NPDES permits. The second stage turns to conventional pollutants, and seeks to explain variations in the extent to which states implement restrictive controls on Bio-chemical oxygen demand (BOD) and total suspended solids (TSS) in major municipal permits [1]. Each of these two major stages of the analysis then proceeds in two steps. The first step consists of ordinary least squares (OLS) regression analyses of each of the four sets of theoretical explanations for variations in NPDES permit restrictiveness mentioned above. The models estimate the strength of "responsiveness," "group based", "capacity based", and "top down federal control" models of state point source permit restrictiveness, respectively. For each of these models, the analyses are limited to the forty-four states that have received NPDES permitting authority because it makes little sense to seek an explanation of varying state permitting processes by including EPA regional NPDES programs in the sample for study. In the second step of these analyses, efforts are made to integrate variables from these partial models into an integrated model in order to provide further insight into the relative strength of the various sources of explanation.

Overall, the analyses presented in this chapter suggest that state policymaking theories do not do a particularly good job of explaining state variations in NPDES permit restrictiveness – at least in comparison to the job they appear to do in explaining non-point source (NPS) policy activism. However, in spite of this broad conclusion, there is some evidence supporting the notion that strong municipal lobbies in the states appear to reduce the prevalence of restrictive *conventional* pollutant limits in major municipal permits. This suggests that there is at least some reason to be concerned about capture related policymaking dynamics that have been emphasized by group based theories, only this time the concern is with influence exercised by large public entities rather than private industry. And, on the other hand, there is also some evidence presented here suggesting that the estimated severity of water pollution problems in the state increases the prevalence of restrictive permit limits on conventional pollutants imposed on major municipal dischargers. This suggests that state permit writers can and do respond to water quality conditions when they develop conventional pollutant permit limits. Neither of these results, however, appear to apply in the case of requirements relating to whole effluent toxicity (WET). In the case of WET, however, we find that federal program oversight – as measured by the temporal proximity of state authorization – has strong and identifiable effects on the restrictiveness of state permits, and this kind of federal oversight also appears to affect the restrictiveness of permit requirements relating to conventional pollutants as well. We also find evidence that one can interpret to suggest that the organizational form of the NPDES permitting agency has an effect the proclivity of the states to impose WET requirements, even though the results here are the opposite of what was found in the non-point source case [2].

Based on these results, it seems apparent that the politics of state water pollution policymaking are quite different in the preemptive point source case than they are in the supportive non-point source case. In the point source case, the most consistent factor explaining variations in permit restrictiveness relates to EPA's oversight of state programs, as states which received their delegated NPDES authorities recently tend to impose more restrictive requirements than states which received their delegations long ago. At the same time, state level factors influencing variations in point source policy restrictiveness are different than the state level factors influencing NPS policy activism, and the statistical indicators suggest that state level factors explain much less of the variation in point source policy restrictiveness than they do state NPS policy activism. Based on this evidence, *it appears that the institutional arrangements made by Congress affect not only policy outputs, but also policymaking processes at the state level*. With these broad conclusions in mind, let us now turn to a presentation of the analyses of state WET requirements and conventional pollutant restrictiveness, respectively.

13.1. Explaining State Whole Effluent Toxicity (WET) Requirements

What accounts for the highly variable state responses to EPA's efforts to encourage the use of WET requirements in NPDES permits? The analyses here uncover evidence suggesting that state use of WET requirements depends on how recently EPA has authorized the state to issue NPDES permits, thus suggesting that a major motivating factor underlying state use of WET requirements may be the immediacy and strength of top-down EPA pressures applied to state permitting agencies [3]**.** And, as we shall see, none of the common models of state policymaking does a particularly good job of explaining state permitting practices relative to WET. Nevertheless, we do find some evidence that we can interpret to suggest that the institutional form of the permitting agency – a variable drawn from capacity based theories of state policymaking processes -- may also affect the use of WET requirements in the state. However, this influence appears to operate differently than one would expect based on initial theoretical expectations. Here, the evidence suggests that state health agencies are *more* likely to impose WET requirements than non-health agencies. This difference *may* be traceable to the health based nature of the WET policy instrument itself rather than overall agency commitment to environmental protection – the traditional reason for expecting more aggressive environmental policies from non-health agencies. However, because this finding is uncovered in very incidental fashion, it is best viewed as tentative and in need of further research and corroboration. The modeling efforts yielding these broad conclusions are presented in the subsections that follow.

13.1.1. The Responsiveness Model:

Theories of state policymaking that follow in the tradition of the "responsive" model suggest that state policymaking processes abide by the needs and preferences of their citizens. According to these models, state policies should vary according to both the need for particular policies and state level policy preferences. The independent variables used here to represent this set of influences are the need for controls on toxic pollutants, the existence of a moralistic political culture, public opinion on the environment, and Democratic Party control of state government institutions. The need for toxicity requirements in the states is measured by the extent to which toxic pollutants are released to state waters [4]. Public preferences are measured by the existence of a dominant moralistic political culture and by public opinion within the state relating to environment issues. And finally, for environmental issues, past research suggests that Democratic Party control of governing institutions may affect environmental policy outputs at the state level (Calvert, 1989; Lester, 1980). Because elections determine the extent to which the Democratic Party dominates state governing institutions, it too may be viewed as indicative of public sentiment in favor of stringent environmental controls. Each of these variables is described in greater detail in the Appendices.

The OLS regression model results shown in Table 13-1 below seek to explain variations in the use of WET requirements based on these need and preference based variables. Results for two estimated models are presented. One model seeks to explain variations in WET requirements across all major permits issued and the other seeks to explain these variations for major industrial permits only.

Table 13-1 - Explaining Whole Effluent Toxicity (WET) Requirements in State Water Pollution Permits: Statistical Evaluation of the "Responsive States" Model

Authorized States Only (n=44)

Variable	DV=Major Permits*: Coefficients (SE)	DV=Major Permits*: Beta	DV=Major Permits*: Significance	DV=Major *Industrial* Permits**: Coefficients (SE)	DV=Major *Industrial* Permits**: Beta	DV=Major *Industrial* Permits**: Significance
% Federal Land	-.161 (.361)	-.075	.658	-.143 (.356)	-.067	.690
Moralistic Culture	-21.649 (17.056)	-.256	.212	-17.572 (16.789)	-.209	.302
Traditional Culture	18.230 (17.868)	.215	.314	17.700 (17.588)	.210	.321
Public Opinion: Environmental Spending	-79.103 (80.047)	-.178	.330	-126.269 (78.792)	-.286	.118
Estimated PS Need-toxics	-1.339E-03 (.001)	-.291	.070	-1.162E-03 (.001)	-.254	.109
Democratic Party Control	-1.410 (.854)	-.296	.107	-1.371 (.840)	-.290	.111
	Adj. R2 = .066			Adj. R2 = .085		
N = 44	F = 1.492		F Sig = .209	F = 1.650		F Sig = .162

* The Dependent Variable (DV) analyzed here is the percentage of all major permits issued in the state with WET requirements.
** The Dependent Variable (DV) analyzed here is the percentage of major industrial permits issued in the state with WET requirements.

Both of these models perform rather poorly. They explain less than 10% of the variation in state use of WET requirements in major permits generally, and in industrial permits in particular. Neither model contains even a single variable that is statistically significant in the predicted direction. Surprisingly, none of the coefficients in either model – except the one for the percentage of federal land in the state – even have signs that operate in the predicted directions! In the first model that focuses on all major permits, both the need and the political party variables are statistically significant (at the .05 and .10 levels, respectively) in predicting that the use of WET requirements is *diminished* by the discharge of high levels of toxic pollutants into the waters of the state and by Democratic Party control of state policymaking institutions. In the second model focusing on major industrial permits only, we see the same pattern, except that now the public opinion variable is also statistically significant in the wrong direction!

Clearly, these are not the results that would be predicted by Erickson et. al. (1993) and others who have argued that state policymaking is best understood as an outgrowth of state preferences and needs. In addition, they do not appear to square well with Lowry's suggestion that federal intervention improves the match between needs and state environmental policies (Lowry, 1992). What is more, the uniform reversal of the signs in the model relative to the predictions of responsiveness based theories suggests clearly that something is going on in the point source permitting process that is fundamentally different than the politics of state variation in non-point source pollution control. With these thoughts in mind, let us turn to an evaluation of another major variant in the current compendium of state policymaking theories – that relating to state capacities.

13.1.2. The Capacity Based Model:

A number of scholars of state policymaking have argued that variations in state policy outputs can be understood as outgrowths of variable state capacities. The earlier scholars advocating this kind of position focused on economic variables reflecting the wealth of the state, such as per capita income (Dye, 1967). The theoretical approaches advanced by these scholars would argue that state water pollution policies should become more aggressive as available state resources increase. More recently, scholars have focused on the capacities of government institutions, and have suggested that policy outputs can also be viewed as flowing from the variable capacities of state institutions (Bowman & Kearney, 1986 & 1988). Evidence has now developed, for example, suggesting that institutional characteristics of state legislatures and administrative agencies may affect policy outputs (Ringquist, 1993; Hunter & Waterman, 1996). And, specific evidence is mounting that health agencies, because they tend to be less focused on an environmental quality mission than environmental and natural resource agencies, also tend to be less active in pursuing environmental goals than these other agency forms (Ringquist, 1993; Hunter and

Waterman, 1996). The earlier chapters in this work on non-point source water pollution control activism now add to this evidence.

But do these capacity based theories of the state policymaking process apply not only to activism but also the restrictiveness of regulatory controls generally, and the implementation of WET requirements in NPDES permits in particular? The OLS regression model results shown in the table below suggest that they do not. The dependent variables in the models are again the proportion of major permits in each of the authorized states that include WET requirements for all major dischargers and for major industrial dischargers, respectively. The independent variables used measure per capita income, legislative professionalism, and whether the state administers its permitting program through a health agency or not. A control variable is also included to account for the percentage of land in the state that is owned by the federal government. Each of these variables is described in further detail in the Appendices.

Table 13-2 - Explaining Whole Effluent Toxicity (WET) Requirements in State Water Pollution Permits: Statistical Evaluation of the "State Capacity" Model

Authorized States Only

Variable	**DV=Major Permits*: Coefficients (SE)**	**DV=Major Permits*: Beta**	**DV=Major Permits*: Significance**	**DV=Major *Industrial* Permits**: Coefficients (SE)**	**DV=Major *Industrial* Permits**: Beta**	**DV=Major *Industrial* Permits**: Significance**
% Federal Land	-6.874E-02 (.311)	-.032	.826	4351E-02 (.307)	.020	.888
Per Capita Income	-8.226E-04 (.002)	-.063	.704	-1.874E-03 (.002)	-.144	.382
Health v. Non-Health	-32.975 (18.362)	-.261	.080	-34.415 (18.126)	-.272	.065
Legislative Professionalism	-84.904 (49.347)	-284	.093	-73.922 (48.712)	-.247	.137
	Adj. R2 = .096			Adj. R2 = .12		
N=44	F = 2.142		F Sig = .094	F = 2.460		F Sig = .061

* The Dependent Variable (DV) analyzed here is the percentage of all major permits issued in the state with WET requirements.
** The Dependent Variable (DV) analyzed here is the percentage of major industrial permits issued in the state with WET requirements.

These capacity based models of state policymaking processes relating to WET do not perform as predicted. While neither model does a particularly good job of explaining overall variation in their respective dependent variables, the model explaining variation in WET requirement utilization in major industrial permits shows slightly better predictive characteristics than the model explaining variations in WET requirement usage across all major permits – explaining 12%, as opposed to 9.6%, of the variance in the dependent variable. However, the performance of these models is not compelling, particularly when one accounts for the coefficients of the predictor variables in the two models.

In each of the two models, the signs of the predictor variables drawn from capacity based theories are once again in the wrong direction! The results suggest that the utilization of WET requirements in NPDES permits *decreases* with per capita income. They also suggest that the issuance of an NPDES permit by an environmental or natural resources agency is likely to *decrease* the proportion of WET permit requirements in the state for both all major dischargers and industrial dischargers, respectively. And finally, it also suggests that professionalized state legislatures tend to *reduce* the extent to which states use WET requirements.

While these are clearly not the results that existing capacity based explanations of state policy outputs would predict, it is useful – I think – to take pause and reflect upon the institutional variable a bit further. From a methodological point of view, the appropriate response to this a-theoretical set of results is probably to dismiss the results of the institutional variable as spurious and/or inconsequential. However, a review of past literature (Gormley, 1983, Petulla, 1987, Eisner, 2000) and a bit of further reflection suggests that there may be an alternative explanation. The theoretical expectation that environmental and natural resource agencies are likely to pursue environmental goals more rigorously than health agencies is grounded in the existence of institutional missions that are directly traceable to environmental quality and resource conservation, as opposed to human health. These theoretical expectations do not account for the specific nature of the dependent variable being explained, however. In this particular case, the dependent variable – the proportion of major permits incorporating WET requirements – has foundations in scientific methodologies that are common in the health field. Whole

Effluent Toxicity (WET) estimates the mortality of indicator organisms in a manner that is similar to indicators used in health-related studies, and may therefore seem familiar and appropriate to professionals in the health field – more so than might be the case for environmental engineers and chemists who have traditionally played important roles in environmental organizations. Consequently, it seems appropriate to hold open the possibility that the relatively strong performance of the institutional capacity variable here is not spurious, but may reflect a true measure of capacity – one that relates to the policy instrument being utilized rather than the overall mission of the agency.

However, even this somewhat generous interpretation of the results for the administrative form variable does not erase the fact that capacity based theories do not appear to provide very good explanations for variation in the use of WET requirements among the states. With this thought in mind, let us now turn to an evaluation of a third major theory of state policymaking – that relating to the strength of groups in the policymaking process.

13.1.3. The Group Based Model:

For many years, scholars of government and politics generally, and state policymaking in particular, have argued that state policy outputs can be explained through pluralistic conceptions that are based on the influence of groups in the policymaking process. In water pollution policy, the most prevalent groups are polluting enterprises that have a vested interest in using surface waters as receptacles for waste and environmental groups that seek the opposite outcome. According to expectations drawn from this model of the state policymaking process, we should see fewer NPDES permits with WET requirements in states with strong polluting interests, and more NPDES permits with WET requirements in states with strong environmental groups. We would also expect to see increased usage of WET requirements in states with strong tourism industries because tourism often relies on good water quality for its economic viability and may therefore seek more stringent point source controls.

The OLS regression model results shown in Table 13-3 seek to explain variations in the use of WET requirements as outgrowths of these group based variables. The dependent variables in the models are again the proportion of permits in the state that include WET requirements for all major permits and major industrial permits, respectively. The independent variables used measure environmental group strength in terms of the proportion of the state population that has joined the National Wildlife Federation, while the measure of polluting industry strength is the proportion of the state's economy that is devoted to manufacturing [5]**.** The tourism variable is measured in terms of state tourism related expenditures as a percentage of Gross State Product. Once again, each of these variables is described further in the Appendix.

Table 13-3 - Explaining Whole Effluent Toxicity (WET) Requirements in State Water Pollution Permits: Statistical Evaluation of the "Group Based" Model

Authorized States Only

Variable	**DV=Major Permits*: Coefficients (SE)**	**DV=Major Permits*: Beta**	**DV=Major Permits*: Significance**	**DV=Major *Industrial* Permits**: Coefficients (SE)**	**DV=Major *Industrial* Permits**: Beta**	**DV=Major *Industrial* Permits**: Significance**
% Federal Land	-.117 (.391)	-.055	.766	4.609E-02 (.384)	.022	.905
Environmental Group Strength	-7.271 (3.389)	-.322	.038	-7.791 (3.324)	-.345	.024
Polluting Industry Strength %GSP = Man.	-152.329*** (96.446)	-.278	.122***	- 181.349**** (94.587)	-.331	.063****
Tourism - % of GSP	-86.546 (151.909)	-.114	.572	-146.313 (148.980)	-.193	.332
	Adj. R2 = .051			Adj. R2 = .088		
	F = 1.581	F Sig = .198		F = 2.037	F Sig = .108	

* The Dependent Variable (DV) analyzed here is the percentage of all major permits issued in the state with WET requirements.
** The Dependent Variable (DV) analyzed here is the percentage of major industrial permits issued in the state with WET requirements.
*** Statistically Significant at the .10 level (one tailed test).
**** Statistically Significant at the .05 level (one tailed test).

Overall, like the two previous models of state policymaking, the group-based model does not perform particularly well. The model focusing on all major NDPES permits explains about 5% of the variation in WET usage, while the model focusing on major industrial permits explains about 9% of the variance. The explanatory variables drawn from group based theories of state policymaking perform similarly in both models, with one variable operating in the predicted direction and the other two variables operating in a direction that is opposite of expectations. Perhaps ironically, this relatively lackluster performance might be viewed as a slight improvement on the two previous models, neither of which included a single variable that operated in the directions predicted by dominant theories of state policymaking.

The results of the group based model presented above suggest that strong environmental groups, strong tourism industries, and strong polluting industries all tend to depress the use of WET requirements in NPDES permits issued by authorized states. While the results for the environmental group strength and tourism industry strength measures are the opposite of our expectations, the results for the polluting industry strength variable are consistent with theoretical expectations about industry capture. Indeed, for both versions of the dependent variable, the industry strength variable appears as statistically significant according to one-tailed test criteria. This result for the industry strength variable seems to give reason for some concern about industry capture of the permitting process, but it is too weak to justify strong conclusions in this regard – particularly given the weak performance of this variable in the integrated model presented later in this chapter.

The dominant conclusion from the analyses presented above is that traditional theories of state policymaking do not do a very good job of explaining variation in state use of WET requirements in NPDES permits, although evidence drawn from group based theories reminds us of potential concerns about industry capture of the regulatory process. For this reason alone, it seems appropriate to look for alternative explanations. Because of the rather strong oversight authorities granted to EPA over point source permitting in the FWPCA, it seems appropriate to look for an alternative explanation that is based on EPA oversight and involvement with state permitting programs.

13.1.4. Federal Influence on NPDES Permit Restrictiveness:

In the FWPCA, Congress granted to the EPA rather strong tools of influence over state policymaking in relation to point source discharges. In addition to direct permitting authority in all 50 states, the EPA has authority to authorize state programs to issue their own permits, withdraw State authorizations for non-compliance with the Act, and veto individual permits. As was noted previously, these processes are spelled out in some detail in federal regulations (40 CFR Part 123). The authorization process that we focus on here involves state specification of its statutory authorities, NPDES permitting practices and resources, as well as significant review by EPA. It therefore presents a clear opportunity for federal influence on state NPDES permitting programs. After authorization, EPA still has the authority to influence state permitting practices through its permit veto powers and its ability to withdraw authorization, but these powers are exercised rather infrequently. Nevertheless, these latter authorities do provide the Agency with the leverage necessary to influence state permitting activities in significant ways when it chooses to do so.

The regression results shown in the table below test whether federal influence affects the extent to which states establish WET requirements in the major NPDES permits they issue, controlling for the proportion of land in the state owned by the federal government. It seeks to explain the proportion of major NPDES permits using WET requirements as a function of how recently the state received its NPDES authorization, operationalized as the number of months it took for the state to receive its NPDES authorization. It therefore seeks to measure the influence of the temporal proximity of the authorization process on the extent to which States include WET requirements in the permits they issue.

Table 13-4 - Explaining Whole Effluent Toxicity (WET) Requirements in State Water Pollution Permits: Statistical Evaluation of Federal Influence

Authorized States Only

Variable	DV=Major Permits*: Coefficients (SE)	DV=Major Permits*: Beta	DV=Major Permits*: Significance	DV=Major *Industrial* Permits**: Coefficients (SE)	DV=Major *Industrial* Permits**: Beta	DV=Major *Industrial* Permits**: Significance
% Federal Land	.134 (.288)	.063	.645	.236 (.291)	.110	.421
Federal Influence - Temporal Proximity of Authorization	.225***(.055)	.530	.000***	.220*** (.057)	.518	.000***
	Adj. R2 = .239			Adj. R2 =.227		
n = 44	F = 7.764		Sig = 001	F = 7.311		Sig = .001

* The Dependent Variable (DV) analyzed here is the percentage of all major permits issued in the state with WET requirements.
** The Dependent Variable (DV) analyzed here is the percentage of major industrial permits issued in the state with WET requirements.
*** Significant at the .001 level (one tailed test)

According to the results displayed, states that received their authorization to issue NPDES permits recently are more likely to have WET requirements in their NPDES permits than states that received their authorization many years ago. Indeed, this parsimonious model does a better job of explaining state WET requirement usage in major NPDES permits than any of the three entire models of state policymaking previously investigated. The federal influence variable is statistically significant at the .001 level in explaining the inclusion of WET requirements in both major permits generally and major industrial permits in particular. And the models as whole explain almost 24% and 23% of the variation in WET requirement usage in major permits and major industrial permits, respectively. Clearly, these results suggest that the extent of state use of WET requirements is responsive to the temporal proximity of the NPDES authorization process [6]. The control variable relating to the proportion of land in the state owned by the federal government does not perform well, and its sign is also in the wrong direction.

While these results suggest that federal influence is an important variable explaining the restrictiveness of WET controls used in state issued permits, it is clearly not a complete explanation. In an effort to improve upon this explanation it is therefore sensible to develop a more completely integrated model to explain the use of WET requirements in state issued NPDES permits.

13.1.5. An Integrated Model:

Given the results of the previous models, developing an integrated model to explain state use of WET requirements is both simple and not completely satisfying. While the federal influence model is the obvious beginning point, only two additional variables previously tested seem to warrant serious consideration for inclusion in an integrated explanatory model, along with the control variable for the proportion of land in the state owned by the federal government [7].

An obvious choice for consideration is the "capture" variable reflecting the strength of polluting industries that is tested in the group based model. This variable, operationalized as the percentage of Gross State Product (GSP) devoted to manufacturing, was statistically significant in the theoretically suggested direction in the group based model. A second choice for consideration is the institutional form of the state wastewater permitting agency. The capacity based model revealed a statistically significant *positive* relationship between permits issued by health agencies and the use of WET requirements in permits. While considering this variable for inclusion in the integrated model is suspect from a procedural perspective because the relationship operated in a direction that was opposite to the original theoretical expectations that gave rise to it, it does have clear theoretical foundations when one considers existing literature suggesting that there is a relationship between the professional and cultural orientations of government agencies and their policy choices (Gormley, 1983; Petulla, 1987; & Eisner, 2000). For this reason, I include it in an initial integrated model, even as I acknowledge that the process by which it is arrived at in this specification is a reason for skepticism regarding any potential result.

The results of this initial integrated model are displayed in Table 13-5 below. They again show clearly the impact of the federal influence variable relating to how recently the state received NPDES permitting authorization. These results are quite similar for both major permits generally and major industrial permits. By contrast, the industry strength variable does not perform particularly well in either model, and its effects basically disappear when one controls for federal influence and the institutional form of the permitting agency. The institutional form variable continues to perform rather well even after the introduction of controls for federal influence and industry strength, as the existence of the permitting authority in an environment or natural resource agency again appears to depress the use of WET requirements by about 50% for both major permits generally and major industrial permits in particular. Both models are statistically significant when viewed as a whole and explain between 35% and 40% of the variation in state use of WET requirements. Nevertheless, the poor performance of the industry strength variable when federal influence and institutional form are controlled suggests that a more parsimonious revised model should be considered. The continuing poor performance of the control variable also makes it a good candidate for exclusion in these revised models.

Table 13-5 - Explaining Whole Effluent Toxicity (WET) Requirements in State Water Pollution Permits: An Initial Integrated Model - Statistical Results

Authorized States Only

Variable	**DV=Major Permits*: Coefficients (SE)**	**DV=Major Permits*: Beta**	**DV=Major Permits*: Significance**	**DV=Major *Industrial* Permits**: Coefficients (SE)**	**DV=Major *Industrial* Permits**: Beta**	**DV=Major *Industrial* Permits**: Significance**
% Federal Land	.169 (.286)	.079	.557	.253 (.287)	.118	.383
Federal Influence – Temporal Proximity of Authorization	.260**** (.054)	.614	.000****	.254**** (.054)	.599	.000****
Health vs. Non-Health Agency	-51.084*** (16.251)	-.404	.003***	-51.640*** (16.304)	-.392	.004***
Industry Strength: % of GSP-Manufacturing	4.365 (74.876)	.008	.954	-8.422 (75.124)	-.015	.911
	Adj. R2 = .371			Adj. R2 = .368		
n = 44	F=7.351	Sig = 000		F=7.247	Sig = 000	

* The Dependent Variable (DV) analyzed here is the percentage of all major permits issued in the state with WET requirements.
** The Dependent Variable (DV) analyzed here is the percentage of major industrial permits issued in the state with WET requirements.
*** Statistically significant at the .01 level (two tailed test).
**** Statistically significant at the .001 level (one tailed test).

The revised models shown in Table 13-6 below improve upon the initial model, at least marginally. The models as a whole continue to be statistically significant and they also explain between 35% and 40% of the variation in WET requirement usage for both major permits generally and major industrial permits in particular. However, this same level of performance is achieved with two less variables, and the coefficients and their significance levels remain largely unaltered from the initial model. Consequently, it once again becomes clear that the industry strength variable adds little explanatory power to the model. Industry capture, it appears based on this analysis, does not seem to be a very important factor in explaining statistical variations in state use of WET requirements, when federal influence and the organizational form of the state implementing agencies are taken into account [8].

Table 13-6 - Explaining Whole Effluent Toxicity (WET) Requirements in State Water Pollution Permits: A Revised Integrated Model - Statistical Results

Authorized States Only

Variable	**DV=Major Permits*: Coefficients (SE)**	**DV=Major Permits*: Beta**	**DV=Major Permits*: Significance**	**DV=Major *Industrial* Permits**: Coefficients (SE)**	**DV=Major *Industrial* Permits**: Beta**	**DV=Major *Industrial* Permits**: Significance**
Federal Influence – Temporal Proximity to Authorization	.254**** (.051)	.610	.000	.247(.052)****	.582	.000
Health vs. Non-Health Agency	-50.492*** (15.283)	-.399	.002	-51.617*** (15.617)	-.408	.002
	Adj. R2 = .396			Adj. R2 = .382		
n = 44	F = 15.101		F = .000	F = 14.313		F = .000

* The Dependent Variable (DV) analyzed here is the percentage of all major permits issued in the state with WET requirements.
** The Dependent Variable (DV) analyzed here is the percentage of major industrial permits issued in the state with WET requirements.
*** = Statistically significant at the .01 level.
**** = Statistically significant at the .001 level.

What do these revised models suggest about the determinants of state NPDES permit restrictiveness as it relates to whole effluent toxicity? They suggest clearly that federal influence can matter when it is exerted, in this case in relation to the state authorization process. Conversely, however, the significant impacts of recent authorization processes also suggest – by implication – that EPA influence is not exerted consistently in the months and years after delegation has occurred. This suggestion is re-enforced by discussions conducted with water pollution policy professionals, as they mentioned that EPA oversight of state NPDES permitting programs has not been extensive in recent years. The model results also show that the health agency variable remains a rather strong predictor of the proportion of major permits with WET requirements, even after the effects of the federal influence variable are taken into account. As a result, this integrated model can be interpreted to suggest that the institutional orientations of the state agencies issuing NPDES permits affect the extent to which WET requirements are imposed, and that these institutional orientations relate not only to the strength of the Agency's commitment to environmental goals, but also to its receptiveness to particular kinds of policy instruments. The effects of institutional form (and the bureaucratic cultures that accompany them), it appears, may relate not only to mission orientation as is traditionally hypothesized, but also the choice of policy instruments as well [9] With these general results in mind, let us turn to an evaluation of the influence of traditional theories of state policymaking and top-down federal influence on the restrictiveness of permit requirements relating to conventional pollutants discharged by major municipal wastewater treatment plants.

13.2. Explaining Water Quality Based Permit Limits on Conventional Pollutants

Since the passage of the 1972 FWPCA, EPA and the states have been required to establish restrictive water quality based effluent limitations in cases where technology based standards are not sufficient to ensure the achievement of water quality standards. And, while the nature of water quality standards for toxic pollutants varies among the states, virtually all states have water quality standards in place for conventional pollutants like total suspended solids and dissolved oxygen. Consequently, unlike the WET requirements that have come of age only since the mid 1980's, requirements relating to the imposition of restrictive limitations on conventional pollutants in municipal permits have existed for three full decades.

As is clear from the data presented in Chapter 12, the states have varied substantially in the extent to which they have imposed restrictive effluent limitations for conventional pollutants on major municipal dischargers. This subsection uses a series of regression models to investigate likely sources of this variation. More specifically, the models investigate whether this variation is attributable to varying state needs and preferences as would be predicted by the responsiveness model, varying state economic and institutional capabilities as would be predicted by capacity based models, or variations in group strength as would be predicted by group based models of the state policymaking process. An effort is also made to explain state variations in the restrictiveness of conventional permit limits in terms of the federal influence variable that was found to be useful in explaining variations in WET requirements.

None of the analyses conducted provide complete and compelling explanations for the identified variations in major municipal permit restrictiveness. While the models provide some evidence that the political strength of larger municipal government lobbies and extent of water quality impairment in the states influences permit limitations for conventional pollutants, none of the theoretical approaches to state policymaking explains a high proportion of the identified variation in the restrictiveness of conventional permit requirements. The federal influence variable that was useful in explaining state variations in WET requirements is again a useful predictor of permit stringency; however, it does not appear to perform as well in explaining the restrictiveness of conventional pollutant permit limits as it does in explaining the use of WET requirements.

Thus, as was the case with the previous analysis of WET requirements, the overall picture of state NPDES permitting for major municipal dischargers created by the analyses that follow is one of a relatively insulated process, although in this case it appears to be affected by the political strength of regulated municipalities and the estimated extent of water quality impairment in the state, as well as top down bureaucratic influences. The following pages present the evidence that leads to these conclusions.

13.2.1. The Responsiveness Model:

Table 13-7 seeks to explain identified variations in the use of restrictive conventional pollutant limits in major municipal permits in terms of the variables that are predicted to be of importance by responsive models of state policymaking. The political culture, public opinion, and Democratic Party variables used are identical to the variables used in the previous analysis of WET requirements. The need variable here, however, differs because indicators of the severity of toxic pollutant discharges do not necessarily coincide with indicators of the water quality stresses created by large volumes of conventional pollutants emanating from municipal wastewater treatment plants. The need variable here, therefore, focuses on the extent to which the states reported water quality impairments and threats to water quality in their most recent water quality reports to EPA and is identical to the need variable used to predict NPS policy activism in Chapter 11 (USEPA, 2000A). All of the variables used in the model are explained more thoroughly in the Appendices.

Table 13-7 - Restrictiveness of Conventional Pollutant Limits in Major Municipal Permits: A Statistical Evaluation of the Responsiveness Model

Authorized States Only

Variable	Initial Model: Coefficient (SE)	Initial Model: Beta	Initial Model: Significance	Revised Model: Coefficient (SE)	Revised Model: Beta	Revised Model: Significance
% Federal Lands	5.506E-02 (.244)	.034	.823	--	--	--
Moralistic Culture	-20.323	-.313	.091	--	--	--
Traditional Culture	27.664 (12.382)	.413	.032	--	--	--
Public Opinion on the Environment	-22.192 (53.586)	-.066	.681	--	--	--
Democratic Party Control	-.759 (.576)	-.206	.196	--	--	--
Need – % of waters impaired	.603*** (.178)	.470	.002	.456 ** (.198)	.346	.027
	Adj. R2 = .333			Adj. R2 = .097		
N=41	F = 4.251	Sig.=.003		F = 5.318		Sig.=.027

** Statistically significant at the .05 level (one tailed test).
*** Statistically significant at the .01 level (one tailed test)

At first (cursory) glance, a number of the variables assessed appear to do a relatively good job of predicting the use of restrictive permit limits on conventional pollutants in major municipal permits. However, this is not actually the case because four of the five variables drawn from responsive theories of state policymaking have signs that do not operate in the predicted directions. The control variable relating to federal ownership of lands in the state is also misdirected. Thus, of all of the variables assessed in this model, only the one measuring the level of need in the state for stringent water quality controls operates in the predicted direction – and it is statistically significant at the .01 level. Substantively, this suggests that permit writers at the state level do appear to respond to the need for restrictive controls, even if they do not appear to respond to other forms of influence that are predicted to be important by responsive theories of the state policymaking process. This result is notable also in terms of the extant literature on the use of ex ante procedural control mechanisms (McCubbins, Noll, and Weingast, 1987 and 1989), because it suggests that the extensive procedural requirements imposed on the states as a part of their NPDES delegations do not ensure widespread responsiveness to preferences within the state. On the other hand, however, it also suggests that information on water quality threats and impairments is affecting permitting decisions for conventional pollutants – a result that is encouraging with regard to the long term prospects for policy devolution.

13.2.2. The Capacity Based Model:

Table 13-8 provides the results from a regression model designed to test the utility of capacity based theories of state policymaking in order to predict the extent to which states impose restrictive conventional permit limits on major municipal dischargers. The variables are the same as those used in the previous analysis of WET requirements, and reflect the wealth of the state, state legislative professionalism, and the institutional form of the permitting agency, respectively.

Table 13-8 - Restrictiveness of Conventional Pollutant Limits in Major Municipal Permits: A Statistical Evaluation of the Capacity Based Model

Authorized States Only

Variable	Coefficient (SE)	Beta	Significance
% Federal Land	-.216 (.265)	-.131	.421
Legislative Professionalism	-24.004 (42.115)	-.103	.572
Per Capita Income	-2.005E-03 (.002)	-.195	.226
Health vs. Non-Health Agency	10.844 (14.175)	.111	.486
	Adj. R2 = -.031		
N = 41	F = .703	Sig.= .595	

The model performs quite poorly. The model as a whole is not statistically significant, and it explains none of the identified variation in state use of restrictive permit limits. None of the variables are statistically significant, although the institutional form variable at least operates in the predicted direction – a contrast to the finding for WET requirements evaluated in the previous subsection. Once again, however, it seems that we need to look elsewhere for a satisfactory explanation of state variations in the restrictiveness of conventional pollutant permit limits for major municipal dischargers. Based on these results, the restrictiveness of conventional permit limits in major municipal permits do not appear to depend on traditional measures of state economic and institutional capacities.

13.2.3. The Group Based Model:

Table 13-9 evaluates expectations drawn from group based models of the state policymaking process. Like the previously evaluated group based models, it assesses the influence of environmental group strength, industry strength, and tourism, and also controls for the proportion of land in the state owned by the federal government. However, this model also adds an assessment of the political strength of major municipal dischargers in the state because the dependent variable focuses on this particular group of dischargers. A more detailed description of the specific measures used to represent all of these variables is provided in the Appendices.

Table 13-9 - Restrictiveness of Conventional Pollutant Limits in Major Municipal Permits: A Statistical Evaluation of the Group Based Model

Authorized States Only

Variable	Initial Model: Coefficient (SE)	Initial Model: Beta	Initial Model: Significance	Revised Model: Coefficient (SE)	Revised Model: Beta	Revised Model: Significance
% Federal Land	-7.110E-02 (.287)	-.043	.806	-.358*(.262)	-.217	.179*
Environmental Group Strength	-5.931 (2.540)	-.336	.025	--	--	--
Industry Strength	93.019 (72.416)	.215	.207	--	--	--
Local Government Strength	-978.297 ** (488.573)	-.299	.053	-1081.341** (519.093)	-.330	.044
Tourism Strength	-90.221 (110.111)	-.154	.418	--	--	--
	Adj. R2 = .222			Adj. R2 = .07		
N = 41	F = 3.285		Sig=.016	F=2.513		Sig=.094

* Statistically significant at the .10 level (one tailed test).
** Statistically significant at the .05 level (one tailed test).

In purely statistical terms, the group based model appears – at first blush – to be a substantial improvement over the capacity based model. However, as was the case with the responsive model, the statistical results become less impressive when one views the results through the lenses of the theoretical expectations that gave rise to them. Three of the four variables drawn from group based theories have signs that are opposite of our theoretical expectations. The environmental group strength measure, for example, predicts that the proportion of restrictive permits issued in the state will *decrease* as the strength of environmental groups in the state *increases*! Similarly, the tourism variable predicts that the proportion of restrictive permits issued will *decrease* as the importance of the tourism industry *increases*. And, the industry strength variable, by contrast, predicts an *increase* in the proportion of restrictive permits issued as the strength of industry *increases*. All of these results, of course, are a-theoretical.

By contrast, the local government strength variable and the control variable for the percentage of land in the state owned by the federal government both operate as expected. The local government strength variable predicts that increases in local government strength will be accompanied by decreases in the proportion of major permits subject to restrictive permit limits, and it is statistically significant at the .05 level. The control variable also predicts that increases in the proportion of land in the state that is owned by the federal government will be associated with decreases in the proportion of major municipal permits that are more restrictive than traditional secondary treatment limits, but it is not statistically significant.

Both of the municipal strength variable and the control variable are retained in a revised group based model of the NPDES permitting process for major municipal dischargers. This revised model suggests that major municipal dischargers exert an influence that reduces the likelihood that they will be required to achieve levels of treatment that exceed traditional secondary treatment limits (eg. the technology based limits discussed in Chapter 12) if they are numerous in proportion to the population of the state, and therefore are likely to be relatively powerful in the political process. While these effects do not appear to be overwhelming, they are noteworthy because they suggest that there may be substantial influence applied by municipal dischargers during the permitting process – an occurrence that is potentially analogous to the capture concern as it has been applied to industrial polluters. However, even with this statistically significant effect, it is appropriate to note that the model as whole explains only about 7% of the variation in state use of restrictive conventional pollutant limits in major municipal permits. It is therefore appropriate to investigate other possible sources of variation in the dependent variable as well.

13.2.4. Federal Influence on NPDES Permit Restrictiveness:

Table 13-10 provides the results of a regression model designed to test the impact of federal influence during the NPDES authorization process on state use of restrictive requirements for conventional pollutants in major municipal permits, controlling for the proportion of land in the state that is owned by the federal government. It is a model that is analogous to the federal influence models used to explain variations in WET requirements in the previous subsection.

Table 13-10 - Restrictiveness of Conventional Pollutant Limits in Major Municipal Permits: A Statistical Evaluation of Federal Influence

Authorized States Only

Variable	**Initial Model: Coefficient (SE)**	**Initial Model: Beta**	**Initial Model: Significance**	**Revised Model: Coefficient (SE)**	**Revised Model: Beta**	**Revised Model: Significance**
% Federal Land	-.146 (.261)	-.088	.580	--	--	--
Federal Influence – Temporal Proximity to Authorization	7.736E-02* (.052)	.237	.143*	8.196E-02	.251*	.113*
	Adj. R2 = .022			Adj.R2=.039		
N = 41	F = 1.447		Sig=.248	F=2.630		Sig=.113

* Statistically Significant at the .10 level (one tailed test).

Like the previously presented models of federal influence on permit restrictiveness relating to WET, this model suggests that states with recent NPDES authorizations are more likely to impose restrictive limits on conventional pollutants in major municipal permits than states that received their NPDES authorizations many years ago. However, in this case, the influence of the authorization process appears to be less pronounced, as the federal influence variable is statistically significant only according to a rather lenient criterion for statistical significance – a one tailed test at the .10 level. Nevertheless, the results are consistent with the earlier finding relating to WET permit restrictiveness, and they therefore provide further evidence confirming the influence of the authorization process on NPDES permit restrictiveness. The control variable in this model is directed as predicted, but it is not statistically significant in a revised model and is omitted in the final specification presented. In the end, the model shown here is not a complete one, and this suggests that it is appropriate once again to evaluate a more fully specified integrated model.

13.2.5. An Integrated Model:

As with the previously developed integrated model for explaining the prevalence of WET requirements in state issued permits, specifying an integrated model to explain the prevalence of restrictive limits relating to conventional pollutants in major municipal permits is at once simple and not fully satisfying. Four variables from the previous analyses appear to be appropriate candidates for inclusion in the model. They are the need (problem severity), strength of local governments (the "municipal capture" variable), the federal influence, and the control variables, all of which displayed at least some form of explanatory power in the previously presented models. Table 13-11 below presents the results of an integrated model comprised of these four variables.

The results of this model are the strongest ones yet in terms of their ability to explain state level variations in the restrictiveness of conventional pollutant limits in major municipal permits in theoretically coherent fashion. The model explains about 22% of the variation in state permit restrictiveness relating to conventional pollutants – a significant improvement over the previous models, at least when concerns relating to theoretical coherence are taken into account. In addition, all of the variables – with the exception of the control variable – are statistically significant in the predicted directions [10].

Table 13-11 - Restrictiveness of Conventional Pollutant Limits in Major Municipal Permits: An Integrated Model

Authorized States Only

Variable	Initial Model: Coefficient (SE)	Initial Model: Beta	Initial Model: Significance	Revised Model: Coefficient (SE)	Revised Model: Beta	Revised Model: Significance
% Federal Land	-.238 (.243)	-.145	.334	--	--	--
Need - % of Waters Impaired	.375** (.187)	.285	.053	.401** (.185)	.304	.037
Federal Influence – Temporal Proximity to Authorization	.113 (.05)**	.348	.028	.102** (.048)	.314	.038
Local Government Strength	-1188.672 (497.124)**	-.363	.022	-1123.664** (.475.606)	-.343	.024
	Adj. R2 = .218			Adj.R2=.219		
N = 41	F = 3.783		Sig=.011	F=4.729		Sig=.007

** Statistically significant at the .05 level, one tailed test.

State permit restrictiveness relating to conventional pollutant limits for major municipal dischargers, it appears, can be viewed (at least partially) as a function of need, federal influence, and the political strength of local governments in the state political system. Furthermore, as with the WET analyses presented earlier, this model suggests that state decision-making regarding permit restrictiveness is a relatively insulated process involving bureaucratic actors. However, in this case, the models also suggest the existence of notable influences by those with an interest in the specific permits being issued – conditions that provide potential reason for concern about bureaucratic capture. In this case, though, the capture related concern focuses on the influence of larger public bodies – larger municipal governments, rather than industrial polluters. At the same time, however, the results here suggest that this insulation is also accompanied by the application of appropriate technical expertise, as the need variable appears to explain significant portions of the variation in the aggressiveness of state water pollution control efforts. In making these statements though, it is important to keep in mind that this model remains underspecified and the explanations it provides are still not complete.

13.3. Summary and Implications

What are the implications of these analyses of state implementation of the NPDES permitting program for Congressional control of the policymaking process and the devolution of powers from the federal government to the states? The analyses in Chapter 12 revealed that states have complied with many of Congress's procedural directions, but they also provided evidence of large variations in the restrictiveness of NPDES permits. In this chapter, we have had difficulty explaining this variation in permit restrictiveness using traditional theories of state policymaking, although we did find some evidence of state sensitivity to the severity of water pollution problems and legitimate concerns about capture for conventional pollutant limits applicable to larger municipal dischargers. Importantly, we also find that patterns of federal oversight of state programs appear to provide at least a partial explanation for the variations uncovered in both toxic and conventional pollutant limits. In the end, therefore, the insights drawn from this work for both Congressional influence on policy implementation and further policy devolution are nuanced, rather than obvious, and they suggest a need for further research – particularly research relating to the top-down federal-state policy dynamics.

The analyses presented in Chapter 12 found substantial levels of procedural compliance in point source permitting, but they also uncovered clear evidence of its limits – many of which appear to be grounded in resource constraints. Procedurally, most states now have authority to issue NPDES permits within their jurisdiction, and – as the FWPCA requires – they have issued tens of thousands of these permits to dischargers around the country. These are important tests of state compliance with Congress's wishes, and the vast majority of states – 44 of them, to be exact – have now met these tests. However, a handful of states continue to abdicate their roles under the Act by leaving NPDES permit issuance responsibilities to EPA, and the slow response of some states in seeking additional NPDES related authorities (Pretreatment, Federal Facilities, Bio-solids) makes it clear that state acceptance of roles defined for them by Congress – while common – is not automatic.

The recent "GAP" analyses of the funding levels needed for full implementation of the FWPCA suggest that resource limitations play a significant role in deterring full state involvement in the permitting process (ASIWPCA, 2002), and this point was re-enforced recently by one regulator from a state without NPDES authorization who pointed out to the author that his state had refrained from obtaining NPDES authorization because of the costs involved in taking on these additional responsibilities. We also see significant and continuing NPDES permit backlogs, and these backlogs re-enforce this same point. Even procedural requirements are not self executing at the state level – particularly when the resources devoted to the task are limited in relation to the goals being pursued.

Significantly, the analyses in Chapter 12 also uncover limits on the efficacy of Congressional direction with regard to the restrictiveness of NPDES permits. The high levels of variation in permit restrictiveness relating to both WET and conventional pollutants suggest that a number of states are not aggressively pursuing the FWPCA's zero discharge goal. The analyses in this Chapter (13) provide evidence that EPA influence *can* influence state permitting policy, even though it also suggests implicitly that *strong federal influence is not exercised much of the time.* States that have recently received delegated NPDES authority from EPA appear to respond to Agency wishes to at least some degree, but states that received their NPDES authorities long ago seem to operate their permitting programs largely under the federal radar screen. The most powerful explanatory variable predicting the use of whole effluent toxicity (WET) limits in state permits is the temporal proximity of the federal decision to authorize a state to issue NPDES permits. This form of federal influence is also a useful predictor of the extent to which states issue restrictive permit limits covering conventional pollutants – although the predictive power of the variable in this case does not appear to be as pronounced as it is for WET.

While minimalist nature of EPA oversight is clearly related to resource limitations, it may also traceable to a lack of easy access to needed information on ambient water quality. For example, the difference in the likely impact of federal influence on WET vs. conventional pollutants makes sense when one considers the informational complexities involved in establishing water quality based permits limits for conventional pollutants and compares it to the complexities involved with including WET requirements in an NPDES permit. In the latter case, WET monitoring requirements need only be incorporated in the permit along with some form of reasonable justification and a trigger for further action if effluent toxicity is uncovered. In the former case relating to conventional pollutants, the imposition of stringent permit limits generally requires defensible analyses of receiving water flows, ambient concentrations of the pollutants of concern, and estimates of the expected pollutant loadings involved. In spite of EPA guidance recommending that these steps be taken, resource limitations at EPA (and probably in the states as well) appear to limit the extent to which it can accurately determine when these more restrictive conventional permit limits are needed on a reliable and ongoing basis.

This lack of sufficient information, of course, will impose constraints on EPA's ability to both issue restrictive limits in un-authorized states and carry out effective oversight of authorized state programs – even shortly after the point of state authorization. In this context, it is not surprising that the data uncovered here suggests that the states are more likely to impose restrictive limits than is EPA. As a national regulatory agency, EPA is farther from day to day water quality problems and does not have significant and ongoing ambient water quality monitoring responsibilities. As a result, the Agency may find it more expensive and difficult to collect the necessary data for stringent water quality based effluent limits than do the states. Consequently, it appears that a combination of significant site specific variations in technical circumstances and constraints relating to resources and EPA monitoring information are likely explanations for why EPA makes less use of water quality based effluent limits for conventional pollutants in major municipal permits than do the states.

The overall results here therefore suggest that there are windows of time in which EPA – acting in furtherance of Congress's expressed statutory wishes – can influence the content of state permits. However, this very same analysis makes it clear that federal influence operates only periodically, and it also suggests that oversight may vary in effectiveness depending on the site specific complexity of the decisions to be influenced. The former insight was confirmed during discussions conducted with a water pollution professional who suggested to the author that ongoing oversight of state programs was not the Agency's highest priority – particularly in recent years since the "devolution revolution." The validity of this latter insight, by contrast, is evidenced by the continuing problems that have confronted EPA as it has sought to prompt states to undertake active efforts to develop TMDLs – a technically complex process that requires substantial amounts of site specific data and information. Congressional control through top down agency oversight of state programs therefore appears to be possible, even though it is not currently particularly prevalent or – perhaps – very effective in predictable ways for highly complex site specific problems.

What does this all mean for the appropriateness of further devolution of federal powers to the states in point source water pollution control? Unfortunately, the answer to this question is not entirely clear. Existing theories of state policymaking across the board seem to be relatively weak predictors of state permit restrictiveness, and they provide mixed signals regarding the appropriateness of future of policy devolution in water pollution control policy. The finding of a relationship between need (problem severity) and increased permit restrictiveness relating to conventional pollutants suggests that states can respond to problems within their jurisdictions, and this finding can be interpreted to provide support for devolution. However, our failure to find a similar relationship in the case of WET raises questions about the frequency with which this kind of response occurs and we find sufficient evidence of capture related concerns to suggest that caution be exercised in reference to further insulation of NPDES permitting processes as could occur through further policy devolution. In the end, therefore, the evidence relating to the importance of broad vs. narrow influences on state permit restrictiveness uncovered in this analysis is not overwhelming, and cannot – in my view – be used unconditionally to support either massive devolution or unbridled re-centralization of NPDES permitting authority within EPA.

One can, however, glean from these results some nuanced insights that may be useful to debates about policy devolution and federal and state roles in point source water pollution control. The most important variables in determining permit restrictiveness identified in this analysis appear to comprise what might be viewed as a combination of Sanford's picket fence federalism (Sanford, 1967) and Gormley's "boardroom politics" (Gormley, 1986). As noted above, we see evidence of federal influence in the use of WET requirements, and – to a somewhat lesser extent – in the use of restrictive conventional pollutant limits as well. And, while the evidence is not strong across the board, there also appears to be some reason for concern about the influence of larger municipalities in the permitting process and – simultaneously – reasons for optimism about the ability of state permitting professionals to take account of need in establishing conventional permit limits. There are also results that are at least consistent with culturally based theories of institutional receptiveness to differing kinds of policy tools – a form of picket fence of influence if you will, or at least conditions that provide strong potential for it.

Consequently, the results revealed in this analysis are consistent with the suggestion that the NPDES permitting remains a rather insulated process that responds to the preferences of a relatively small set of actors, in spite of extensive ex ante *procedural* mechanisms provided by Congress to ensure continuing fidelity to the water quality goals of the Act. With the exception of the findings related to the need variable above, none of the public preference related variables drawn from the responsiveness model of state policymaking shows any effect on permit restrictiveness. Environmental groups representing diffuse interests may sue based on procedural requirements, but they apparently cannot sue in large enough numbers to effectively influence the content of the many permits issued in each state. Procedural controls do enable important means of recourse in particular cases, but they do not appear to enable patterns of broad participation across the board.

These insights are important because they suggest that we may want to think further about how to open up the NPDES permitting process, while simultaneously maintaining its ability to respond in technically sensible ways to variations in problem situations. Procedural requirements alone, it appears, do not constitute sufficient means for overcoming the insulated character of the NPDES regulatory process because the NPDES permitting process already includes numerous procedural requirements (see 40 CFR Part 124) and we still see little evidence that broad statewide preferences influence the permitting process. Another approach to address this broad concern is to call for substantial increases in resources, so that more effective implementation and oversight can actually occur. While this is probably part of the solution, it may not be a realistic approach because of the proliferation of under-funded “fence posts” [11] that already proliferate in US water quality policy and the remoteness of the chance that even substantial funding increases would be sufficient to do the job overseeing each of these fence-posts.

The ultimate insight to be contributed here with regard to federal and state roles and policy devolution, therefore, may be that EPA has an important potential role to play in fostering *more open* water quality permitting processes *at the state level*, and in ensuring that these processes benefit from an abundance of high quality information. Water quality problems do have strong site specific components, and there is – in many cases – good reason to leave decision-making authority at levels where site specific factors can best be taken into consideration. What is needed is the availability of abundant and high quality information, and current EPA oversight efforts do not yet fully address this concern. While procedural requirements facilitate opportunities to redress grievances in particular cases, they are not designed to foster reasoned policy development or broad based participation. More aggressive support (and even requirements) relating to water quality monitoring and reporting, accompanied by the addition of new and strong support structures for participation (Epp, 1998), may be necessary if these goals are to be achieved. EPA may want to keep a “gorilla in the closet” to oversee these processes, but it can also do more to foster informed decision making by a wide range of interested parties at the state level. The current TMDL process seems ill suited to this purpose, and Congressional intervention is clearly needed to bring about changes in this process.

13.4. Conclusion

In conclusion, it is appropriate to observe that the forgoing analyses of point source water pollution regulation reveal a pattern of relatively high levels of procedural compliance with Congress’s directives, along with very significant state level variations in substantive compliance. In many respects, this pattern is similar to the pattern uncovered in the analysis of non-point source water pollution policy activism, where all fifty states conducted the required assessment and management planning activities but were highly variable in the extent to which they implemented active programs according to more substantive criteria. Only in the point source case, the command and control regulatory structure of the NPDES program appears to have made procedural compliance less complete – probably because the procedural requirements themselves are far more pervasive. It is, after-all, more difficult to ensure compliance with hundreds of pages of required regulatory processes than it is to comply with a simple statutory requirement or two. Nevertheless, in spite of some continued state reluctance to seek federal NPDES authorization and the existence of a continuing permit backlog problem, the issuance of permits restricting discharges at the state level is the rule rather than the exception. The states are therefore doing what Congress has asked of them procedurally in a crude, but fundamentally important way.

However, it is also appropriate to emphasize that we encounter a level of variability in permit restrictiveness that appears to be quite large, as was the case in the analysis of state NPS policy activism. One important thing that does differ in the two cases, however, is the manner in which the states comprise that variation. Indeed, with only a couple of notable exceptions – New Jersey and Florida, the states with the most active non-point source water pollution programs *are often not* the ones found here to be most restrictive in their permit requirements. One sees, for example, statistically significant negative correlations between NPS activism and the use of WET requirements [12] and no correlation at all between state NPS policy activism and NPDES permit restrictiveness for conventional pollutant requirements applicable to municipal dischargers.

These relationships suggest that the policy dynamics underlying state policymaking in point source and non-point source water pollution control are quite different from one another. While one obvious component of this difference is the relative insulation of the bureaucratic decision-making process applicable to point source permitting from electoral bodies, another related consideration appears to be the relatively strong oversight tools available to EPA for oversight of the NPDES permitting process across the states. A number of laggard states in NPS water pollution policy activism appear to be issuing rather restrictive controls in NPDES permits as a result of pressures applied by EPA during the authorization process. Conversely, however, it also appears that some leading states in terms of NPS policy activism are resisting the commitment of resources and attention to increasing NPDES permit restrictiveness, perhaps in favor of pursuing more active efforts to control the non-point source pollutant releases that now comprise a majority of the nation's water quality problems. Consequently, it appears that the current federal statutory structure established by Congress may force action in recalcitrant states, while also supporting an unhealthy balance of emphasis between point and non point sources of water pollution across the states generally.

This latter insight suggests a final conclusion to be emphasized here, and it relates to the need for further research relating to the form and nature of federal oversight of state programs. While these analyses of state NPS policy activism enabled us to build reasonably robust models of the non-point source water pollution policy process, this was not the case for NPDES permit restrictiveness. Here, our state policymaking theories did not perform as well in explaining variable policy outputs, and the sea of variables relating to top down policy influence and implementation makes the job of understanding this influence quite difficult. Despite the difficulty of the task, however, we must recognize that improving our understanding of these processes of hierarchal influence is important not only to the problem of Congressional control, but also to the overall process of policy implementation and state policymaking in federal system. This chapter provides an important start by demonstrating that wide variations in substantive state policy outputs occur even under preemptive policy structures in which ex ante procedural controls are strong. And, similarly, it also points out that strong top-down controls can influence state policy outputs even as preemptive structures may also foster the insulation of these policy processes from public preferences. However, more analytical and empirical work is necessary if we are to arrive at a more complete understanding.

14. CONCLUSION

Several years ago, the Brookings Institution released a study ranking the greatest achievements of American government in the latter half of the 20th century (Light, 2000). Based on a survey of 450 historians and political scientists, Paul Light and his colleagues rated the improvement of water quality the 11th greatest government achievement of the second half of the twentieth century (Light, 2000, p. 4). Notably, the problems of reducing disease and ensuring safe food and water were rated 4th and 6th greatest government achievements, respectively. Quite arguably, improving water quality was an important factor in the successes achieved in both of these areas as well, so the number eleven ranking probably understates the importance of our nation's water pollution control achievements. The point here is that water pollution control is a fundamentally important policy area in the United States, and it is one in which we have achieved a substantial degree of success over the last half century.

The overview of water pollution policy in the United States provided in Part I, and the analyses presented in Parts II and III, offer additional evidence supporting this broad conclusion, even as they also point to policy implementation difficulties and the existence of important and continuing water pollution problems. During the latter half of the 20th century, we have seen successful efforts to reduce pollutant loadings to the nation's waters, even as we have simultaneously failed to achieve the Federal Water Pollution Control Act's (FWPCA) ambitious policy goals. The analyses presented in this work suggest that this state of affairs is largely the product of Congress's statutory directions, and the ongoing efforts of federal and state administrators to comply with them. At the same time, the analyses point out that instances of failed and problematic implementation of Congress's statutory instructions do occur, and that states vary significantly in their substantive effort to develop aggressive water pollution control programs. In short, the analyses here suggest that we have neither runaway bureaucracy nor Congressional control. Rather, we have a far more complex process that involves both institutionalized directions from Congress and disturbance factors that disrupt the implementation process from multiple directions.

A number of more specific conclusions can also be drawn from this work, however, and this final chapter seeks to highlight some of the most important of them. We will proceed here in several steps. First, we will summarize major findings of this work both broadly speaking and in reference to the three major hypotheses that have guided this research. Then, we turn to the implications of these findings for the scholarly literature and further research. And finally, we conclude with some thoughts regarding federal water pollution policy and the devolution of policymaking authorities to the states in this important policy area.

14.1. Findings

Recent scholarly work on Congressional control of bureaucracy, policy implementation, and state policymaking has improved our understanding of American policymaking processes in many ways. However, it has often overlooked a fundamental fact. Overhead conceptions of democracy that are predicated on control of administrative decision-making by elected officials require not only short-term responsiveness committee views and oversight efforts, but also fidelity to laws passed by Congress during policy implementation at both the federal and state levels. If our analyses of overhead democracy do not account for this process in systematic fashion, we miss much of what is important because we fail to assess whether federal and state agencies produce the kinds of outputs that they are directed to produce by statute. And indeed, a review of the scholarly literature over the last couple of decades has revealed only minimal work in this area.

The clearest finding growing from this work is that Congress matters, and it matters in much the same way that the Framers originally envisioned when they established our institutions of governance. Congress matters because it enacts laws that authorize, fund, and guide the actions of government, and – through judicial interpretation and aggressive 20th century federal policy initiatives – this guiding function of federal law has been extended to state as well as federal government actions. The Constitution grants to Congress the power to make laws, and it is the job of public administrators to implement these laws.

Over the last fifty-five years, Congress has provided three broad sets of policy directions for administrative implementation. These three sets of directions, or eras of U.S. water pollution control policy, started in 1948 with supportive efforts to build state programs. These supportive efforts were followed in the early 1970's by a highly directive preemptive era in which the federal government played a very strong and directive role vis a vis state water pollution programs in the development and implementation of US water pollution control policy. And then, starting in the late 1980's, legislative direction changed once again, as Congress began to play a more reactive role in responding to administrative experiments carried out by EPA and the states. While these changes in Congressional policy direction reflected differing mixes of political influence involving the states themselves and various functional interests over time, the analyses here suggest that both the federal government and the states generally sought to comply with Congress's directions after they were enacted into law.

Over time, these efforts to implement Congress's enacted laws have become foundations for institutionalized practices that guide the policymaking behaviors of government. In this regard, it becomes clear that governance in America is not fundamentally a principal-agent relationship. There are just too many principals and too many agents involved to rely solely on that kind of analytical focus and expect to come to a realistic understanding of what is happening. Rather, governance in America is best viewed as a political process that (sometimes) responds to problems and processes conflicts, and then produces laws that guide administrative policymaking efforts to deal with them. This lawmaking power, more than any other, gives Congress the ability to steer the procedures and outputs of government. And it is this ability to "steer" that is most important to our ability to address important public policy concerns and respond to democratic influences over the long term.

While it is common in the scholarly literature to focus on failures to achieve legislatively stated policy goals and outcomes, far less attention is paid to determining whether governments actually produce the specific policy outputs that are called for in statute. This latter question is important, however, because it enables a more specific outline of what happens during the implementation process after laws are made. While the relationship between Congress's desired policy outputs and their impacts and outcomes is an important one, it is not the central focus of this study. Rather, the focus here has been on the investigation of three hypotheses relating to Congress's statutory directions and the extent to which they actually lead to desired policy outputs at the federal and state levels of government. In each case, these hypotheses are grounded in expectations drawn from basic precepts of institutional theory (Weber, 1922; March & Olsen, 1984; Peters, 1999).

These precepts suggest that when Congress passes laws, administering agencies tend to implement them in ways that form ongoing institutional patterns of compliance. The specific hypotheses investigated are therefore as follows:

> H 1: Substantive statutory direction from Congress structures the extent and nature of federal involvement in surface water pollution control policymaking and implementation.
>
> H 2: The extent and nature of federal policy direction affects state surface water pollution policy outputs.
>
> H 3: State water policy outputs are more likely to be responsive to broad based state level influences when federal involvement is minimal than when it is extensive.

Broadly speaking, the analyses presented in this work find that federal agencies and state governments have generally responded to Congress's directions, even though there have been some clear lapses at the federal level and state implementation has been incomplete and uneven.

We have also sought to investigate the extent and causes of state policy variations, and whether the nature Congress's statutory directions appears to affect them. In this regard, we find a tendency toward state level compliance with Congress's procedural directions under both supportive and preemptive federal policy designs, accompanied by very wide variations in goal-oriented compliance in both cases as well – a finding is consistent with recently expressed concerns about variable state capacities (Rabe, 2000). We also find evidence suggesting that the more intrusive federal involvement used in preemptive policy designs may limit the extent to which public opinion influences state policy outputs, even as it also appears to enable responsiveness to variable levels of problem severity in the case of NPDES permit limits on conventional pollutants. At the same time, however, under the supportive policy design used for non point sources, public preferences and practices do not appear to have as large direct effects on state policy variations as either state capacities or group dynamics. These general conclusions are accompanied by evidence suggesting that current forms of federal intervention are generally biased toward addressing point source problems, and this appears to contribute to resource misallocation because non-point sources now comprise a larger proportion of our nation's water pollution problems than point sources.

The ironic result is an argument for federal intervention that is grounded in the existence of wide variations in policies that do not appear to be *direct* results of either varying public preferences or varying degrees in the severity of water pollution problems, accompanied by reasonably significant deficiencies in current forms of federal involvement. In other words, federal policy intervention does seem to be appropriate in this policy area, even if the current forms of this intervention do not appear to be working as we would hope. We will return to this point at the end of this chapter.

In the meantime, however, the following discussion outlines specific findings relating to each of the hypotheses guiding this research. It is then followed by a discussion of the implications of these findings for the scholarly literatures relating to Congressional control of bureaucracy, policy implementation, and federal influences on state policymaking.

14.1.1. Hypothesis 1: Congressional Direction and Federal Policymaking:

The evidence presented in this work suggests clearly that Congress's substantive statutory directions affect the extent and nature of federal involvement in water pollution control policymaking and implementation. This is consistent with hypothesis 1, and is evident from the historical analyses conducted in Part II, as well as the investigations of non-point source and point source water pollution control programs in Part III.

The historical analyses found that federal administrative agencies substantially complied with 22 of 25 selected major water pollution policy changes in the post war era (88%). Only the 1948 Wastewater Loan program, the Enforcement Conferences authorized by the 1948 Act, and the 1972 Total Maximum Daily Load Program appeared as cases where federal implementation efforts were non-compliant with

Congress's statutory wishes. Over time, therefore, it seems clear that major policy changes made by Congress in statute influenced the policymaking actions of federal agencies in predictable ways in the vast majority of cases. And this statement holds true across both time and policy type. Substantive compliance rates exceeded 75% for all three major water pollution policymaking eras in the post war period, as the supportive (78%), pre-emptive (89%), and experimental eras (100%) all experienced high rates of substantive compliance. Likewise, the federal agencies involved seemed equally inclined to implement policies that were supportive and directive in nature, as substantial compliance rates for these two broad categories of policies were 88% and 89%, respectively.

Before one becomes too giddy about administrative compliance with Congress's statutory directions, however, it is important to emphasize several clear caveats to the relatively "good news" presented above --- at least it is good news as defined by traditional overhead conceptions of the democratic process. The historical analyses presented also reveal significant difficulties in over a third of the cases of substantially compliant policy implementation, evidence of bureaucratic overload involving highly directive policies established during the pre-emptive era, and an apparently inverse relationship between rates of substantial compliance and actual policy impact. At the same time, the cross-sectional analyses presented in Part III suggest that procedural compliance may be easier to achieve than substantive forms of compliance in water pollution control -- perhaps because the magnitude of change sought after in the two cases differs. These important caveats will now be discussed in more detail.

While federal agencies did implement most of the major statutory policy changes enacted by Congress during the post World War II era, implementation difficulties were apparent in a number of cases. Overall, thirty-six percent (8 of 22) of the selected major policy changes implemented by federal agencies involved substantial implementation difficulties, and these difficulties often materialized in the form of significant delays and controversies during the implementation process. The major policy changes experiencing these kinds of problems included: 1) the complex enforcement procedures and the water quality standards requirements of the supportive era; 2) the technology-based effluent standards, the planning requirements, enforcement provisions, water quality based permitting provisions, and construction grants program in the pre-emptive era; 3) and the storm-water provisions and strategic management provisions in the experimental era.

While the specific sources of these implementation difficulties varied across the cases, they generally appear to have involved issues associated with insufficient resources, deficiencies in the structure of Congress's enacting statute, conflicts among key political principals at the federal level, and technical complexity. In most of these cases, however, Congress's passage of ex ante instructions has provided sufficient impetus for overcoming these difficulties over time because only 3 of the 25 major policy changes investigated involved implementation difficulties that were great enough to result in substantial non-compliance with Congress's directions.

It is worth noting that a substantial portion of these implementation difficulties occurred during the preemptive era after Congress enacted its highly ambitious re-write of the FWPCA. The directive policies implemented during this era were particularly subject to implementation difficulties, as over half of the major policy changes made during this era involved substantial delays and controversies during implementation. The relative prevalence of these difficulties during this era appears to be largely traceable to the factors noted above – the ambitiousness of the new statutory requirements, as well as political conflicts, technical complexities, and the high costs of carrying them out. When these factors are combined with Congress's naïve and over-optimistic estimates of the time it would take to implement some of these provisions – the one year deadline for establishing technology based effluent standards for a wide range of industry categories comes to mind here, for example, it appears that Congress set the table for policy overload and implementation difficulties even before the implementation process began.

In spite of these implementation difficulties, however, it does appear that the policy changes implemented during the pre-emptive era led to significant positive impacts, and one can argue that these impacts appear to exceed the impacts yielded in the two other eras assessed in this analysis. During the pre-emptive years, there were substantial reductions in conventional pollutant loadings to the nation's waters from industrial sources and substantial increases in the treatment capacities of the nation's municipal sewerage infrastructure (ASIWPCA, 1984). At the same time, controls on toxic substances were initiated in a number of instances, and a number of important water bodies have experienced water quality improvements. The Cuyahoga River, for example, did not burn in the 1980's and Lake Erie was brought back to life. While both the supportive era in the middle of the twentieth century and the current experimental era can claim important successes – often in expanding and refining water pollution regulatory capabilities, neither era appears to have resulted in impacts that were as great as those achieved during the pre-emptive era.

Thus, while substantial implementation difficulties were experienced during the pre-emptive era, these difficulties appear as though they eventually yielded significant policy impacts. The opposite situation may be occurring in the current experimental era, as comparatively limited and generally more timid Congressional directions appear to be leading to relatively high rates of compliance in terms of EPA policy outputs, even as the impacts of current policies remain somewhat questionable. Unfortunately, however, a lack of reliable data on trends in ambient water quality makes it difficult to determine the extent to which these differences in levels of apparent impact actually translate into actual differences in water quality. Consequently, it is important to acknowledge that we will not ultimately be able to compare impacts with confidence until we have confidence in our ability to assess water quality outcomes across time and space. And, at this point, in spite of decades of administrative effort, that confidence still does not exist.

The analyses presented in Part III provide further evidence of federal policy responsiveness to Congress's statutory directions, although this was not the primary reason those analyses were conducted. More specifically, the analyses of non-point and point source policy aggressiveness presented in Part III suggest that the EPA has responded to most of Congress's procedural directions, even as the Agency has had difficulty guaranteeing true substantive compliance on a consistent basis. In the non-point source case, the EPA established the mechanisms necessary to enable state submission of the required non-point source assessments and management plans, and to facilitate distribution of grants under the FWPCA's Section 319 program. Likewise, in the point source case, the EPA established the policies and regulations that were necessary to implement the FWPCA's wastewater permit program and its delegation to state governments, and it also issued numerous permits directly in states that had not received NPDES permit authorizations.

These apparently high levels of procedural compliance, however, are accompanied by significant variations in substantive compliance in both the non-point and point source cases. It appears clear, for example, that the EPA established partial approval mechanisms for state section 319 programs in order to enable state programs to proceed with their Section 319 program efforts, even as they did not fully meet EPA requirements. Similarly, in the point source case, we see wide variations in permit stringency among both EPA Regions and the states.

Thus, while it is clear that federal agencies respond to Congress's statutory direction in most cases, it is equally clear that implementation difficulties and inconsistencies in the application of policies arise during this process. At the federal level, limited resources and policy overload, disagreements among political principals, technical complexity, and poorly constructed statutes all appear as though they led to significant federal implementation difficulties. At the same time, the EPA appears to be quite inclined to follow procedural steps required by Congress, even if it can also be somewhat lenient in the substantive requirements it imposes. Procedural consistency appears to be a more certain federal policy response than substantive consistency, even though the federal government's efforts to provide non-point source funding support and basic wastewater permitting requirements in all fifty states makes it clear that EPA has sought to achieve both procedural and substantive compliance to at least some degree.

14.1.2. Hypothesis 2: Congressional Direction and State Policymaking

The evidence presented in this work also suggests that Congress's statutory directions have significant effects on state water pollution policy outputs. The historical analyses in Part II demonstrate that when federal agencies implement Congress's mandates, states often respond in ways that are generally consistent with those mandates. The cross sectional analyses in Part III provides more detailed support for this finding, as they suggest relatively high levels of procedural compliance with Congress's directions in non-point and point source water pollution control among the states. However, these cross sectional analyses also point out quite clearly that relatively high rates of procedural compliance are frequently accompanied by high levels of variation in the aggressiveness of state water pollution policies. They also suggest that procedural compliance may reach a point of diminishing returns when required federal mandates become quite numerous, as is the case with point source water pollution permitting.

The historical analyses conducted in Part II suggest that large numbers of states follow through on Congress's statutory directions most of the time – 87% of the time based on the sample of major post World War II policy changes investigated in this work. As was the case with federal administrative agencies, however, the states also experience implementation difficulties. And indeed, it is apparent from the historical analyses conducted that federal implementation difficulties lead directly to state implementation difficulties in almost tautological fashion. If a federal agency has trouble implementing a policy, those troubles tend to cascade down to the states during the implementation process. Just over a third of the major water pollution policy changes enacted by Congress appear to have led to implementation difficulties among the states, and the these policy changes appear to have coincided on a one to one basis with the implementation difficulties experienced by federal implementing agencies. Clearly, when federal agencies produce new regulations, policies, and guidance pursuant to Congress's directions, the states as a whole tend to react in ways that are at least generally consistent with those policies, thus providing clear support for hypothesis 2 above.

The cross sectional analyses conducted in Part III provide further evidence of this basic form of state responsiveness to federal water pollution policy mandates, even as they also demonstrate extremely high levels of variation in the aggressiveness of state water pollution policy outputs. The analysis of state non-point source water pollution policies, for example, highlights state responsiveness to federal policy mandates that are basically supportive in structure. Federal non-point source water pollution policies are supportive in that they include program elements that are broad rather than detailed, and states are envisioned as playing significant policymaking roles. In this analysis, the findings suggest that states maintain generally high levels of procedural compliance with Congress's non-point source water pollution procedural mandates. While not all states met Congress's ambitious timelines for the submittal of the required non-point source water pollution assessments and management plans, all fifty states had submitted and received approval of these documents in less than five years – a generally reasonable time frame given the technical and institutional complexities involved in the process of producing these assessment and management plans. All fifty states have also participated in the 319 non-point source water pollution grant program within that same time frame, and they have collectively invested over $1.5 billion in non-federal resources to participate in this federal program over the last decade and a half. Thus, while some states failed to comply with Congress's tight timetables, state non-point source water pollution programs complied with the procedural requirements in relatively reasonable amounts of time in all fifty states.

This rather uniform pattern of state procedural compliance operates in marked contrast to the substantive ambitiousness of state efforts to address non-point source water pollution problems within their borders. The states varied significantly in the extent to which they sought to ensure consideration of non-point source water pollution concerns in state and local decision-making, enacted enforceable mechanisms for addressing non-point source water pollution concerns, and committed non-federal funds to address non point source water pollution concerns. Some states – such as Maine, Oregon, Washington, New Jersey, and California – clearly took their policymaking roles in this area quite seriously and implemented aggressive non-point source water pollution control programs in these areas. Other states – such as Idaho, New Mexico, and South Dakota – did little more than was necessary to collect federal monies under the 319 grant program. Clearly, therefore, while procedural measures of state compliance suggest high rates of state compliance with federal mandates, the more substantively oriented measures used in the analysis make it clear that the supportive federal policy structures used to address non-point source water pollution concerns do not result in anything close to consistently aggressive state policy efforts in furtherance of federal policy goals.

What about the highly directive policy structures enacted by Congress to address point source water pollution discharges? Do they lead to high rates of procedural and substantive compliance with Congress's statutory mandates for restrictive state permitting programs? In contrast to federal structures for non-point sources, the structures enacted for point sources include federal program elements for the NPDES permitting program that are quite specific and detailed. And states under this kind of federal-state relationship are viewed first as administrators of the federal program, and only after that as policy makers in their own right.

The analysis of point source water pollution permits reveals a pattern of state compliance with Congress's mandates that differs somewhat from the one found for non-point sources. Overall, the states have complied with many of Congress's procedural mandates in the FWPCA for point source permitting, although procedural non-compliance is more apparent here than for non-point source programs – in all likelihood because the procedural requirements are far more numerous and onerous. While it has taken many years, forty-four of the fifty states have now sought and received authorization to administer the NPDES program, even though many states have not received all of the possible forms of federal authorization. There are also major variations in the rates at which states have sought federal authorization, as states such as Oregon, Minnesota, and Wisconsin have been quick to seek authorizations and other states such as Oklahoma, Texas, and Florida have been relatively slow in doing so. Still another group of states – Massachusetts, Arizona, New Mexico, Idaho, Alaska, and New Hampshire – continue to avoid federal authorization altogether. While these latter states are technically compliant because Congress only recommended and did not require state NPDES authorization, they are clearly failing to be true to the spirit and structure of Congress's wishes as expressed in the FWPCA. On the other side of the coin, however, these states can legitimately argue that they are simply declining to participate in one of the federal government's many forms of unfunded mandates, as it is clear that the funds provided by EPA to the states are not sufficient to fully fund the federally required program elements.

One important required procedural element of authorized state NPDES programs is that they issue permits for acceptable wastewater discharges within their states. They are also required to re-issue these permits at least every five years. The data presented in Part III demonstrates that state water pollution programs are issuing required NPDES permits, and in very large numbers. Indeed, the total number of facilities covered by NPDES permits issued by the states now exceeds 75,000. This is a massive number of discharge permits by any accounting, and it does not include permits issued to address storm-water discharges and concentrated animal feeding operations (CAFO's), as are (now) required by EPA regulations. Clearly, the states have undertaken a massive effort over the past three decades to control point source discharges consistent with Congress's statutory requirements, and their issuance of these permits reflects a massive effort to maintain compliance with Congress's procedural directions. The states are also now faced with quantum level increases in permitting workloads, as wet weather problems associated with storm-water runoff from urban areas and CAFOs are estimated to add hundreds of thousands of additional facilities to be regulated as point sources under the NPDES program (EPA, 2001D). At the same time, however, while there have been funding increases recently in the Section 106 state grant program (EPA, 2003), significant portions of these increases are devoted to groundwater and tribally oriented activities and – in any case – they appear small in relation to the funding gap identified by ASIWPCA and EPA in their recent analyses (ASIWPCA, 2002).

Perhaps not surprisingly in this context of limited resources, the states have been somewhat less successful in re-issuing these permits within the required five year time frames than they have been in issuing the permits in the first place. The data presented in Part III reveals that none of fifty states have fully complied with this requirement, although some states have been far more successful in managing permit backlogs than others. The states are not alone here, however, as average EPA permit backlogs for the six unauthorized states in which it maintains permitting responsibilities exceed those of the states themselves. Viewed as a whole, it is clear that NPDES authorized states have undertaken a massive effort to comply with the FWPCA's requirement that they issue NPDES permits, and it is equally clear that their level of compliance with the re-issuance requirements associated with these permits is partial at best due to the massive number of permits involved and the limited resources available to issue them.

The analysis of state NPDES permit restrictiveness presented in Part III reveals state variations that are more pronounced than the levels of variation in state compliance with federal procedural mandates and recommendations. State implementation of permit controls on whole effluent toxicity

(WET) varies from 0 to 100% of the major permits issued, and this variation extends to both municipal and industrial permits. Similar levels of variation are apparent in the data presented on conventional pollutant parameters, as the percentage of states with limits on conventional pollutants in major municipal permits that are more stringent the federal technology based minimum standards also varies from 0 to 100%. Clearly, while Congress's intent in creating the NPDES program was to establish procedural and substantive mechanisms that would ensure minimum levels of control on point source discharges, the extent of stringency varies considerably among the states. While variability in and of itself does not contradict Congress's intent, the magnitude of variability uncovered does suggest that a number of states are not being particularly aggressive in pursuing Congress's clear statutory suggestions regarding the need for stringent water pollution controls.

As we look at these variations in permit restrictiveness, it is important to note that the composition of this variation is substantially different than the variations uncovered in state non-point source water pollution policy activism. With two notable exceptions (Florida and New Jersey), *the states with active non-point source programs are not typically the states with the most stringent permit requirements according to the measures used in this analysis*. There is no positive correlation between state non-point source activism and either measure of state point source permit restrictiveness used in this analysis. And indeed, there is a statistically significant *negative* correlation between non-point source activism and the extent to which states impose permit requirements relating to WET. States with active non-point source programs appear less likely to impose WET requirements than states without active non-point source programs. Clearly, the factors generating variations in non-point source activism are not the same as the factors generating variations in point source permit stringency.

At least three broad patterns thus emerge from these cross sectional analyses. First, the analyses found significant efforts by the states to comply with Congress's procedural mandates. Clearly, when federal agencies issue required policies passed on by Congress, the states attempt to react in ways that are consistent with federal mandates most of the time. Second, and perhaps surprisingly to some, the overall rates of procedural compliance on the part of the states appears to be higher under the less intrusive policies implemented for non-point source water pollution control than they do for the more intrusive pre-emptive policies implemented for point sources. Here, the massive number of requirements imposed in the context of rather limited resources appears to produce barriers to complete state procedural compliance. And finally, in both the non-point and point source cases, there are major variations among the states in the extent to which their water pollution policies aggressively pursue federal goals. Thus, in spite of clear efforts to produce procedural policy outputs that are compliant with federal mandates, major variations in the activism of state non-point source policies and the restrictiveness of state point source permits are clear and apparent from the analyses conducted.

What do these analyses suggest about the effects of Congress's statutory directions on state water pollution policy outputs? First, and probably most importantly, they suggest clearly that Congress's statutory directions have major impacts on state water pollution policies. Federal actions appear to force state actions where they might not have occurred otherwise, and states frequently react by seeking to follow federally mandated procedures. Second, it appears that these reactions may reach a point of diminishing returns, as the burden of compliance on the states increases without commensurate increases in resources. At some point, it appears, states simply cannot keep up with the growth in federal requirements imposed by the Congress and EPA. The ongoing difficulties with NPDES permit backlogs, for example, appear to make this point quite clearly. Third, even within the context of basic procedural compliance, we see great variations in water pollution policy aggressiveness at the state level and these variations are apparent in both the non-point and point source cases. And finally, it is also apparent that the composition of this variation differs across the non-point and point source cases, thus suggesting that the political dynamics differ between supportive and highly directive federal policy designs. Consequently, while states are clearly affected by Congress's statutory directions, the nature of these impacts appears to vary depending on the design of federal policy and the characteristics of the states involved.

14.1.3. Hypothesis 3: Federal Policy Design and State Policy Responsiveness

The third hypothesis evaluated in this work suggests that state policy responsiveness to broad based influences is likely to decrease with increases in federal policy intervention. Based on arguments that federal intervention can distort state policymaking processes (NAPA, 1997), the expectation here is that high levels of federal intervention in point source water pollution control will lead to lesser levels state policy responsiveness to broad based influences in this area than in non-point source water pollution control where the level of federal involvement is lower. The broad based policy influences evaluated here are public opinion on the environment, the existence of a moralistic political culture, Democratic Party control of state government institutions, and water pollution problem severity. The analysis finds mixed results in relation to the broad hypothesis, with the evidence varying across the measures evaluated.

The evidence presented in this work does suggest that public opinion concerning the environment (Erikson, et. al., 1993) and political culture explain variations in non-point source water pollution programs better than they explain variations in point source permit stringency. Indeed, measures of both public opinion concerning the environment and moralistic political culture appear as statistically significant predictors of non-point source policy activism in the initial model of responsive state water pollution policymaking evaluated in this work. By contrast, these variables do not appear to explain variations in point source permit restrictiveness relating to either toxic or conventional pollutants. Thus, this portion of the analysis provides some support for the hypothesis noted above.

However, the situation changes when state capacities and interest group strength are accounted for. With controls for these variables in place in the models analyzed, the public opinion variable falls out of the NPS model even as the moralistic culture variable retains its impact. This yields an overall explanation of state NPS policy activism that is based more on state capacities and interest group strength than on public opinion concerning the environment. By contrast, both public opinion on the environment and political culture are poor predictors of point source permit restrictiveness, even after the introduction of controls for state capacities, group strength, and recent federal involvement. The evidence therefore suggests that broad based influences relating to preferences and practices appear to have a stronger influence on state policy outputs under the supportive policy design used for non-point sources than under the directive policy design used for point sources. However, this influence does not appear to be particularly strong when viewed in totality, as only the moralistic culture variable retains its significance when controls for state capacities and groups strengths are introduced into the model.

Notably, we find little evidence of partisan influence on overall policy aggressiveness, as Democratic party control does not appear to affect either NPDES permit restrictiveness or overall non point source policy activism. It is worth noting here, however, that we did find some evidence suggesting that Democratic Party control of state government institutions does exercise influence on state enactment of strong enforceable authorities for non-point source pollution control – one component of overall NPS policy activism.

The picture changes, however, when the focus is on the severity of water pollution problems in the state, because the evidence here suggests that federal intervention may improve the match between the extent of water pollution problems and the aggressiveness of the state policy response – at least when there is reasonably good information available about the water pollution problems in question. Water pollution problem severity does appear to have a measurable impact on the stringency of pollutant controls imposed by states in the case of conventional pollutants, a set of pollutants for which the information on ambient water quality is generally more established than is the case for toxic pollutants. However, for toxic pollutants, we do not find a statistically significant relationship between problem severity and state permit stringency. Consequently, in the point source case, we do see some evidence of a relationship between problem severity and the aggressiveness of policy response. By contrast we see no such evidence in the non-point source case, where federal intervention is less extensive. In general, therefore, the evidence with regard to effects of problem severity on state policy aggressiveness contradicts the hypothesis above, as it suggests that a strong federal presence improves the matching of problems and policy solutions – a result that accords better with Lowry's (1992) findings than with the current rationale for policy devolution (NAPA, 1995 & 1997).

What do these results suggest about the influence of federal policy design on the responsiveness of state water pollution policies? The evidence does generally support the notion that less intrusive forms of federal intervention allow state political systems to respond better to broad based *preferences and cultural practices*, as these variables appear to explain variations in state non-point source policies better than they do point source policy variations. However, the results also suggest that state preferences are not particularly strong and direct factors in producing active state non-point water pollution policies under a supportive federal policy design, as the effects of public opinion on the environment appear to lose explanatory power when variable state capacities and group strengths are accounted for. At the same time, *we also find some evidence that preemptive forms of federal intervention can facilitate a matching between problem severity and the aggressiveness of state policy responses,* as the extent of water pollution problems in the state does appear to affect the stringency of NPDES permit controls on conventional pollutants.

It is worth noting, however, that these conclusions relate only to the choice between pre-emptive federal involvement and supportive forms of federal involvement. They do not speak to the impacts of the *current* federal policy structure viewed as a whole, with its mix of a supportive approach for non-point source problems and a preemptive approach for point source problems. Indeed, there is evidence in this research suggesting that current federal policies may facilitate a misallocation of resources, as states currently spend more money addressing point sources of water pollution than they do non-point sources (ASIWPCA, 2002), while non-point sources appear to comprise a larger proportion of the problem as a whole (EPA, 2000A). At the same time, we also find evidence that recent federal influence appears to facilitate stronger anti-pollution efforts in relation to point sources in many states that have weak non-point source programs. And conversely, we also find that states with stronger non-point source programs tend to be less aggressive in instituting point source controls on whole effluent toxicity. When one considers that 47 of 50 states reported significant non-point source problems in their 1998 water quality assessments (EPA, 2000A), the EPA's apparent influence in fostering more extensive point source controls seems at least somewhat misdirected. I shall return to this point in later in this chapter.

All of these findings have implications beyond the narrow confines of the hypotheses discussed in this subsection. The following subsections outline the broader implications of the findings presented here for the scholarly literatures on Congressional control of bureaucracy, policy implementation, and state policymaking, as well as for future research. These discussions are then followed by an overview of the implications of these findings for the future of US water pollution control policy.

14.2. Implications

The findings of this work have implications for several subfields of the scholarly literature in Political Science. The discussion below outlines these implications, and also offers some ideas concerning appropriate areas for future research. It is then followed by a discussion of the implications of this work for the future of US water pollution policy, and some closing thoughts about where to go from here.

14.2.1. Contributions to Scholarly Literature

As was noted in the early pages of this work, scholars have debated the extent to which Congress controls administrative decision-making for some years now. In the 1970's, prominent academicians cited broad statutory delegations of power to administrative agencies (Lowi, 1979) and lackluster Congressional oversight efforts (Ogul, 1976; Dodd & Schott, 1979), and concluded that the bureaucracy had "run away" and was out of control. Since that time, there have been major changes in scholarly thinking about this question, as studies based on principal-agent theories have evaluated indicators of Congress's managerial concerns (committee composition, oversight hearings, etc.), and found relationships between Congressional desires and visible policy outputs (Weingast & Moran, 1983; Moe, 1985; Wood and Waterman, 1994). More recently, we have seen the development of a literature addressing ex ante statutory forms of political control over administrative decision-making (McCubbins, Noll, & Weingast, 1987 & 1989; Spence, 1997 and 1999a and b).

As yet, however, these debates have not come to terms with a question that is central to public administration as a field of practice and study, and to overhead theories of democratic accountability. Do public administrators receiving delegated authorities comply with Congress's statutory directions as they implement government programs? While this question is of fundamental importance, it has – somewhat surprisingly – received relatively little systematic attention in the literatures on Congressional control (Spence, 1999A and B) and public administration (Egeberg, 2003). A similar gap is evident when one focuses on the literature on federalism and state policymaking in the United States, and the central role of the states in implementing many federal domestic policies. While this literature clearly recognizes the importance of federal intervention on state policymaking (Wright, 1988; Lowry, 1992; Gerber & Teske, 2000), it has not yet sought to assess systematically the relationship between Congressional directions in statute and the state level policy outputs that flow from them. The discussion that follows summarizes key insights emanating from this work that address these broad gaps in the scholarly literature, and it does so separately for the three major bodies of scholarly literature that have helped inform this work.

14.2.1.1. Congressional Influence on Administrative Decision-making:

Broadly speaking, this study makes at least two important contributions to the scholarly literature relating to Congressional control of administrative decision-making. First, it provides additional evidence suggesting that ex ante statutory controls are important elements in Congress's arsenal of tools for influencing administrative decision-making. In this context, the evidence uncovered also corroborates Spence's conclusion that "preference determining" controls are at least as important as procedural controls in fostering fidelity with Congress's statutory wishes. And second, the analysis here suggests that ex ante tools – while important – are nevertheless imperfect instruments of control, the effectiveness of which can be limited by influences associated with political direction of policy implementation at the federal level, variable levels of federal bureaucratic oversight, and state level policymaking processes.

One important contribution of this work lies in its provision of clear evidence that Congress can and does influence administrative decision-making through law. While this broad conclusion is not new or novel, this work goes a step further by providing evidence of the importance of ex ante forms of control over the entire post World War II period, and in specific relation to the scope and instrumentation of US water pollution policies. In so doing, the evidence presented in this work adds to a rather limited base of empirical work relating to the efficacy of ex ante Congressional controls, as only Spence (1999 a and b) has tested the influence of ex ante controls with substantial sets of empirical data. As the reader may recall from Part I, his work identified evidence of the impact of both structural and procedural statutory controls on licensure decisions made by the Federal Energy Regulatory Commission (FERC) between 1960 and 1990 (1999a), even as he has also suggested that FERC has successfully avoided Congress's imposition of procedural controls in a number of instances (1999b). The findings here extend Spence's work in at least three ways.

First, the analysis here extends Spence's work by providing empirical evidence of the influence of statutory ex ante controls outside of the FERC (Spence, 1999a). In so doing, the evidence here corroborates the importance of ex ante statutory influences on administrative decision-making in more than one agency. And, because this influence is corroborated in a policy area that has been frequently characterized as both based on bargaining (Ingram, 1977; Hunter & Waterman, 1996) and as generally out of control (Lowi, 1979), there is reason to believe that ex ante controls are influential in other policy areas as well. The FERC, it seems clear, is not the only agency in Washington DC that shows an inclination to comply with (at least some of) Congress's statutory directions.

The analysis here also extends Spence's work by suggesting that the influence of structural controls reaches not only the federal bureaucracy, but also the decision-making processes of states that implement federal programs. While efforts have been made to assess the effectiveness of ex post managerial controls by Congress on state policymaking (Chubb, 1985; Hedge, et. al., 1994, etc.), similar efforts do not appear to have been undertaken for ex ante controls. Thus, when Congress enacts major provisions calling for federal and state policy actions, the evidence here suggests that states as a whole do appear to respond in ways that are consistent with those provisions in most cases. Congress's power to establish federal law enticing or requiring state actions is a potent force indeed, and – based on this analysis – it appears to extend to a range of federal program activities that rely on the states for policy implementation.

And finally, the findings here extend Spence's work by examining forms of ex ante control that he does not address specifically. While Spence's work focuses primarily on procedural controls and "preference determining" factors inherent in institutional settings (mission & organizational structure), the analyses here focus on the influence of regulatory scope and policy instrumentation on administrative policy outputs. The analyses suggest that Congressional controls that are focused narrowly on state governments and use supportive policy instruments (e.g. non-point source programs) yield different kinds of policy outputs than controls that are focused broadly on whole classes of activity (point source wastewater discharges) and rely on command and control regulatory policy instruments. In the case of non point source water pollution policies, the policy outputs produced are a series of state program activities that vary widely in their specific components. In the case of point source discharges, the policy outputs produced at the state level share a common "permit" based form, but the permits themselves vary in their specific requirements. In both cases, however, the influence of ex ante statutory directions are clearly apparent in the procedural activities undertaken by EPA and the states to comply with Congress's directions, even as the substantive outputs generated by this procedural compliance vary considerably.

Thus, the findings here are generally consistent with Spence's work because they suggest that structural forms of ex ante control appear to be at least as important as the procedural forms of ex ante control that have received so much attention in the literature over the past two decades (McCubbins, 1985; McCubbins, Noll, and Weingast, 1987 & 1989; Spence, 1997 and 1999A and B). However, this work focuses on the influence of statutory scope and policy instrumentation, and suggests that they too represent powerful forms of Congressional influence on subsequent agency decision-making. This finding is an important one in a literature that has emphasized Congress's use of managerial forms of control, ex post, during the administrative policymaking process and procedural forms of ex ante control. At the same time, it provides further support for the general concept advanced by Spence that "preference determining" controls are particularly effective, because statutory decisions regarding both the scope and instrumentation associated with particular policies can effectively determine bureaucratic preferences. In this case, however, the preferences that are "determined" relate to the audiences and activities to be regulated and the types of government actions that are authorized, rather than the mission and structure of the affected agencies.

The second important contribution of this work to our understanding of Congressional influence on administrative decision-making relates to its identification of several sources of imperfection in the operation of ex ante structural controls on administrative decision-making. While Spence has identified bureaucratic preferences as a limit on the efficacy of procedural controls (1999a and b), existing literature on Congressional control of bureaucracy has made little effort to ascertain the limits of other forms of Congress's structural influence. The analyses provided here have enabled the identification of three sets of factors which limit the effectiveness of controls relating to the scope and policy instruments used in federal water pollution control policy.

The first set of factors that can limit the effectiveness of structural controls operates at the federal level, and relates generally to the directions provided to the bureaucracy by political leaders. These directions come in several varieties that can affect the effectiveness of ex ante controls. First, and perhaps most importantly, Congress can and does undermine its own structural influence if it does not provide sufficient resources to carry out the tasks it requires. Limited (or non existent) resources have created barriers for effective water pollution policy implementation since Congress's failure to fund the 1948 wastewater treatment loan fund, and it is clear that inadequate resource provision has had performance limiting effects on US water pollution policy until this day. Indeed, budgetary data provided to the author by EPA in 2003 reveal that the federal work years funded for water pollution control activities in EPA dropped by forty-five percent between 1978 and 1997. When these figures are viewed in combination with the results of ASIWPCA's recent GAP analysis (ASIWPCA, 2002), one can certainly argue that the imperfect compliance record of the states and EPA with regard to required NPDES permitting processes is a direct outgrowth of Congress's failure to appropriate sufficient resources to carry out the tasks it has required. This interpretation is also consistent with Spence's view of the factors that limited the effectiveness of the procedural controls that were imposed upon FERC.

The analyses here have also identified several other factors relating to political directions that can impede bureaucratic compliance with structural controls enacted by Congress. Congress can also undermine its own influence if it enacts statutes that are inherently flawed in terms of the incentives they establish for key target audiences. This was the case, for example, with the enforcement conference provisions of the FWPCA in the 1950's that provided new federal authorities, but offered no real incentive for anyone to take advantage of them. Congressional failures to understand and address technical complexity can also serve as a source of imperfection because Congress cannot ultimately resolve technically complex issues by simply establishing deadlines and requirements for their resolution. The multi-year delays in EPA's issuance of technology based effluent standards are a clear testament to this fact. And finally, the analyses presented in this work have highlighted the importance of conflict among political leaders in the implementation process, as President Nixon's impoundment of wastewater treatment grant funds and Administrator Ruckelshaus's opposition to additional FWPCA planning requirements suggest. While these factors have been recognized in the past (Mazmanian & Sabatier, 1983; Gormely, 1989; Ringquist, et. al., 2003), their implications for Congressional influence on administrative decision-making have not been fully illuminated.

The second set of factors that can limit the effectiveness of ex ante controls relates to politics and policymaking at the state level. State governments are not automatic implementation agents for federal policies. They possess their own dynamics that can influence the ways that federal programs are administered. As a result, federal policies that are implemented at the state level must be integrated into existing systems of state governance if they are to have effect. As was noted in chapter 2, much scholarly work has been devoted to understanding the factors that influence state policymaking, and these very same factors can become impediments to compliant implementation of federal policies. Three broad potential sources of impediment are apparent in this regard, and they correspond to major theoretical approaches to state policymaking processes reviewed in Chapter 2. State governments that respond to public preferences and the severity of problems within their borders can impede federal policy compliance if opinions and problems do not match those envisioned by Congress in federal law. Limited state capacities can also impede compliance with federal policy, as can the political power of various groups within the state. All of these kinds of influences were found in this work to have potential effects on state policymaking in the area of non-point source water pollution control, although the models evaluated suggested that limited state capacities and the lack of strong environmental groups in the state had more significant and direct negative effects.

A third set of factors that influence state fidelity to Congressional mandates appears to relate to the nature of federal-state interactions. The models presented in Chapter 13 showed that one factor that appears to affect the stringency of state issued NPDES permits is how recently the state received authority to administer the point source permitting program. Apparently, the exercise of federal oversight implicit in the authorization process provides an opportunity for EPA to impress upon the states the importance of setting stringent limits in NPDES permits – at least as they relate to WET and the imposition of restrictive limits on certain conventional pollutants in major municipal permits. A necessary corollary to this finding, however, is that the failure to carry out federal oversight can also limit state compliance with Congressionally enacted federal directions. Thus, while traditional state policymaking variables clearly hold the potential to affect the manner in which federal mandates are implemented at the state level, the nature of federal-state interactions – or the lack thereof – may also have this kind of effect.

While the contributions outlined in this discussion are important ones in relation to the literature on Congressional influence over administrative decision-making, this work also adds to our understanding of policy implementation as a field of study in public administration. It is to an outline of these contributions that we now turn.

14.2.1.2. Policy Implementation

This work also contributes to the public administration literature relating to policy implementation, and two sets of contributions are particularly noteworthy in this regard. The first contribution consists of assessing compliance on the basis of policy outputs rather than impacts or outcomes, and the resulting realization that administrative compliance with Congress's directions is closer to the rule than to the exception. The second contribution lies in the suggestion that differentiating among implementation processes based on policy design is important, as different sets of statutory directions appear to yield different kinds of implementation processes. These two sets of insights give additional structure to past work on policy implementation, and also illuminate some potential next steps for future research seeking to link top-down direction with concerns emanating from bottom-up theories of policy implementation.

One of the most important contributions made by this work lies in its suggestion that public administrators at both the federal and state levels do indeed follow Congress's procedural directions in statute most of the time. This conclusion stems directly from a choice of evaluative criteria that is based on what public administrators are actually asked to do, rather than the impacts or outcomes they are supposed to achieve. As was noted previously, implementation research began with top down views of the policy process and this research often led to rather pessimistic conclusions regarding the potential for successful policy implementation (Pressman & Wildavsky, 1984; Bardach, 1977). While the later work in this top down tradition (Bowen, 1982 and Mazmanian & Sabatier, 1983) was more optimistic about the prospects for effective implementation than the earlier work, even it took a rather negative view. To a large degree, this broadly accepted pessimism grew from the choice of the dependent variables for study. Studies of policy implementation often evaluated the extent to which Congressionally enacted policies accomplished the impacts and outcomes they sought to achieve.

This choice of dependent variables, I would argue, largely determined the disappointing results that followed. When the primary measure of successful implementation is the ambitious goal of the statute – a revitalized Oakland or fishable and swimmable waters throughout the country, for example – we are selecting a wish or a hope as our evaluative criterion rather than a realistic and achievable objective. Implementation failure, in this situation, is built right into the structure of the analysis. It is for this reason that scholars have recently suggested that future work on policy implementation place greater attention on the dependent variables chosen for study (Winter, 2003), and the analyses here have taken this suggestion seriously. Here, we focus on assessing bureaucratic fidelity to Congress's statutory directions in terms of policy outputs rather than impacts or outcomes. And the high rate of compliance according to this kind of criterion is particularly apparent for procedurally oriented policy outputs produced at both the federal and state levels.

This work outlines substantial evidence suggesting high rates of procedural compliance with Congress's directions both throughout the post World War II era, and in contemporary efforts to address non-point and point source water pollution concerns. As noted previously, almost 90% of major water pollution policy changes were implemented by federal agencies and the states largely as they were envisioned in statute during the post World War II era. In more recent years, all fifty states complied with Congress's assessment, management, and grant related directions in implementing the Section 319 NPS program. And, over the past thirty years, states have progressively increased their role in water quality permitting, and have now issued tens of thousands of permits restricting wastewater discharges in ways that are basically consistent with Congress's directions in the FWPCA. These are not small accomplishments. As policy outputs growing directly from Congress's directions, they represent both compelling evidence of ongoing efforts to comply with ex ante controls and important examples of rather successful policy implementation.

Our evaluation of substantive compliance rates among the states yields a less optimistic conclusion, as it finds tremendous variability in the aggressiveness of state water pollution programs. Here, the focus remains on policy outputs, but the measuring rod becomes the ambitious goals of the statute itself, rather than the policy procedures that Congress outlines in statute. By this criterion, we see wide variability in compliance, as policy outputs in some states aggressively pursue Congress's statutory goals while policy outputs in other states clearly fail to do so. As Congress provides significant flexibility to build non-point source programs or extensive program requirements for issuing point source water pollution permits, discretion on the part of those implementing federal policies becomes both inevitable and required, and wide variations in substantive policy outputs occur. By substantive criteria, therefore, some states maintain high levels of fidelity to Congress's goals, while others do not.

Thus, when policy implementation is viewed from the standpoint of policy outputs, a reasonably optimistic picture of the policy implementation process appears. By and large, when Congress specifies particular procedures that federal agencies and the states should follow, the evidence presented here suggests that federal agencies and the states tend to comply with these procedures. As a result, rates of procedural compliance appear to be rather high. At the state level, however, procedural compliance can produce highly variable substantive results, as the highly varying levels of state water pollution policy aggressiveness suggest. Nevertheless, in spite of this variation, we do see increased levels of water pollution control activity at the state level that appears to result from Congress's intervention in both the non-point and point source cases, even though that activity may amount to little more than spending the federal grant monies that are made available in some cases.

The picture becomes more mixed when we view policy implementation in relation to its expected impacts. In spite of clear variations in substantive policy outputs, it is clear that we have come a long way in addressing water pollution concerns in the US since 1948, as the Paul Light's analysis suggests (Light, 2000). The positive impacts of FWPCA implementation are particularly evident when we assess policy impacts since the 1972 re-write of the Act. Through the successful implementation of the point source permitting program, pollutant loadings from industrial sources to the waters of the US have been substantially reduced, and we have also achieved massive increases in the number of people served by minimum (secondary) levels of wastewater treatment (ASIWPCA, 1984). These impacts are important and valuable, but they are also accompanied by continuing compliance problems in many instances (PennEnvironment Research and Policy Center, 2002), and expanding concerns about new pollutants and sources of contamination (Alm, 1992, Kettl, 1999). Consequently, the implementation record when we assess impacts is therefore decidedly mixed.

In spite of this mixed implementation record with respect to impacts, it is abundantly clear that the only word to describe our implementation progress in relation to the ambitious goals of the FWPCA is failure. Wastewater discharges were not eliminated by 1985 as the Act suggested they should be, but rather have continued and multiplied as we become aware of ever new sources of important water pollution problems. Many of our waters are not fishable and swimmable, and stream segments in need of more stringent pollutant controls seem to multiply whenever state agencies and EPA seek to determine whether new sets of Total Maximum Daily Load calculations and controls are needed. The cost of this failure is substantial, and it will be paid for over the decades to come in one way or another.

The picture revealed by this discussion should be clear. The success of implementation depends on the criteria we use to evaluate it. While the relatively optimistic picture presented in this work based on evaluations of policy outputs is important to recognize, it should serve not as a final conclusion but as point of initiation for renewed efforts to improve our understanding of the ingredients of implementation success according to more ambitious criteria. In implementation research, outlining what does happen successfully may help us understand where our efforts may go awry. It also drives the problem of policy success away from implementation where prescriptions for improvement are hard to find back toward the process of policy design where many argue that it rightfully belongs (Linder and Peters, 1987).

Consistent with this insight, a second important contribution of this work to the literature on policy implementation lies in its suggestion that we look at the structure of Congress's statutory direction as a beginning point for analyzing implementation processes. In particular, this analysis suggests that the scope of the audiences and activities targeted for policy attention and the policy instruments relied upon to alter their behaviors are important starting points for improving our understanding of water pollution policy implementation in the US. For preemptive policies relating to point source water pollution, we see regulatory controls that are broadly applicable in scope and directive command and control policy instruments that are reminiscent of the "programmed" policies that Berman referred to over two decades ago. For policies relating to non-point source water pollution control, we see federal requirements with narrow scope that apply only to state governments and are accompanied by significant and growing supportive funding from the federal government.

The work presented here makes it clear that while there are some broad similarities in the distribution of policy outputs for these two types of policies, the implementation processes for them are quite different. We see that procedural compliance is common at both the federal and state levels with both of these kinds of policy mandates. As noted previously, however, procedural non-compliance appears to be more common for preemptive policies than for supportive ones, and this appears to be the case because administrative units reach points diminishing returns when it comes to their capacities to respond to demands. As the command and control requirements associated with NPDES permitting have proliferated over the years, federal and state agencies have found it difficult to comply fully with all of the requirements imposed. One result is that we see continuing problems with NPDES permit backlogs, and they show no sign of letting up in the resource constrained atmosphere in which NPDES permitting is conducted. And, unfortunately, it is likely that the backlog problem represents just the tip of the iceberg in this regard.

At the same time, we see that states across the country are using permitting mechanisms to control point source wastewater pollution, while no similar uniformity of mechanisms is apparent in efforts to address non-point source water pollution. The law relating to these two forms of water pollution is structured differently, so we see different kinds of policy outputs as a result of the different kinds of requirements imposed by statute. Efforts to understand implementation of water pollution policies that do not account for these differing forms of Congressional direction and policy output will therefore fail to illuminate the true nature of what is going on.

Consequently, if we are to understand implementation, the argument made here is that it is fundamentally important to understand the structure of the laws being implemented. If we fail to do so, we gloss over important differences in implementation processes that give meaning to the processes and outputs that we identify. In the end, this insight suggests that we place much greater emphasis on developing more complete taxonomies of policy design alternatives, and then investigate the implementation dynamics that flow from the use of those differing designs. To the extent we follow this prescription in the US, we will find that understanding state level policymaking processes will become important, and the research here offers some useful insights in this area as well.

14.2.1.3. State Policymaking, Federalism, and Intergovernmental Relations

This work also makes two significant contributions to the literature on state policymaking, federalism, and intergovernmental relations. First, it suggests that states produce variable water pollution policy outputs even when federal policies seek to impose rather uniform policymaking processes. Second, and probably more importantly, this work also suggests that state water pollution policymaking and implementation processes differ fundamentally depending on the design of federal policy. These two contributions are now discussed in turn.

As noted above, one significant contribution of this work to the literature on state policymaking relates to significant variations in state water pollution permit restrictiveness in the face of federal technology based standards. In spite of uniform federal technology based controls for point source wastewater discharges, this work finds substantial variation in the restrictiveness of controls issued by state permitting agencies. While many would expect this to be the case for supportive policy designs that are constructed to maintain state discretion, one might not expect it for preemptive federal policy designs where uniform federal requirements apply. However, under the FWPCA, states do have discretion to establish permit requirements, as well as the ability to set effluent limits based on water quality as opposed to technology based considerations. The evidence presented in Part III of this work makes it clear that the states have varied tremendously in the extent to which they have chosen to impose requirements more stringent than federal uniform technology based requirements. And this variability is evident for limits on both toxic and conventional pollutants. For both of these pollutant categories, the evidence presented in this work finds that some states are imposing requirements more stringent than federal minimum requirements in up to 100% of their permits, while other states do not do so at all. Clearly, therefore, even uniform federal policy processes do not ensure consistent policy outputs. While variations in permit restrictiveness are built into the structure of the FWPCA in some respects, the extent of variability highlighted here is somewhat surprising given the expectations one may have of federal technology based standards.

A second, and probably more important, contribution of this work to the literature on state policymaking lies in the finding that federal policy design affects the dynamics underlying state policymaking processes. Or, to put it differently, the likely causes of state policy variations appear to vary, depending on federal program design. The analyses presented in Part III suggest that variations in state policy outputs under the supportive federal policy design used for non- point sources appears to be well explained by traditional models of state policymaking processes. In the final model used, variables from responsive, capacity, and group based models of state policymaking processes in combination explain about two-thirds of the variation in state water pollution policy outputs. Supportive federal policy designs, therefore, appear to supplement state resources and programs in particular areas without unduly disrupting state policy dynamics. Notably, however, these policy dynamics do not appear to be panaceas of good governance based on this analysis, as variables reflecting *problem severity and public opinion do not appear to be particularly strong and direct influences on state policy outputs*. However, more sophistical statistical work is necessary before one dismisses the influence of these variables altogether, because the basic regression models used in this work do not account for recursive relationships or indirect effects.

By contrast, the analyses of variations in point source water pollution permit restrictiveness undertaken here suggest that traditional state policymaking variables do not do a particularly good job of explaining variations in restrictiveness of state issued NPDES permits – at least in comparison to the job they do in explaining variations in state NPS policy activism. Rather, the most consistent variable found to matter in this case reflects the temporal proximity of the states' authorization from EPA, a measure of top-down federal oversight. According to the analysis, states that have received their NPDES authorizations more recently are more likely to impose stringent requirements than states that received their authorizations many years ago. This suggests that states respond to pressures from federal agencies when they are applied (as they are during EPA's review of an authorization application from a state), but they may not continue to do so over time.

Consequently, based on the results here, federal preemptive requirements appear as though they may insulate policymaking from political processes within the state. This makes sense, it would seem, when one accounts for the fact that decisions regarding permit requirements are made administratively in most cases, while decisions relating to the activism of non-point source programs would tend to require greater state legislative intervention. While the federal requirements do impose important procedural constraints that allow permits to be contested in court, these constraints do not appear to ensure that the stringency of permits requirements across the board. They may guarantee a procedural opportunity for appeal, but they do not ensure a result. Consequently, if we are to look at state policymaking and implementation processes systematically, it seems important based on this work to differentiate our analyses based on the nature and extent of federal intervention into state policymaking processes.

14.2.2. Potential Areas for Further Scholarly Research

Like most scholarly research, this work raises as many questions as it answers. It is appropriate to highlight here several areas for future research that may yield substantial advances in the literatures discussed above.

First, future research should focus on conceptual efforts to outline the range of options available to Congress in providing ex ante control of regulatory policy implementation at the federal and state levels. While existing policy typologies of ex ante design (McCubbins, 1985 and Spence 1997) and public policies generally (Lowi 1972; Wilson 1980; Ripley and Franklin, 1983; Mazmanian & Sabatier, 1983) are useful starting points, the research conducted here suggests that they do not yet adequately address the complex interrelationships between Congress's statutory directions and policy outputs at the state level. The historical analyses presented in Part II, for example, suggest that preemptive policy structures and large infusions of federal dollars to state governments can both motivate substantial state level policy activity. However, these two cases do not reflect the full range of options available to

Congressional policymakers seeking to influence regulatory policy outputs at the federal and state levels. There are other forms of statutory design – investments in public advocacy organizations or informational policy approaches, for example – that may yield effective influences on policy implementation? Only be conceptualizing a range of statutory design options for regulatory policies, and tracing the implementation dynamics that flow from them will we come to a fuller understanding of Congress's ex ante influence, inter-governmental implementation processes, and state responses to federal policy intervention. This work provides only a rudimentary beginning to this process.

Second, the research here reminds us again of the importance of developing strong measures of the conceptual variables we are seeking to understand – a problem that is all too often dealt with in only cursory fashion in quantitative research. While the measures of state water pollution policy aggressiveness used in this work represent significant improvements over measures used in the past, one could still envision further improvements. What is more, one could also envision further improvements in the independent variables used here, and these relate to state specific variables reflecting needs and preferences, capacities, and group strength as well as federal oversight. In an effort to guide further work in this area, we will now discuss potential improvements in these areas in turn.

While the measures of state water pollution policy aggressiveness used here are superior to measures used in the past in many respects, we must continue efforts to develop additional and improved measures. We have not in this work, for example, measured state enforcement policies, and even the vastly improved measures of non-point source activism and point source stringency used here could potentially benefit from further improvements. The policy dynamics surrounding enforcement may differ from non-point source activism and NPDES permit stringency because they can be more visible than permit decisions, while also taking place primarily in administrative rather than legislative forums. In addition, as noted previously, enforcement outputs may be more subject to managerial forms of manipulation than either of the policy aggressiveness measures analyzed in this work. At the same time, while the toxic and conventional pollutant stringency measures used in this work do a much better job of measuring stringency than any measures used in the past, one can certainly imagine more complete measures of permit stringency that would account for a fuller range of pollutant parameters included in permits, monitoring requirements, and/or special conditions relating to wet weather related requirements, and other permit conditions. While these data would certainly be difficult to collect under the current circumstances, it would not be difficult to envision changes in federal regulations and/or state practices relating to permit and compliance reporting that would improve the availability of more complete and appropriate data.

The analyses here also remind us of many of the drawbacks of existing explanatory measures used in state policymaking research. Some of these deficiencies are specific to water pollution control in particular, but others have plagued state public policy research for many years. While the available measures of financial and administrative capacities and public opinion have improved significantly over the past decade or two (see also Berry, et. al., 1998), measures of water pollution problem severity and group strength remain particularly in need of improvement. The measures of point and non-point source water pollution severity used here appear to the best currently available in comparable form, but changes in federal and state monitoring and reporting practices could improve our understanding of state variations in water pollution problems quite considerably. At the same time, our measures of group strength generally, and industry strength in particular could benefit from further research and effort. While per capita membership in the National Wildlife Federation is a useful and very defensible measure of environmental group strength, we would benefit from measures that take account of the actual strength of their efforts to influence state legislatures and administrative agencies. Of course, these improvements are much more easily called for than implemented, as environmental groups are often protective of their membership lists and direct measures of legislative and administrative influence are illusive. Existing measures of industry strength are even more suspect in this latter regard, as the proportion of a state's economy comprised by a particular industry category is several causal steps away from direct influence on legislative and administrative decision-making. Thus, even though the measures used here are quite defensible in comparison to measures used in past state policy research, we should continue to envision, develop, and use improved measures in the future.

The results presented here also suggest that we need to conduct more research into the nature, extent, and effectiveness of differing forms of federal oversight. Although the temporal proximity of primacy agreements offers a clear quantitative measure of recent federal influence, it would be quite naïve to believe that this is the only form of federal influence available. The results presented here therefore highlight the paucity of our current understanding of federal-state oversight processes, while also suggesting that oversight efforts are potentially important in influencing state policy outputs – particularly under preemptive policy structures. Conceivably, the federal government may also influence state policy implementation through a variety of other mechanisms such as grant agreement negotiations, vetos or threatened vetos of state policy actions relating to permitting and/or state funding assistance, concurrent enforcement actions, and/or agency responses to judicial suits and court decisions motivated by legal actions of environmental groups or the regulated community. Future research on the extent to which these forms of federal oversight are undertaken, and their relative effectiveness in influencing state policy outputs would help us improve our understanding of how Congress and federal agencies can increase their influence of over state policymaking processes – which, after all, is the purpose of federal intervention in the first place.

Third, our understanding of potential causal relationships might also benefit from more sophisticated statistical analyses, although one might argue that some of the measurement issues noted above could be addressed first. Nevertheless, two more advanced forms statistical analyses might help us improve our knowledge of these sources of state variation in state policy water pollution policy aggressiveness. First, because it is likely that the explanatory variables used in the models presented in Part III are related to one another, recursive modeling efforts designed to assess the directions of causality among independent variables may help us build models that yield greater insight. And second, once issues of the directions of causality among the independent variables are addressed, the development of path analytical models might help us quantify both the direct and indirect effects of differing explanatory factors. The end result, hopefully, would be a more complete understanding of the sources of variation at the state level and, potentially, improved insight into the desirability and appropriateness of differing forms of policy devolution.

And finally, while this work suggests clearly that ex ante statutory direction matters, and that its form affects intergovernmental policy implementation, it does so in only one policy area – water pollution control. Further research in other policy areas would help us verify the external validity of the findings here, while perhaps also yielding insights regarding further variations in the forms of ex ante control available to Congress. Efforts of this kind should probably begin with other environmental policies with federal-state implementation structures such as air and waste, but one can certainly envision this kind of analysis being extended to other forms of social regulation such as occupational safety and health, and perhaps non-regulatory policy areas as well.

While additional research conducted in the above mentioned areas would be quite useful in advancing scholarly literature, the results of the analyses conducted in this work also provide a useful window from which to analyze the current state of American water pollution policy. The background information presented in Part I and the historical and cross sectional analyses presented in Parts II and III provide a substantial body of information and analysis that has direct bearing on future Congressional choices with regard to federal water pollution policy generally, and federal-state relationships in this area in particular. It is to a discussion of these insights that we now turn.

14.2.3. Water Pollution Policy in the United States: Where From Here?

The information and analyses presented here yield several conclusions about our current system of water pollution control in the United States. They also suggest some appropriate future directions for US water pollution policy. The two subsections that follow highlight conclusions in these areas and provide a brief overview regarding some potential future policy directions.

14.2.3.1. The Current State of Water Pollution Control in America:

Paul Light and his colleagues were correct in their positive assessments of water pollution policy in the Post World War II era (Light, 2000). As a result of strong Congressional direction and substantial efforts to implement those directions on the parts of federal agencies, state governments, and regulated entities, we now have a water pollution policy infrastructure that is capable of addressing water pollution problems throughout the country. This was not the case a half a century ago, and the significant accomplishments since that time are a testament to both Congressional influence and regulatory progress at both the federal and state levels. We know that this policy infrastructure has reduced pollutant loadings to waters in the United States. We know that it has addressed water pollution problems in a number of important water bodies. And, we know that it has enabled continued economic development at reduced cost to the environment. These propositions, it seems to me, are not subject to significant dispute.

However, this broadly positive picture does not mean that all is well in the world of US water pollution policy. To the contrary, the analyses here highlight at least four significant problems that should be addressed if we are to make progress toward the ambitious goals outlined in the FWPCA. Several of these problems are quite evident in the existing literature, although not all of them have been stated clearly as such up until this point in time. Evidence of the last of these problems has surfaced particularly in this work, even though some in the practitioner community may have had suspicions about this particular problem prior to this time. The discussion will now outline each of these major problems.

First, we do not have clear and defensible measures of the water quality conditions throughout the United States, and this creates major problems in our efforts to both understand our progress and target our resources. As a nation, we have done a poor job of monitoring water quality, and – consequently – we do cannot fully understand the impacts of our policy actions. One water pollution policy professional put it this way:

> “We still cannot tell you, after thirty years (of the current Federal Water Pollution Control Act), what the overall trends in the quality of the nation’s waters actually are”.

While this blunt statement may seem as though it should be a controversial admission, it is widely accepted among scholars and practitioners of environmental policy and water pollution control (Gormley, 2000; Davies & Mazurek, 1998; EPA, 2000; GAO, 1986). Thus, while it is clear that we have made progress in combating growing threats to our water resources, we have done a very poor job of our measuring our progress. This failure calls our current program efforts into question, and also prevents us from having adequate confidence in our prescriptions for further improvements.

Second, in spite of massive expenditures over the last half-century, it is clear that Congress is not investing the resources that are necessary to accomplish its ambitious goals. During the last thirty years, federal grants to the states for administration of the federally required programs have amounted to about $3.8 billion, approximately 5 % of the $72 + billion spent on federal subsidies for wastewater facility construction. When state, local, and private sector funding for pollution control infrastructure is taken into account, our expenditures on water pollution control infrastructure over the last thirty years reaches well into the hundreds of billions of dollars. While states have increased their expenditures on environmental programs over the last decade and half (Brown, 2001), there is a massive and continuing multi-million dollar gap between current water pollution expenditures and the amount of money needed to fully administer the FWPCA (ASIWPCA, 2002).

While this discussion should make it clear that Congress has under-invested in water pollution control relative to the ambitious goals that it has set in this policy area, the same point is evident if we look at EPA's water pollution control expenditures in relationship to overall federal budgetary appropriations. Indeed, the EPA's entire annual budget totals about $8 billion, and the water regulatory portion of the budget is much smaller than that – approximately $2 billion or so, less than one one-thousandth of the federal budget. While some scholars have argued that statutory regulation is less expensive than other forms of government intervention (Majone, 1996), Congress has taken this legitimate insight to unreasonable extremes in the case of water pollution control. When we invest hundreds of billions on infrastructure improvements and small fractions of that on regulating and managing those investments, we have to question whether the balance of our expenditures has been appropriate. Congress bears responsibility for this imbalance, as it finds it far more comfortable to fund distributive policy efforts than it does to provide sufficient funding for the regulatory and technical assistance efforts that are necessary to accomplish its expansive purposes.

Accompanying this restricted funding for federal water pollution control efforts, we also see continually expanding federal regulatory requirements and responsibilities. Between 1986 and 1998, the number of pages in the Federal Water Pollution Control Act (FWPCA) has increased by about 50 % (largely as a result of the 1987 Water Quality Act), and regulations implementing these statutes have also expanded substantially. We see clear evidence of this regulatory overload in our analyses of NPDES permitting, as a number of states fail to impose water quality based effluent limits of various kinds and substantial permit backlogs remain for years on end. We are now seeing the unfortunate results of this funding neglect, as states find themselves unable to implement fully the FWPCA's required regulatory programs. With an estimated 20,000 Total Maximum Daily Loads to conduct (Federal Register, 2000), a water quality standard program in need of updating, new wet weather requirements to implement, and seemingly endless increases in estimated future costs to rehabilitate existing sewerage infrastructure, the existing funding gap appears to be just the tip of the iceberg. This "hollowing out" of the national water pollution control program effort is not going unnoticed. The number of citizen petitions to withdraw state NPDES programs has grown from 1 in 1989 to 26 in 2001 (USEPA, 2002C). EPA and state water pollution programs are overloaded, and the slippage we see in this analysis from Congress's directions is in large part traceable to this mismatch between Congress's statutory desires and the resources it has appropriated.

A third major problem that needs to be addressed relates to the imbalance that exists between efforts to reduce point and non-point sources water pollution. As is evident from the analyses conducted herein, we have a rather strong command and control regulatory system for point source wastewater discharges and a largely non-regulatory grant in aid system to combat water pollution stemming from non-point sources. While this differentiation has been useful for purposes of comparative analysis, it has the effect of confusing our overall water pollution control efforts. As has been noted, the policy instruments authorized for these two sources of water pollution differ in terms of the audiences to whom they apply, the kinds of federal-state roles they envision, and the forms of intervention they authorize. At the same time, the information now available suggests that the vast majority of water pollution problems in the country are attributable to non-point sources (USEPA, 2000A & B). Largely as a result, we have seen substantial increases in funding to address non-point source water pollution concerns over the last decade, and a gradual expansion of the definition of point sources to include wet weather runoff from additional industrial facilities, municipalities, and larger animal feeding operations. While these expansions in the universe of point sources subject to federal regulation effectively enables federal and state agencies to deal with a larger universe of water pollution problems using command and control regulatory structures, it also creates additional stress on an under-funded regulatory system and makes determinations on the use of regulatory controls dependent on legalistic determinations that have little to do with water quality. In this context, we have to ask ourselves whether the current two-tiered water pollution policy system distorts our efforts to develop rational responses to water pollution problems as a whole, even if there is some rationale for applying different tools based on differences in the nature of point and non-point source water pollution problems (Alm, 1992; Peters and Hoornbeek, 2004).

In fact, a good case can be made that the unbalanced regulatory system currently in place results in irrational systems of water quality control. For example, current discussions of the future of US water pollution policy revolve around Total Maximum Daily Loads (TMDLs) – the FWPCA requirement that environmental controls be implemented consistent with the total pollutant loadings that can be absorbed by a water body while still meeting water quality standards. This focus, however, is not a productive one unless problems associated with the dual nature of our existing water quality controls are addressed. There are many water quality problems remaining in our country, as is suggested by EPA's estimate that 20,000 TMDL's are in need of development (Federal Register, 2000). At this point, however, our system for imposing TMDL based controls is lacking in both the resources to implement these regulatory actions and appropriate mechanisms to prioritize our actions. And, even if there were more resources and good information on the quality of rivers and streams throughout the country, the federal government and the states are not in a good position to implement controls under the TMDL program because existing federal authorities are one sided. They enable EPA efforts to force more stringent point source controls, while leaving states on their own to determine the need for more stringent non-point source controls. The end result – it appears – is likely to be an unduly expensive system of point source controls and perhaps an overly lenient system of controls for non-point sources, a point that has been voiced by point source dischargers. And, because the EPA has limited authority to impose non-point source water pollution controls, this tendency toward ever more stringent point source controls accompanied by lenient non-point source controls is likely to continue until the current bi-furcated system is rationalized by statutory changes in some fashion.

A fourth problem that should be addressed presents itself as a policy conundrum that will make it difficult to know how best to address the bi-furcation of current regulatory system. The analyses presented in this work demonstrate vast disparities among the states in regard to the aggressiveness of their water pollution programs. There are massive variations among the states with regard to the activism of their non-point source water pollution programs, and similar – although differently distributed – variations in regard to the stringency of point source permits. At the same time, the analysis of NPDES permit requirements presented here also suggests that current federal oversight efforts effectively promote greater stringency in state issued NPDES permits in states with relatively weak non-point source water pollution problems – typically, those which have received their NPDES permitting authorizations recently. The end result, it appears, may be federal pressures – consistent with existing federal policy design – to increase the stringency of NPDES permits that are particularly effective in states with weak non point source water pollution programs. If we accept EPA's broad suggestion (2000A & B) that non-point source water pollution sources now impair more waters than point sources, then it becomes clear that existing federal oversight efforts are misdirected. We are thus left with a conundrum suggesting that wide discrepancies in state actions may justify further federal action, but existing forms of federal oversight appear to force costly and potentially ineffective point source regulatory efforts.

In short, the analyses presented in this work and the problems outlined above provide support for the idea that further federal action is necessary if we are to continue pursuing existing water quality goals effectively, even as they also suggest that the current federal program is not particularly effective in targeting actions toward priority problems. At the same time, however, the insights here also provide us with some initial ideas on where we might go from here. What follows is an effort to outline some useful first steps in this regard.

14.2.3.2. Where to Go From Here:

One thing that should be evident from the discussions outlined above is that Congress must exercise leadership if the problems noted here are to be addressed. Throughout the last half century it is clear that Congressional leadership has been central to progress in water pollution control. That continues to be the case today. The current experimental era has now outlived its usefulness, as current regulatory stalemates relating to TMDL's, sewerage infrastructure and operation, and large animal feeding operations make it apparent that continued progress can now only take place in the context of strong actions that only Congress can initiate.

Congress is now many years late in re-authorizing the FWPCA, and the problems outlined above require that it take up this issue and take it seriously. To the extent there is a debate occurring, however, it is somewhat misguidedly focusing on TMDL's and money for outdated sewerage infrastructure. While these issues are important and do need to be addressed, they should not be the sole focus of inquiry. The discussion that follows seeks to outline some basic options that Congress should consider when it chooses to step up to the plate and exercise the leadership role it has historically played in this area, even if this possibility sounds like a pipe dream given the current Congress's apparent lack of interest in these issues. However, the ideas and options presented here are just a beginning point. They remain in need of further definition. Nevertheless, they should provide useful starting points for additional analyses that will clearly be needed to guide future policymaking in this area in the years to come.

The first issue that Congress should address directly is the quality of our nation's water quality monitoring and tracking efforts. For over a decade and a half now, the EPA has said it is working with the states to improve existing monitoring systems. At this point, it is still hard to discern whether any progress has been made in this area. It is clear, however, that EPA has only a soft mandate in this area to report the results of state assessments, and it has not chosen to impose any kind of structure to ensure the quality and comparability of state monitoring results. As a result, the reports issued in recent years do not seem much more definitive than those of earlier years. While the issue of how best to monitor and track trends in ambient water pollution control is a complex one that is characterized by numerous technical uncertainties, federal policy cannot be effective until it is guided by some set of accepted measuring rods. Under the current system, in spite of GPRA, NEPPs, and additional strategic efforts on the part of EPA, we do yet appear to be where we need to be. It therefore seems to be time for Congress to establish some form of clear direction to EPA to produce some definable set of ambient water quality measures to guide monitoring efforts nationally – perhaps in cooperation with the National Academy of Sciences or some other respected scientific body, and then step up to the plate and fund this kind of monitoring and reporting system accordingly. This will take millions of dollars, but we are spending millions already and we don't know where the effort is taking us.

A second area in need of Congress's focus and attention is the level of investment we make in our water pollution control efforts. As noted above, Congress's desires as stated in statute far exceed the resources it is providing, and this gap is widening as EPA and the states seek to address wet weather related water pollution problems in the context of an aging national sewerage infrastructure. The easy answer here is to suggest larger budgets, but that is not enough. In the current context, it is appropriate and important to provide additional funding for water pollution control, but we also need to re-think the manner in which those funds are expended. At a minimum, the analyses here suggest, that care be taken to fund monitoring and water quality indicator related program efforts more heavily, and perhaps also to create a more equitable and appropriate balance between direct subsidies for infrastructure and funding to support EPA, state regulatory, and technical assistance efforts. It seems clear that this balance has been skewed toward subsidies in the past, and that this has resulted in some of the policy overload problems that currently exist at both the federal and state levels.

A third area in need of significant Congressional policy attention is the need to adjust the overall structure of our federal-state water pollution control effort to match our current understanding of the problems that confront us. At least two problems highlighted in this work are worthy of attention in this regard. First, there is a need to reconcile the conflicting approaches we currently take in point source and non-point source water pollution control, because the bifurcation of the current structure will inevitably lead to unduly expensive and ineffective results. There are several options available, none of which may be completely satisfactory in and of itself. One option, which might be advocated by enthusiasts of policy devolution, would be withdrawing the preemptive approach used for point source discharges altogether, and relying on grant based mechanisms to deal with both point and non-point source controls. However, the analysis here has made it clear that state commitments to water pollution control vary substantially, and this approach would foster even greater discrepancies and potentially increased capture related concerns as well. And, even well developed state programs are likely to suffer if the door to the closet containing the EPA "gorilla" is locked on a permanent basis.

An additional option is the development of extensive pollution trading programs similar to what has been done for sulfur dioxide in air emissions. The recently retired EPA Assistant Administrator for Water, Tracy Mehan, had been promoting this concept for water and one can certainly see advantages in this approach. Under a properly operating trading system, point source dischargers who are subject to stringent regulatory controls might be able to help address water pollution problems more inexpensively if they simply paid for improvements in non-point source controls. While there are advantages to this approach, the devil is in the details as the system would become increasingly complicated when efforts are made to deal with multiple pollutants and multiple dischargers. In addition, even if these problems could be addressed, it is not intuitively obvious why point source dischargers should have the lion's share of the regulatory burden when non-point sources are increasingly contributing the lion's share of the problem. Nevertheless, this kind of approach may be useful in some cases, and we may want to consider enabling its further use under certain circumstances.

Another option would be to develop technology based controls of some sort for non-point sources generally, and impose these controls on farmers, foresters, construction professionals, and others who might be involved in non-point source water pollution producing activities. While this is being done to some degree under the guise of expanding the definition of a point source under the FWPCA, this current approach is unlikely to succeed ultimately in the current resource constrained environment. At some point, new requirements with no effective teeth due to federal and state resource constraints undermine the entire system. If, by some miracle, Congress were to choose to pursue the expansion of federal regulatory authorities to non-point sources in the continued context of very limited resources, it would also seem appropriate to look at other ways to reduce the overall demands of the federal-state system (grant oversight, water quality standards oversight, point source oversight, etc.). The simple establishment of new and uniform non-point source controls might add yet another federal-state policy fence-post that would effectively diminish the ability of states to manage the overall set of controls in effective fashion – again, particularly in the current resource constrained environment.

This latter insight highlights yet another set of concerns that should be dealt with in a re-structuring of the current system – those relating to existing disparities among the states in their efforts and the need to foster more sensible forms of federal intervention with regard to water pollution program priorities. One approach that holds some promise might be to implement a system of "functional equivalence" that would require the states to develop wholistic approaches within their borders that would address the full range of water quality program components – point sources, non-point sources, watershed management, water quality standards, pre-treatment approaches, infrastructure financing, etc. Under this kind of system, states might retain responsibility for prioritizing actions across sources consistent with federal program goals, and receive broader latitude than they currently have under other existing FWPCA program requirements for point sources. In return, their entire program, including overall funding levels, might be made subject to federal EPA review and approval. Criteria for these reviews would need to be established, and – to ensure continued accountability – these reviews could be subject to some form of legal review in the courts as a result of citizen suits. Other forms of continued accountability might also be implemented. The federal government might engage in more active efforts to foster the development of water pollution control advocates that might participate in state decision-making efforts – a variation on the federal support structure concept highlighted by Charles Epp (1998) in relation to other policy areas. EPA and the federal government might also retain concurrent authority to issue permits for all forms of discharge as well as ongoing enforcement responsibility, where needed, thus enabling the continuing availability of the federal "gorilla in the closet." If this kind of system were implemented in the context of existing federal program goals and a drastically improved system of monitoring and reporting on ambient water quality, one could certainly envision it serving as a potential vehicle for program improvement.

The above discussion provides a set of ideas that would clearly be in need of further development before they could be enacted and/or implemented. However, they do provide a sense of the kinds of options available to Congress if it were to again take its inherent leadership responsibilities for water pollution control seriously. My hope is that this will at least eventually be the case, and that the discussion here may contribute in some positive way to this effort.

14.3. Closing Thoughts

If there is a single lesson to take away from this work, it is that Congress does influence policy in fundamental ways. It continues to serve as the primary policymaker in our federal system of government, and will continue to do so in the years to come. And, in spite of a plethora of analyses over the past several decades focusing on the language of delegation, committee preferences, oversight hearings, and other forms of activity, Congress's power to make law, ex ante, under the Constitution remains the most critical tool of control available to it.

The evidence presented in this work has suggested that Congress has guided this country's water pollution control efforts in the post war World War II era. Some of Congress's directions have been implemented without major problems, while others have encountered significant difficulties. In both cases, however, we have seen federal and state administrators respond to Congress's directions, and policies clearly appear to have changed as a result. In those few cases where policies have gone un-implemented in reasonable periods of time, the issues underlying these failures have come back to Congress and have resulted in changes that were in fact implemented. The 1948 loan program was eventually transformed into a funded grant program, the dysfunctional enforcement conference provisions of the 1950's eventually led to enforceable water quality standards and NPDES permits, and the TMDL provisions of the 1970's were eventually enforced in the courts and have been returned to Congress as well. The point here is that Congress's legal directions do matter, and even in those relatively few cases where they are disregarded, time (albeit, a long time in some cases) has a way of bringing them back to Congress for final resolution once again.

Similarly, it is also clear from this work that the form of Congressional policy design matters. While supportive policies based largely on grants and preemptive regulatory policies can both be effective, the analyses here suggest that the politics engendered by these policies are different – a Lowi-esque conclusion, to say the least. At bottom, this means that there is a need to pay greater, not lesser, attention to Congress and its policymaking functions. In a time of growing bureaucratization and privatization it is tempting to conclude that policy is made and implemented by the executive branch and through its agents in the states and private sector. This work reminds us once again that Congress is central to the American policymaking process, and will likely remain so in the future.

APPENDIX A

Major State Non-Point Source Water Pollution Expenditures

A total of twenty-five states were identified that expended substantial state generated monetary resources targeted toward non point source water pollution control, above and beyond the FWPCA's Section 319 grant program matches, in the 1998-2001 time frame. These states were identified from the three following sources:

1. EPA Non Point Source Success Stories – Volume III (USEPA, 2002A)
2. The National Association of State Budget Officer's (NASB0) May 2000 survey of State Budget Officers (NASBO, 2000)
3. The Environmental Council of the States' 2000-01 Compendium of State Environmental Innovations (ECOS, 2001A).

To be listed as providing major financial support above and beyond the 319 program match, a state had to be listed in at least one of these publications as having expended at least $500,000 in state funds to support non-point source and/or watershed related activities for years between 1998 and 2001. The states meeting these criteria are as follows:

California
Connecticut
Delaware
Florida
Georgia
Illinois
Iowa
Maine
Maryland
Massachusetts
Michigan
Minnesota
Missouri
New Hampshire
New Jersey
New York
North Carolina
Ohio
Oregon
Pennsylvania
Rhode Island
Vermont
Virginia
Washington
Wisconsin

APPENDIX B

Strength of State Enforceable Authorities for Non-Point Source Water Pollution Control

1. Numerical ratings are applied to each of four major sections of state law, as summarized in the Environmental Law Institute's Almanac of Enforceable State Laws to Control Water Pollution, 1998 (ELI, 1998). These sections relate to: 1) water pollution law; 2) operational laws for forestry; 3) operational laws for agriculture and; (4) operational laws for earth moving activities. The strength of each set of legal requirements is rated on a 2.5 scale, with a ten point overall scale resulting from the four rankings.

2. Within each of these 2.5 point scale ranking categories, points are apportioned as follows:

   2.5 points = Required actions by potential non-point source polluters and state agencies prior to release of pollutants, accompanied by a broad coverage of pollutants and polluting activities within the legal category and enforceable requirements contained in the statute.

   2 points = Required actions on the part of potential non-point source polluters and/or state agencies, but with a significant exemption from the breadth of pollutant coverage. Clear enforcement authorities are also necessary.

   1.5 = Broad and clear authority to regulate non-point sources, but generally without clear and significant required actions by potential polluters and/or state agencies prior to pollutant release. Clear enforcement authority is also required, but it may be accompanied by significant exemptions.

   1 = Broad coverage of non-point source pollutants or polluting activities subject to regulation, with at least two substantial exemptions from coverage. Authorities to regulate may also have restrictions

   .5 = Some enforceable coverage of non-point source pollutants and polluting activities. However, authorities may be limited or restricted and exemptions from coverage are significant and substantial.

   0 = no significant enforceable requirements for non-point source water pollution.

3. Point totals for each of the four categories are totaled to arrive at "strength of enforceable authorities" score, which is used as one component of the dependent variable for NPS Policy Activism. As noted above, the scores are displayed in Chapter 10 in Part III of this work.

Note: The total scores for both Idaho and South Dakota are reduced by 2 points, because the presence of very strong "no more stringent" laws in those two states.

APPENDIX C

Point Source Water Pollution Data Sources and Coding

This appendix provides an outline of the data sources and coding procedures used in generating the data presented in Chapter 12 of this work on point source water pollution controls. The information used in that chapter includes data on NPDES Permit Program Authorizations, the numbers of NPDES permits issued by states and EPA, state permit backlog data, permit requirements on Whole Effluent Toxicity (WET), and permit limits for major municipal dischargers for Total Suspended Solids and Bio-chemical oxygen demand.

NPDES Program Authorization Data

Data on NPDES program authorizations and the length of time it has taken states to receive authorizations were obtained from EPA. Their reference document, State NPDES Program Status, January 21, 2001 (USEPA, 2001B), included the types of authorizations each state has received and the dates upon which each state received those authorizations. The length of time until receipt of authorization figures were derived by counting the months between the date of the first state to be authorized (for each category of authorization) and the date the state in question received authorization for that authorized program element. States that had not received authorization were counted numerically as one month beyond the date of the last state to receive that authorization. In all cases, the last state to receive NPDES authorization was Maine, which received authorization for all NPDES program elements (except biosolids) in January of 2001.

Permit Data

The data on NPDES permits issued were drawn from EPA's Permit Forecasting Tool (PIFT). These data were provided to the author by EPA staff in Winter of 2001, and the data were retrieved in Fall, 2000. The data sited here exclude data for minor permits in four states (WY-64, LA-2278, ID-78, AK-120) that were listed as "not being issued". Alaska and Idaho are the only states that list "major" permits that were covered under general permits.

Permit Backlog Data

The data on expired permits were also drawn from PIFT. The "major" data included both municipal and industrial majors, while the all permits data include majors, minors, and general permitted facilities that were not related to storm-water. Storm-water related permits were not included because states were at various stages of storm-water permit program implementation at the time the data were retrieved, and these data were therefore particularly subject to distortions as a result of idiosyncratic reporting patterns associated with implementing a new program. Storm-water phase II regulations (the storm-water regulations covering smaller cities), for example, were just beginning to be implemented. Figures for Louisiana, Alaska, Idaho, and Wyoming were calculated to exclude "permits not issued" as listed in the PIFT report. They were the only states with permits in this category.

Whole Effluent Toxicity (WET)

The data underlying these estimates were provided by EPA in the fall of 2001, and relate to major industrial and municipal dischargers in the states. The data were provided in electronic format, and were then printed onto several hundred pages so they could be coded by hand. In this case, the data consisted of a several hundred page printout of permits containing WET requirements. Based on conversations with EPA staff, it appears that PCS does not differentiate between cases in which actual WET limits are applied and cases in which the applicable WET requirement comes in the form of monitoring requirements only. Consequently, the permits counted with WET requirements include permits with limits and permits with monitoring requirements only. However, in both of these situations, an effort is made to ensure that the effluent is not toxic, because a finding of toxicity – in and of itself – is likely to trigger a toxicity reduction evaluation and may also violate the FWPCA's prohibition against "toxics in toxic amounts." And, because most of the cost associated with WET requirements stems from the monitoring requirement, the distinction between permit limits and monitoring requirements is not of great importance for the purposes here.

Major Municipal Permit Limits for Conventional Pollutants

The data underlying these estimates were provided by EPA in January of 2003. The data provided were for all Major Municipal Permits contained in EPA's Permit Compliance (PCS) database --- a total of several thousand permits, and the request included permit data for all 50 states.

While the data were provided in electronic format, they were printed out on a total of 406 pages and hand coded. The conventional pollutant parameters coded were total suspended solids (TSS) and Bio-chemical Oxygen Demand (BOD). The EPA staff member providing the data included both a legend for the data columns included and an explanation of that legend during several telephone conversations. That information was quite helpful in enabling proper coding of the data.

For each of these pollutant parameters, the EPA data provided included information on the pipes or conveyances regulated, the pollutant parameter regulated (TSS and BOD) at each pipe or conveyance, and the applicable monthly average limit and/or the seven day average limit(s) for each pipe. Because the national technology based standards for both TSS and BOD are 30 milligrams per litre (mg/l) monthly average and 45 mg/l seven day average (EPA, 1996 p. 76), the coding consisted of determining whether any of the limits for each major municipal permits was below these threshold values.

One exception to these numerical threshold values involved BOD permit limits that were applied to carbonaceous BOD (CBOD), as opposed to five-day BOD. EPA allows for the issuance of BOD limits to be determined on the basis of CBOD in cases where it is reasonable to believe that nitrification is taking place during the treatment process that may affect testing determinations using the five day BOD procedure (40 CFR 133.102). In these cases, EPA recommends that 25 mg/l monthly average and 40 mg/l seven day average be used in lieu of the 30/45 limits, unless the state has data demonstrating that a different conversion is appropriate. Consequently, in cases where the permit limited CBOD rather than BOD, this alternative 25/40 mg/l threshold was used.

Using these threshold values, the following decision rules were used in determining whether the permit was "more restrictive" than the technology-based requirements:

1. The existence of any permit limit more restrictive than a threshold value noted above indicated that the permitting authority was setting a limit more stringent than the technology based standard.
2. While many permits contained rather restrictive values for both TSS and BOD, a single restrictive value for one or the other of these two pollutant parameters was sufficient for the permit to be classified as restrictive.

3. Because of the prevalence of significant permit backlogs, no effort was made to differentiate currently applicable limits from those with previously applicable limits. However, because of the anti-backsliding requirements in the CWA (Section 402 o), it is quite unlikely that permit limits would become more lenient over time. This assumption was corroborated by visual inspection of the actual data during the coding process. In only a few cases were more stringent limits found to be applicable during earlier permit periods, a negligible number when several thousand permits were investigated.

During the coding process, it became evident that three states had not submitted data on BOD and TSS limits for their major municipal permits in comprehensive fashion. These three states, North Carolina, Pennsylvania, and West Virginia were omitted from the analysis.

APPENDIX D

Summary Explanation of Independent Variables

<u>Control Variables</u>

Coastal State (Coast) – Coastal states are coded "1" and non-coastal states are codes "0", based on their proximity to an oceanic coastal area or the Great Lakes, as these states are subject to the requirements of the Coastal Zone and Reauthorizations Act (CZARA), which effectively subsidizes more active non point source water pollution programs in these states. In total 26 states are coded as "coastal" and 24 states are coded as "non-coastal".

Federal Land Percentage (Fedland) – This is the percentage of land within each state that is owned by the federal government, excluding trusts. The data is drawn from the 2000 Statistical Abstract of the United States (USDOC, 2000). The state with the highest proportion of federally owned land is Nevada, with 83.1% of its land owned by the federal government, and the state with the lowest proportion of federally owned land is New York where .4% of the land is owned by the federal government.

<u>State Responsiveness Variables</u>

Public Opinion on the Environment – Mean State Opinion on the Environment (PONORENV) – Data summarizing state public opinion on the environment are drawn from Norrander's work on state public opinion regarding various issues (Norrander, 2001). Her indicator of public opinion on environmental spending is based on National Election Study survey results for US Senate races from 1988 through 1992. The questions asked in these surveys focused on attitudes toward environmental spending, and the indicators are expressed as means of the responses tabulated. Lower values reported by Norrander reflect the view that higher levels of environmental spending are desirable, although – for the sake of clarity – the signs presented in this work are reversed for ease of interpretation. The highest level of concern over environmental spending in this index was in Rhode Island, and the lowest level of concern in this area was in Utah.

Estimated Water Pollution Problem Severity (or "Need" for strong water pollution programs) - Two major indicators of water pollution problem severity are used in this analysis. One is oriented toward water pollution impairments and is used in the non-point source models and the point source models relating to conventional pollutants. The other is oriented specifically toward toxic pollutants and is used in the models dealing with Whole Effluent Toxicity (WET). These two measures are described below.

> **Percentage of State Waters Impaired or Threatened** (IMPWAT) -- This variable reflects the percentage of waters in each state listed by the state as impaired or threatened in the 1998 305 (b) Report to Congress (USEPA, 2000A). The variable reflects the average percentage of impaired or threatened waters across rivers, lakes, and coastal areas (including the Great Lakes), each of which is reported separately in the 305 (b) report. In each case, the measure accounts for only those waters that are reported, so inland state figures tend to be based on impairments or threatened impairments in rivers and lakes, while coastal states also account for impairments and threatened impairments in coastal waters. The states with the highest percentages of impaired waters are Indiana and North Dakota, and Wyoming reported the lowest levels of water impairment.

Toxic Water Pollution Problem Severity: Toxics (AMBTOX1) --- Pounds of toxic pollutants released to water per square mile of water area in the state. The data on toxic pollutant releases are from the 1997 EPA Toxic Release inventory, as recorded by the Natural Resources Defense Council of the world website of the Clean Water Network (CWN). The data from the CWN worldwide web site were retrieved in 2001. The total pounds of toxic releases to water include both direct discharges to surface waters and discharges to Publicly Owned Treatment Works that, in turn, discharge to Surface Waters. The data on water area per state is drawn from 2000 statistical abstract of the United States, page 227. It includes both coastal waters and the Great Lakes. The states with the highest reported toxic pollutant loadings per square mile of water area are West Virginia and Pennsylvania, while those with the lowest toxic pollutant loadings are Alaska and Wyoming.

Democratic Party Strength (DCNSINST) - The data used here are drawn from the 2000 Statistical Abstract of the United States, and reflect the total number of years the Democratic Party controlled state government policymaking institutions (The Governorship, and Upper House, and the Lower House) during the years between 1992 and 2000. Democratic control of any of the three state policymaking institutions for a biennium is counted as 2 years. The range of values for this indicator of Democratic Party policy control is 0 (Utah) to 30 (Maryland and several others).

Moralistic Political Culture (MPOLCULT) - Data on political culture are based on Elazar's conceptualization of moralistic, individualistic, and traditional political cultures. Moralistic cultures are the primary focus of this analysis because they would be expected to have particularly active governmental programs applicable to non point source water pollution. Traditional and individualistic states would not be expected to have such active programs according to the cultural theories advanced by Elazar and others. In the data set used for this analysis, moralistic states (primarily northern states) are coded "1" as dummy variables, while other states are coded "0". The source used to code the states was Gray and Jacob, Politics in the American States, 1996, pages 26 and 27.

Traditional Political Culture (TPOLCULT) - Data on political culture are based on Elazar's conceptualization of moralistic, individualistic, and traditional political cultures. States with traditional cultures might be expected to have the least active programs because they tend to favor traditional elites within the population who may have interests in polluting enterprises. In the data set used for this analysis, traditional states (primarily southern states) are coded "1" as dummy variables, while other states are coded "0". The source used to code the states was Gray and Jacob, Politics in the American States, 1996, pages 26 and 27.

State Capacity Variables

Wealth -- Per capita income (Incomepc) – Data on per capita income come from 1995, a year chosen because it is just prior to the 1997-2001 time frame in which data for the dependent variable indicators are taken. The 1995 per capita income data was taken from the 2000 Statistical Abstract of the United States, Chart 727. The highest state per capita income in 1995 was $31,947 in Connecticut, while the lowest was $17,185 in Mississippi.

Institutional Form of the Water Pollution Agency -- Health vs. Non-Health Agencies (AGMISNPS) – Data on state agency forms were drawn from the EPA Office of Water lists of point and non point source water pollution contacts. States with Agencies listing "public health" or "health" prominently in their name were listed as "Health" agencies, while agencies with titles focusing on "environment", "natural resources", "water", or other non health related titles were listed as non-health agencies. State agencies in

Colorado, Hawaii, Kansas, North Dakota, and South Carolina are classified as Health Agencies. Water pollution programs in the remaining 45 states are managed by non-health agencies. Non-health agencies are coded to equal 1, while health agencies are coded to equal 0.

Legislative Professionalism (LEGPROF) – The data reflecting legislative professionalism are drawn from Peverill Squires 1992 study of legislative professionalism in the fifty states. The measure accounts for length of legislative sessions, legislative pay, and staffing levels. According to Squires' measure, New York has the most professionalized legislature while New Hampshire's is the least professionalized.

Group Theory Based Variables

Non-Point Source Water Pollution Industry Strength (PRCFCGSP%gsp) – The data used to estimate the strength of non-point source water pollution industries within a state reflect the proportion of each State's gross state product that is devoted to farming, forestry, fishing, and construction. Because agriculture, forestry, and construction activities are major sources of non-point source water pollution, the proportion of a state's economy devoted to these activities reflects an approximation of the strength of the non-point source water pollution industries in that state. Data to calculate these percentage figures were drawn from the Statistical Abstract of the United States. The highest levels of non-point source industry strength according to this measure were in North Dakota and South Dakota (13%), while the lowest level of industry strength in these areas was found in New York (3%).

Point Source Water Polluting Industry Strength (gspprecm) -- % of State GSP that is derived from manufacturing. Total gross state product in 1997 divided by the total gross state product devoted to manufacturing in 1997. Both figures are chained data from 1992, and are drawn from the 2000 Statistical Abstract of the United States. The state with the highest proportion of their economy devoted to manufacturing is Indiana, while Hawaii is the lowest.

Local Government Strength (mmpthpop) – number of major municipal permits per thousand population. The number of major municipal permits data is drawn from EPA's PIFT report and the population data is from the 2000 Census, as reported in a spreadsheet on environmental expenditures in the states provided to the author by the Environmental Council of the States. The state with the highest number of major municipal permits per thousand population is Maine and the state with the lowest number of major municipal permits per thousand population is Nevada.

Environmental Group Strength (NWFPERTH) – Data on environmental group strength are based on the number of National Wildlife Federation Members per thousand population in the state. The NWF members by state data were provided by NWF staff on December 12, 2001 and population data are drawn from the 2000 census as provided by the Environmental Council of the States. Values for this variable ranged from 10.57 NWF members per thousand population in Vermont to 1.83 NWF members per thousand population in Mississippi.

Tourism Industry Strength (GSPTOU97) **-** This variable reflects domestic travel expenditures as a percentage of Gross State Product (GSP) for each state. The state travel expenditures were reported by the Bureau of the Census, based on figures (in millions of 1999 \$'s) provided by the Travel Industry Association of North America (CIS, 2003). The GSP figures are from 1997 and were reported in the Statistical Abstract of the United States. The state with the greatest tourism industry strength was Nevada, followed by Hawaii, Florida, and Montana. The state with the lowest tourism industry strength was Indiana.

Federal Influence Variable

Federal influence (npdaumos) – Temporal Proximity to NPDES Authorization. This is the number of months it took for the state to receive its NPDES permitting authorization from EPA, expressed as the number of months between May 1973 when California received the first such authorization to the date at which each state received it's respective authorization up to January, 2001 – the date of the most recent NPDES authorization (Maine). States with high values for this variable received their authorizations recently, and have therefore been subject to a more recent dose of major federal influence than the states with lower values. The six states that had not received such authorization by January 2001 are measured until February 2001, the date at which these statistics were developed. California, the first state to receive NPDES authorization is shown as 0 here, while Maine is shown as 332.

APPENDIX E

State Water Quality Program Rankings

This Appendix compares the rankings drawn from this work with three other relatively recent rankings of state water quality programs. These rankings are presented in two tables. Appendix Table E-1 presents rankings for each state in alphabetical order, while Appendix Table E-2 presents the rankings by listing states in each cell in descending order of their estimated level of water quality program strength, activism, and/or stringency. The rankings presented are:

Ridley -- Fund for Renewable Energy and the Environment (FREE), 1988.

The FREE rankings are based on a range of indicators, including EPA state program authorization status, the number of major municipal dischargers, the percentage of major industrial NPDES dischargers in significant non-compliance, the number of major municipal dischargers, the percentage of major municipal NPDES dischargers in significant non compliance, the number of EPA enforcement actions taken to back up failures of state enforcement programs, NPDES permit backlogs, a ranking of non point source water pollution programs and policies, the total numbers of river miles assessed and meeting designated uses, and the total lake acres assessed and meeting designated uses. The range of values for the FREE 88 rankings is 1 (TX) to 10 (NC), with larger values reflecting higher rankings.

H & K -- Hall and Kerr, The Green Index, 1991.

The Green Index report includes a set of measures that take account of a broad set of indicators of state water quality program activism. These indicators include NPDES permitting authorization, authority to regulate federal facilities, a Pretreatment program, a groundwater protection program, Underground Storage Tank program, a groundwater toxics program, a wetlands protection program, and a phosphate ban. The range of potential values for this index is 1(AK, LA, & TX) to 8 (WI, MI, MN), with larger values reflecting higher rankings.

Rgqst – Ringquist, Environmental Protection at the State level, 1993.

Ringquist's rankings combine elements of the FREE and Hall and Kerr rankings. They account for a range of potential water quality program elements, including: the level of state responsibility for NPDES & municipal grant construction programs, the percentage of NPDES permittees in significant non compliance, the number of EPA enforcement actions taken to back up poor state enforcement, the scope and strength of state non point source pollution control programs, an approved pretreatment program, a toxic water pollution control program, federal facilities regulatory authority over NPDES, and a groundwater protection program (Ringquist, 1993, p. 157). The range of values in Ringquist's scale is 2 (TX) to 13 (WI), with larger values reflecting higher rankings.

Hbk, 1997-2002 – Hoornbeek, Runaway Bureaucracy or Congressional Control, 2004.

The last three columns in both tables show rankings developed in this work for both non- point source activism and point source stringency. The column labeled "NPS" reflects NPS activism, while that last two columns display state rankings for the two measures of point source permit restrictiveness used in this work. The first of these two point source rankings reflects the percentage of major permits in the state that included whole effluent toxicity requirements (toxicity), while the second of these two latter columns reflects rankings based on the percentage of major municipal permits in the state with permit limits on Total Suspended Solids (TSS) or Bio-chemical oxygen demand that are more stringent than the federal technology based standards (Convtl). The range of both of these percentage figures is 0 to 100%, with 100% reflecting a higher level of stringency than 0%.

Appendix Table E-1: State Water Quality Program Rankings, Alphabetical Presentation*

State	88 Ridley	91 H&K	93 Rgqst	97-02 Hbk NPS 97-02	97-02 Hbk Toxicity	97-02 Hbk Conven-tional
Alabama	35	37	44	34	22	14
ALASKA***	48	46	49	43	35	43
ARIZONA	35	37	44	44	27	43
Arkansas	49	37	44	47	1	15
California	18	13	19	5	31	31
Colorado	18	26	36	47	14	39
Connecticut	9	13	10	7	5	32
Delaware	35	26	19	24	50	1
Florida	18	26	19	6	17	9
Georgia	2	8	10	13	32	8
Hawaii	18	13	19	29	24	43
IDAHO	35	46	36	33	37	36
Illinois	18	13	3	25	36	1
Indiana	35	13	31	40	26	11
Iowa	2	13	15	20	41	42
Kansas	9	26	19	27	23	27
Kentucky	18	13	19	29	41	13
Louisiana	48	48	49	34	15	16
Maine	18	26	31	1	6	38
Maryland	9	8	3	8	41	17
MASSACHUSETTS	18	37	36	15	16	23
Michigan	18	1	3	17	41	18
Minnesota	9	1	2	18	41	21
Mississippi	35	13	31	37	29	19
Missouri	18	13	19	23	21	28
Montana	18	26	19	32	25	40
Nebraska	2	8	15	40	30	43
Nevada	35	26	36	31	34	29
NEW HAMPSHIRE	35	37	36	8	11	33
New Jersey	9	4	3	4	12	20
NEW MEXICO	35	37	44	50	20	34
New York	18	4	10	11	41	37
North Carolina	1	4	3	11	2	N/A**
North Dakota	18	26	36	44	10	1
Ohio	18	26	19	20	28	6
Oklahoma	46	37	36	40	2	7
Oregon	6	4	3	2	38	10
Pennsylvania	35	13	15	13	40	N/A
Rhode Island	18	13	19	22	13	25

Appendix Table E-1 (continued)

South Carolina	6	13	31	27	8	22
South Dakota	9	46	36	44	19	25
Tennessee	18	37	44	37	18	24
Texas	49	48	49	26	9	5
Utah	18	26	19	47	7	1
Vermont	9	8	10	15	41	41
Virginia	2	8	3	18	41	12
Washington	35	26	31	2	39	35
West Virginia	9	37	44	37	33	N/A
Wisconsin	6	1	1	10	41	30
Wyoming	9	13	15	34	4	43

* The numbers in each column reflect the ranking of the state in for each measure specified in the column heading. The numerical rankings take account of tie values by giving all states with the same value the same ranking. Because ties are common – particularly in the first three sets of rankings, the values presented do not always extend to the 50 rank. In the Table, lower numerical scores reflect higher rankings.
** The N/A indicates that insufficient data was available to rank the state for the measures indicated.
*** The states in capital letters have not received NPDES program authorization. This is relevant for the two latter measures of point source permit stringency because it means that EPA, not the state, issued the permit limits from which the ranking was derived.

Appendix Table E-2: State Program Rankings, Ordered State Presentation*

88 Ridley	91 H & K	93 Rgqst	97-02 Hbk NPS**	97-02 Hbk PS-Toxicity**	97-02 Hbk PS-Conventional Restrictiveness**
North Carolina	Michigan	Wisconsin	Maine	Arkansas	Illinois
Georgia	Minnesota	Minnesota	Oregon	North Carolina	Utah
Iowa	Wisconsin	Illinois	Washington	Oklahoma	North Dakota
Nebraska	New Jersey	Maryland	New Jersey	Wyoming	Delaware
Virginia	New York	Michigan	California	Connecticut	Texas
Oregon	North Carolina	New Jersey	Florida	Maine	Ohio
South Carolina	Oregon	North Carolina	Connecticut	Utah	Oklahoma
Wisconsin	Georgia	Oregon	Maryland	South Carolina	Georgia
Connecticut	Maryland	Virginia	New Hampshire	Texas	Florida
Kansas	Nebraska	Connecticut	Wisconsin	North Dakota	Oregon
Maryland	Vermont	Georgia	New York	**New Hampshire**	Indiana
Minnesota	Virginia	New York	North Carolina	New Jersey	Virginia
New Jersey	California	Vermont	Georgia	Rhode Island	Kentucky
South Dakota	Connecticut	Iowa	Pennsylvania	Colorado	Alabama
Vermont	Hawaii	Nebraska	Massachusetts	Louisiana	Arkansas
West Virginia	Illinois	Pennsylvania	Vermont	**Massachusetts**	Louisiana
Wyoming	Indiana	Wyoming	Michigan	Florida	Maryland
California	Iowa	California	Minnesota	Tennessee	Michigan
Colorado	Kentucky	Delaware	Virginia	South Dakota	Mississippi
Florida	Mississippi	Florida	Iowa	**New Mexico**	New Jersey
Hawaii	Missouri	Hawaii	Ohio	Missouri	Minnesota
Illinois	Pennsylvania	Kansas	Rhode Island	Alabama	South Carolina
Kentucky	Rhode Island	Kentucky	Missouri	Kansas	**Massachusetts**
Maine	South Carolina	Missouri	Delaware	Hawaii	Tennessee
Massachusetts	Wyoming	Montana	Illinois	Montana	South Dakota
Michigan	Colorado	Ohio	Texas	Indiana	Rhode Island
Missouri	Delaware	Rhode Island	Kansas	**Arizona**	Kansas
Montana	Florida	Utah	South Carolina	Ohio	Missouri
New York	Kansas	Indiana	Hawaii	Mississippi	Nevada
North Dakota	Maine	Maine	Kentucky	Nebraska	Wisconsin
Ohio	Montana	Mississippi	Nevada	California	California

Appendix Table E-2 (continued)

Rhode Island	Nevada	South Carolina	Montana	Georgia	Connecticut
Tennessee	North Dakota	Washington	Idaho	West Virginia	**New Hampshire**
Utah	Ohio	Colorado	Alabama	Nevada	**New Mexico**
Alabama	Utah	Idaho	Louisiana	**Alaska**	Washington
Arizona	Washington	Massachusetts	Wyoming	Illinois	**Idaho**
Delaware	Alabama	Nevada	Mississippi	**Idaho**	New York
Idaho	Arizona	New Hampshire	Tennessee	Oregon	Maine
Indiana	Arkansas	North Dakota	West Virginia	Washington	Colorado
Mississippi	Massachusetts	Oklahoma	Indiana	Pennsylvania	Montana
Nevada	New Hampshire	South Dakota	Nebraska	Iowa	Vermont
New Hampshire	New Mexico	Alabama	Oklahoma	Kentucky	Iowa
New Mexico	Oklahoma	Arizona	Alaska	Maryland	Hawaii
Pennsylvania	Tennessee	Arkansas	Arizona	Michigan	Nebraska
Washington	West Virginia	New Mexico	North Dakota	Minnesota	Wyoming
Alaska	Idaho	Tennessee	South Dakota	New York	**Alaska**
Oklahoma	South Dakota	West Virginia	Arkansas	Vermont	**Arizona**
Louisiana	Alaska	Louisiana	Colorado	Virginia	N/A***
Arkansas	Louisiana	Alaska	Utah	Wisconsin	N/A***
Texas	Texas	Texas	New Mexico	Delaware	N/A***

* **Bolded states** indicate the issuance of NPDES permits by EPA, rather than the state.
** See Tables 10-5, 12-6, and 12-7 for more detailed information on these rankings.
*** N/A indicates that there was not sufficient data to rank the state according the measure indicated.

EXPLANATORY FOOTNOTES

Chapter 1

No Explanatory Footnotes

Chapter 2

1. In 1937, President Roosevelt sought to add six new justices to the Supreme Court in order to create a more favorable judicial environment for his efforts to expand federal powers. While his proposal was defeated in Congress, subsequent Supreme Court decisions were more responsive to his proposals (Pritchett, 1978).

2. The statutory variables highlighted by Mazmanian and Sabatier (1983) were:
   - precision and clear ranking of objectives;
   - validity of the causal theory underlying the statute;
   - initial allocation of financial resources;
   - hierarchal integration within and among implementing institutions;
   - stipulation of formal decision rules of implementing agencies;
   - commitment of key implementing officials.

3. Two theories of partisan influence on state policymaking have been proposed and tested in the past. The first is based on the established tendency of the Democratic Party in the United States to favor stronger environmental policies than the Republican Party (Lester, 1980; Calvert, 1989). It is this theory that is explicitly tested in this work. A second theory, advanced by V.O. Key (1949) over a half a century ago, argued that party competition within a state will facilitate more active state policies, as political parties seek to outbid each other for the support of key constituencies. This latter theory is not investigated extensively in this work because past studies have failed to establish it as a currently important variable for predicting aggressive environmental programs (Ringquist, 1993; Lowry, 1992).

4. Both Lowry (1992) and Ringquist (1993) rely on ranking processes developed by non profit organizations that are, in fact, a compendium of policies from different sectors that mix inputs, outputs, impacts, and outcomes. Lowry relies on the 1988 FREE (Ridley, 1988) study which combines policy procedures/inputs (# of delegations), general outputs (# of major municipal and non-municipal permits), impacts (significant non-compliance rates, and outcomes (estimate % of assessed waters meeting designated uses) into one overall surface water program ranking. For his point source work, Lowry appears to rely on the FREE work entirely, while his non point source work combines the FREE data with data from other sources.

Rinquist also uses the FREE data, but combines it with data from Kerr and Hall's (1991) ranking of state environmental programs (Ringquist, 1993, p. 157). His measure also appears to draw from inputs/procedures, outputs, impacts, and outcomes, respectively, as is indicated by the discussion of the FREE procedure above. To the FREE ranking score Ringquist also adds data from the Hall and Kerr study on industrial pretreatment program authorization, toxic water pollution control programs, authority to regulate federal facilities, wetlands programs, and groundwater programs.

5. Although see Denise Scheberle (1997) on the role of trust in federal-state relationships, and Deil Wright (1988) on intergovernmental relationships between the federal government and the states.

Chapter 3

1. The $50 billion figure provided by NAPA is a projected annual estimate developed by the USEPA in 1991, and is expressed in 1986 dollars (NAPA, 2000, p. 21).

2. The Clean Water Act requires the establishment of designated uses that serve to guide the establishment of water quality standards for surface waters throughout the United States. States are responsible for establishing designated uses for water bodies, and the categories of uses vary by state. Typical uses include public water supply, propagation of fish and wildlife, agriculture, etc (USEPA, 1999).

3. Ecosystems vary considerably, and it is worth noting that some water quality contaminants are present naturally in the environment. Arsenic and radon come to mind in this regard.

4. The data compiled here (by EPA for its 305b report) are collected from states. Historically, there has been concern over the quality and consistency of these data because states may use different processes for monitoring water quality and reporting the results to EPA. For general discussions of these processes see the section on Measuring Ambient Water Quality at the end of this chapter, as well as Ringquist, 1993; USEPA, 2000A, and Hoornbeek, 2000.

5. In general, storm-water runoff from large construction operations, concentrated animal feeding operations, and separate or combined sewage systems are considered point sources while storm-water flowing diffusely to receiving waters is not. However, see Section 40 of the Code of Federal Regulations (40 CFR), Part 122-124 for more detailed information.

6. While this threefold characterization is a sensible one, it may not adequately account for the unique and particular features of non-estuarine coastal waters or the Great Lakes.

7. For example, between 1972 and 1992, for example, municipal sewage treatment plants reduced the pounds of BOD they discharge from 13,000,000 to 5,000,000, and this represents a removal rate of 88% compared to 62% in 1972 (ASIWPCA, 1992, p. 13). In addition, the proportion of the population served by secondary treatment increased by 33% and the proportion of the population served by advanced treatment necessary to meet water quality standards increased by 950% (ASIWPCA, 1992, p. 12).

8. It is worth noting that POTW's may be operated by private contractors of various kinds.

9. Pretreatment programs typically focus on two areas of concern in relation to industrial discharges to municipal treatment works. Some industrial pollutants may *interfere* with POTW treatment process and therefore may inhibit adequate treatment. Other pollutants may simply *pass through* the established treatment processes without receiving adequate treatment.

10. Water quality problems that stem from storm-water runoff are often exacerbated by inflow and infiltration (I & I) problems, as storm-waters flow into manhole covers and/or into leaks in sewerage collection systems. While these problems may be exacerbated in older sewerage systems in the east, some western cities have also had significant water quality problems that stem from storm-water runoff. San Diego comes to mind in this regard.

11. Of the fifty state summary reports included in the EPA's 1998 Water National Water Quality Inventory (EPA, 2000A), forty-seven mentioned non-point sources prominently in their discussion of identified water quality problems. The three states that did not – Idaho, Indiana, and South Carolina – did not identify sources of major problems at all.

12. Sources for more information on non-point source problems and strategies for alleviating them include USEPA, 1992, 1993, and 1994 and the EPA worldwide web site (www.epa.gov).

13. Under current federal National Pollutant Discharge Elimination System (NPDES) requirements, AFO's confining 1,000 or more slaughter or feeding cattle (or equivalent units of other animals) are defined as Concentrated Animal Feeding Operations (CAFO's), and are defined as point sources under the Federal Water Pollution Control Act (FWPCA). See 40 CFR Part 122.23 and Part 122, Appendix B more detailed information.

14. The relatively recent debate over whether or not to dredge the Hudson River in New York in an effort to remove polychlorinated by-phenols (PCBs) reflects the difficult issues associated with dredging river beds which are known to contain toxic substances in sediment. In the end, EPA has decided to dredge the river, but this decision came only with much controversy and disagreement.

15. However, septic tanks which discharge directly to surface waters are considered point sources under the FWPCA because they discharge directly to waters of the United States.

16. In the mid 1990's, EPA issued new regulations for sanitary landfills that significantly increased the cost of operating landfills in a manner that is compliant with the Resource Conservation and Recovery Act (RCRA). As a result, many landfills were forced to close, and the number of operating sanitary landfills in the country dropped in subsequent years.

17. These tests for chemical specific pollutants involve a variety of testing methods, some of which are quite expensive and require substantial skill to conduct. For example, Gas chromatography/Mass spectroscopy (GC/MS) equipment that is often quite expensive and requires substantial skill to operate is required for some of these pollutants.

18. For example, the US Geological Survey has operated national water quality monitoring programs under the auspices of its National Water Quality Assessment (NAWQA) program and its National Stream Quality Accounting Network (NASQAN). Both of these efforts are designed to produce useful comparative data on stream quality, with the NAWQA focusing on 59 study areas and the NASQAN focusing on four major river basins – the Mississippi, the Columbia, the Colorado, and the Rio Grande. For more information, see USEPA, 2000A, Chapter 2.

Chapter 4

1. Several early court cases were instrumental in defining the scope of federal power and its relationship to the powers of state governments, including McCullough v. Maryland and Gibbons v. Ogden. See Pritchett, 1978 for more discussion of these cases.

2. The propriety of federal involvement in land use decision-making has been a central element of debates relating to environmental policy in recent years. Because land uses have been increasingly implicated in modern environmental problems, environmentalists have sought increased federal influence in this area. At the same time, development interests and state and local governments have sought to resist federal involvement in this area. In the early years of the Clinton Administration, for example, Secretary of Interior Babbit proposed and sought funding for a National Biological Survey that would enable a better understanding of our nation's ecosystems, and the identification of threats to them. The proposal was defeated, largely because it was viewed as a first step on the road to national land use planning. The current resistance to federal regulation of non-point source water pollution faces many of the same obstacles.

3. While the 1899 Act was the first "broad" federal legislation relating to water pollution control, there were a number of more narrowly focused state efforts prior to that time (Allayaud, 1979).

4. In fact, this 1899 Act was later used as a basis for federal water pollution enforcement in the late 1960's and early 1970's (see Davies, 1970; Bastow, 1986: and Ball, 1976 for discussions of these efforts). This Act has also been used as a basis for prohibiting "offshore drilling and dumping of untreated effluents into navigable waters" (Ball, 1976, p. 170).

Chapter 5

1. This literature includes Hines, October, 1966a; Hines, December, 1966b; Hines, April, 1967; Abkin, 1969; Davies, 1970; Brenner, 1974; Lieber, 1975; Ball, 1976; Thomas, 1976; Allayaud, 1979; Holmes, 1979; Sylves, 1982; Bastow, 1986; Freeman, 1990; Russell, 1990; Freedman & Jaggi, 1993; O'Leary, 1993; McElfish, 1994; Mintz, 1995; Houck, 1999; Freeman, 2000, as well as a number of different Environmental Protection Agency (EPA) and Congressional Research Service (CRS) documents, as well as Congressional Quarterly Almanacs for the time periods in question. After completing the chapters in Part II, I then reviewed relevant portions of several major works on the Environmental History of the United States to verify the results of the initial analysis. I found no significant reason to question the findings, based on this supplemental review. The historical works reviewed were Hays, 1987, Hays, 1998, Hays, 2000, Petulla, 1977, and Andrews, 1999.

2. While I believe that most experts in water pollution policy would concur in the significance of the policy changes that have been selected for study, it is appropriate to recognize that a number of important changes were omitted from the analysis. For example, the wetlands provisions in the FWPCA (Section 404) were omitted from the discussion because the involvement of the Army Corps of Engineers in the implementation of those provisions would serve to complicate the EPA-State relationship that is a central focus of this study. In addition, these provisions are less directly related to surface water protection, the focus of this study, than many of the other provisions analyzed. In addition, the citizen suit provisions are dealt with only tangentially because they are not directly administered by federal agencies and the states. Other provisions are not addressed extensively because they were relatively small compared to other portions of the Congress's direction in the Clean Water Act (The Clean Lakes program established in 1977, for example), dealt with problem areas that are considered to be of relatively low risk relative to other areas addressed by the Act (biosolids management, for example), or simply made adjustments in existing authorities and responsibilities that were already in place (the addition of administrative penalty authorities for enforcement actions in the 1987 Act). Nevertheless, it is, I think, fair to say that these, and any other, omissions are not likely to substantially affect the overall results of the analysis.

3. Some may make the case that the absolute cutoff of $500,000 is not appropriate because it discriminates against smaller states that may spend a large proportion of their budget on non-point source water pollution concerns and still not meet the $500,000 threshold. While conceptually correct, this concern is overstated. One-half million dollars is not a lot of money, even for the smaller states. For example, a number of the smallest states in the country (Delaware, Vermont, Rhode Island, and New Hampshire, for example) did meet this criterion for budgetary activism, even as some larger states (Texas) did not.

In addition, even though a continuous expenditure measure would clearly be desirable, it is not currently available. While the studies from which these data were drawn were detailed enough to ascertain with reasonable certainty whether the funding provided by the states were traceable to the 319 federal grant program, the specific forms of expenditures above and beyond that varied tremendously. They included, for example, bond issuances for a wide variety of purposes (including but not limited to non-point source water pollution control), general purpose revenues, fees to be spent for multiple purposes, and other sources that could not readily be compared with one another on a continuous basis. Consequently, while there were actual revenue or expenditure amounts available in all of these cases, the figures cited are not comparable with one another. As a result, the data sources drawn upon in this work have stronger analytical foundation if they are interpreted dichotomously rather than continuously. And this foundation is stronger than any that currently exists, because – to my knowledge – no attempt has been made to date to estimate state expenditures in these areas for all 50 states.

4. EPA's Permit Compliance System (PCS) data base is the only national inventory of information on NPDES permit provisions available in the country, and it is used by EPA on an ongoing basis as the primary mechanism for managing wastewater discharges on a nationwide basis. For this reason, it provides perhaps the only opportunity for scholars and practitioners to develop large scale measures of permit restrictiveness across the states. It is used by EPA and the States with some regularity, so it is subject to continuing review by water quality professionals.

Like other federal data sources, however, the PCS has been subjected to a number of criticisms. Many of the criticisms relate to the quality of information on low priority discharges and information that must be updated frequently. These data include information on "minor" dischargers, the quality of information in Discharge Monitoring Reports (DMRs) that are updated either monthly or quarterly to provide information on recent tests of effluent quality, and information on state enforcement actions. While the EPA has required state use of this database, some states have been criticized for failing to use it effectively.

Some portions of the data entered into PCS, therefore, are more reliable than others. And this study has sought to use some of the more reliable types of data included in the database. The focus on major discharger data only, for example, avoids concerns about the quality of data for minor discharges. And, in the case of both toxicity requirements and requirements relating to conventional pollutants, the data used relate to the permit requirements themselves (for majors only) which are updated only once every five years or so. Probably because of this focus on permit limits (the benchmark against which other data in PCS often relate), the EPA staff who provided the author with the permit requirement data used in this study expressed confidence in the quality of the data he provided.

This confidence was generally supported by my own review of the data provided, which documented regular and frequent updates of permit requirement information by the states in most cases. What is more, there were a large number of major municipal permits which showed limits right at the national technology based standards (30 mg/l TSS and BOD monthly averages), as would be expected if the data entered were accurate. This finding provides additional reason for confidence in the data presented in this work. Nevertheless, there were a few states in which data on particular pollutant parameters were either missing or insufficient. The data from these states on these pollutants were therefore omitted from the analysis as described in the chapter on point source water pollution policy restrictiveness.

The end result, I believe, is the strongest set of data on permit restrictiveness currently available. Indeed, these data are not only the strongest data available; they are the *only* data available in usable format. To the extent that they remain imperfect, however, it is my hope that this study provides further impetus for continuing improvements. In the end, our country cannot conduct a nationwide water quality program without high quality data on effluent discharges. My hope is therefore that the use of this data in this work may serve as an additional prompt for further improvements on an ongoing basis.

5. Section 101(a)(3) of the Act prohibits the discharge of "toxic pollutants in toxic amounts", and this provision provides a clear Congressionally generated statutory basis for EPA's policy recommendation that states include WET requirements in their NPDES permits.

6. It is important to note in this regard that permit limits more restrictive than the standard technology based limits are required in cases where effluent discharges violate or threaten to violate water quality standards. Very small discharges into very large streams, for example, are not likely to hold this potential, while larger discharges into small water bodies are quite likely to do so. For this reason, state use of permit limits more stringent than the technology based uniform values for BOD and TSS depend not only on their willingness to impose stringent controls, but also on the quality of state assessments regarding the need for stringent effluent controls in the first place. Given the problems with state monitoring of ambient water quality discussed previously (which, to the extent they are incomplete, would tend to reduce the percentage of restrictive permits), however, it seems reasonable to use measures that account for both of these aspects of state programs in this particular context. *The reader should understand, however, that actual variations among the states in ambient water quality may affect this measure because the proportion of permits with stringent limits on conventional pollutants should vary with the extent to which these more stringent limits are needed to achieve water quality standards.*

Chapter 6:

1. See note 5-1 for a listing of this literature.

2. See note 5-2 for further explanation.

3. More specifically, the hypotheses were:

> - Substantive statutory direction from Congress structures the extent and nature of federal involvement in surface water pollution control policymaking and implementation;
>
> - The extent and nature of federal policy direction affects state surface water pollution policy outputs;
>
> - State surface water pollution policy outputs are more likely to be responsive to broad based state level influences when federal involvement is minimal than when it is extensive.

4. This accounting of major legislation does not include rather minor policy changes such as a 1952 Act extending authorizations for the original 1948 Act (66 Stat. 755, 1952, see Hines, 1967, p. 814, note 63), or a bill expanding the federal water pollution program that was successfully vetoed by President Eisenhower in 1960 (CQ Almanac, 1960, pges. 250-251). It also excludes the 1970 Water Pollution Control Act, which – while significant – addressed primarily oil discharges at sea.

5. See the Congressional Quarterly Almanac, 1960, page 250 for figures between 1957 and 1961. In all of these years, Congress's appropriation was at least $45 million.

6. This sliding scale consisted of $80 million in 1962, $90 million in 1963, and $100 in subsequent years.

7. The earliest enforcement conference I found referenced in the secondary literature was one involving the Corney Creek Drainage System in Arkansas and Louisiana. A hearing on that case was called for January 16 and 17 by the U.S. Public Health Service (Holmes, 1979, p. 319), although – given this timing – it seems quite possible that abatement processes began prior to the time the 1956 Act was put into effect.

8. Primary administrative responsibility for the Act remained in HEW for only a short period, as Reorganization Plan Number 2 in 1966 transferred implementation responsibility in the Act to the Department of Interior (Abkin, p. 77).

9. Under the Act, state failure to implement water quality standards for its intra-state waters would result in a 40% federal match rather than a 50% match, CQ Almanac, 1966, p. 632).

10. "Secondary" treatment involves the treatment of organic waste materials through biological processes, in addition to the physical separation of solids that occurs in "primary" treatment.

Chapter 7

1. The veto override votes in the House and Senate both took place on October 18, 1972. The vote was 247-23 in the House, and 52-12 in the Senate (CQ Almanac, 1972).

2. For helpful discussions of the changes made in 1977 Act relating to technology based standards, see O'Leary, 1993 and EPA, 1996.

3. The Act essentially incorporated the results of judicial decisions regarding the establishment of priority toxic pollutant controls as part of its technology based controls, and provided EPA with flexibility to add or subtract from this list (See O'Leary, 1993, Chapter 2 for more discussion).

4. "Non-conventional" pollutants are those which are not listed in 40 CFR Part 401. They include, for example, nitrogen, phosphorus, and total organic carbon.

5. Essentially, the citizen suit provisions included in the 1972 Federal Water Pollution Control Act allowed citizens to sue either dischargers or the EPA if they failed to comply with the Act's directions. The provision was modeled after a similar provision that was included in the 1970 Clean Air Act.

6. There were approximately 250 court cases taking issue with varying aspects of the regulations that had been promulgated (Freeman, 1990, p. 112).

7. Like many of the policy impacts that appear to flow from EPA and state implementation of the FWPCA, it is difficult to know how best to apportion credit for these improvements to various parts of the act. For example, were the significant improvements mentioned here in relation to municipal wastewater treatment traceable to construction grants funding, or the fact that were federal permit requirements in place requiring treatment? Freeman's 1990 analysis suggests that NPDES permit requirements, rather than the federal grant subsidies, were the primary factor (Freeman, 1990, p. 137). However, it seems likely that both provisions of the Act had positive effects in reducing wastewater discharges. Whether the relative emphasis on regulation vs. subsidies was appropriate is another question altogether.

8. Broadly speaking, a general permit covers similar activities within a single jurisdiction. They have been used for oil and gas drilling and stormwater discharges, for example.

9. This usage of the Refuse Act was effectively struck down in late 1971 by a Federal District Court in Ohio, in Kalur v. Resor, which held that the issuance of a permit for an individual facility would require the preparation of an environmental impact statement under the National Environmental Policy Act of 1969 (F. Supp. 1, 3 ERC 1458, 1 ELR 20637 DDC 1971).

10. These ASIWPCA listed "significant facilities" are not identical to "major" permits as defined by EPA. However, they were obviously deemed by the states to be "significant" (ASIWPCA, 1984).

11. In simplified form, the compliance process for NPDES permittees involves the required submittal of "self monitored" discharge data to the authorized state or EPA, inspections by regulatory agencies (EPA or States) on an occasional basis, and the compilation of reports that address instances of significant non-compliance (SNC). SNC violations are those that are particularly large or long in duration, and/or that pose clear threats. For this reason, SNC non-compliance rates substantially understate the actual levels of permittee non-compliance with requirements contained in their permits.

12. The compliance rate figures for industrial facilities were a bit better than they were for industrial facilities. Seventy-nine percent of these facilities had at least one month of non-compliance during the 18 month period, compared to 86% for municipalities (US GAO, 1983, as cited in Freeman, 1990, 113). Moreover, about 16% of the industrial facilities were in "significant non-compliance (SNC)" – meaning that plants had potentially dangerous violations and/or violations of long duration, compared to a comparable figure of 32% of municipal facilities (Freeman, 1990, 113-114).

13. The Conference report on bill stated the following in reference to the requirements of Section 303 of the 1972 Act:

> "The Administrator should assign secondary priority to this provision to the extent limited manpower and funding may require a choice between a water quality standard process and early and effective implementation of the effluent limitation permit program ….. If a State has limited resources and Federal program funding is inadequate, the primary state effort should be devoted to effective implementation of the new program and, to the extent not inconsistent, existing water quality implementation plans rather than assigning needed personnel to the added function required under Section 303". (as quoted in Lieber, 1975, p. 102)

Clearly, even as Congress was including rather detailed language relating to TMDL processes in the new Act, it was simultaneously sending signals to EPA that these provisions were to take a back seat to the new effluent based permit program. While EPA may have strayed from Congress's ex ante directions in failing to implement the TMDL program, it was – at the same time – abiding by Congress's managerial directions.

14. It should be noted here that the author, as a young EPA staff member in the mid 1980's, played a role in producing this estimate for the OTA study. Working in consultation with a senior member of the Agency's enforcement staff, the author developed this estimate based on an estimate of the number of major municipal permits with effluent limits on Bio-chemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) less than the federal technology based standards. A somewhat similar – although not identical – methodological approach is used in Part III of this work.

15. In his veto message to Congress, for example, President Nixon suggested that the "laudable intent" of the new act was outweighed by its "unconscionable" price tag (CQ Almanac, 1972, p. 721). He later sought to impound founds under the Act, an effort that was found on February 19, 1975 to be unconstitutional by the Supreme Court.

16. See CQ Almanac, 1977, p. 700).

17. For example, John Rhett, EPA DAA for Water, admitted that EPA had been slow in getting the grants out. See CQ Almanac, 1977, p. 700 for more information.

18. Myrick Freeman, for example, questions whether the construction grants program was indeed an efficient way to bring about municipal wastewater treatment (Freeman, 1990). In making this argument, he cites studies suggesting that federal government grants actually displaced local funding for wastewater treatment. The clear implication here was that the local governments would have paid for the treatment even in the absence of the federal grants!

19. It is useful to note that while funding for this kind of technical assistance has never been extravagant, and it continues to be rather limited.

Chapter 8

1. President Reagan vetoed the 1987 Water Quality Act on January 30, 1987. On February 3, 1987, the House of Representatives overrode this veto by an overwhelming vote of 401-26. The Senate followed suite one day later, overriding the President's veto by a vote of 86-14 on February 4, 1987 (CQ Almanac, 1987, p. 291).

2. A 2000 strategy published by the USEPA's Office of Water, for example, shows the number of permits at almost 400,000, having grown to that level from about 65,000 in the mid to late 1980's. Resources for implementation of these permits, however, have not increased commensurately.

Chapter 9

1. The Bush administration appears to be reluctant to impose regulatory requirements on the states in the area of water pollution control. For example, its withdrawal of the Clinton administration Total Maximum Daily Load (TMDL) rule requiring more detailed procedures for state implementation of restrictive permit limits for water quality limited streams in December 2002 reflected a reluctance to impose burdens on state governments. Similar reluctance is evident in the President's nominees for influential posts at EPA. In late summer 2001, for example, President Bush's designee for the position of Assistant Administrator for Enforcement and Compliance (the nation's top environmental enforcement officer), Donald R. Schregardus, withdrew himself from consideration for the appointment because of controversies surrounding the cooperative approaches to enforcement he took as Secretary of the Ohio Environmental Protection Agency. His withdrawal followed a hold on his appointment that had been placed in the Senate by Senators Boxer and Schumer because of their concern that he might not be vigilant enough in enforcing federal environmental requirements.

2. It is this procedural quality of the statute that contributed to Lowi's concerns about excessive delegations of Congressional authority.

3. In addition, because the NPDES permitting authority is predicated on language relating to the "discharge of (any) pollutants," the definition of two additional terms also becomes important. These terms are as follows:

> "The term 'discharge of a pollutant' and the term 'discharge of pollutants' each means (A) any addition of any pollutant to navigable waters from any point source ….. (S 502 12)";
>
> "The term 'navigable waters' means the the water of the United States including the territorial seas (S 502 7)".

4. This $189 million figure represents just a bit less than 5% of the $4.325 billion in assistance made available for expenditure in FY 2000. The $1.35 billion figure for SRF funding in FY 2000 noted above

is the amount appropriated for that year. In recent years, the amounts available for expenditure exceed the amounts appropriated because monies from past years have been both matched and invested by the States to create a growing pool of funds, precisely the idea behind a "shared revolving fund."

5. This $238 million figure available for the Section 319 grant program administered by the EPA does not exhaust the federal funding support for non-point source water pollution control. Both the Department of Agriculture and the National Oceanographic and Atmospheric Administration also provide funding support for non-point source water pollution control projects, although not all of these funds are channeled through state governments.

6. Permit limits must be at least as stringent as the Federal Technology Based requirements (although there are certain exemptions – see USEPA, 1996 for more information), although – under the statute – they should also be more stringent in cases where more stringent permit limits are necessary to meet state established water quality standards. Permit limits based on "best professional judgment" are utilized in cases where federal minimum technology based standards have not yet been issued, or in cases where the particular facility does not fall within the definition of existing technology based standards.

7. For an excellent description of the NPDES permitting process, see USEPA NPDES Permit Writer's Manual, 1996.

8. Examples of these documents include Managing Nonpoint Source Pollution (USEPA, 1992), Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (USEPA, 1993), and Section 319 Success Stories Volume III (USEPA, 1994), to name just a few.
For a more complete overview of assistance activities, visit the Office of Wetlands and Watersheds Portion of the EPA's worldwide web site, www.epa.gov.

9. More specifically, under Section 319 b, state program reports were generally to include the following:

- an identification of best management practices to be used;
- an identification of programs for implementation;
- a schedule containing milestones for programs and best management practices;
- a certification by the State Attorney General that the state had adequate authority to implement the measures specified;
- sources of federal and other assistance and funding;
- an identification of federally funded projects and activities that the state would review for compliance with its non point source program.

Chapter 10

1. In the mid-to-late 1990's, EPA and the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) initiated a process for "upgrading" state nonpoint source water pollution control programs. State programs that met nine procedural criteria defining an "upgraded" program became eligible to receive additional "incremental" funding appropriated by Congress beginning in 1999 (Fox, 1999). The nine criteria were as follows:

- The state program contains explicit short and long term goals, objectives, and strategies to protect surface and groundwater.
- The state strengthens its working partnerships and linkages with appropriate State, Tribal, regional, and local entities (including conservation districts), private sector groups, citizens groups, and Federal Agencies.

- The State uses a balanced approach that emphasizes both State-wide nonpoint source programs and on-the-ground management of individual watersheds where waters are impaired and threatened.
- The state program (a) abates known water quality impairments from nonpoint source pollution and (b) prevents significant threats to water quality from present and future activities.
- The state program identifies waters and their watersheds impaired by nonpoint source pollution and identifies important unimpaired waters that are threatened or otherwise at risk. Further, the State establishes a process to progressively address these identified waters by conducting more detailed watershed assessments and developing watershed implementation plans, and then by implementing them.
- The State reviews, upgrades and implements all program components required by section 319 (b) of the Clean Water Act, and establishes flexible, targeted, and iterative approaches to achieve and maintain beneficial uses of water as expitiously as practicable. The state programs include: (a) a mix of water quality based and/or technology based programs designed to achieve and maintain beneficial uses of water; and (b) a mix of regulatory, non-regulatory, financial and technical assistance as needed to achieve and maintain beneficial uses of water as expeditiously as practicable.
- The State identifies Federal lands and activities which are not managed consistently with State nonpoint source program objectives. Where appropriate, the State seeks EPA assistance to help resolve issues.
- The State manages and implements its nonpoint source program efficiently and effectively, including necessary financial management.
- The State periodically reviews and evaluates its nonpoint source management program using environmental and function measures of success, and revises its nonpoint source assessment and its management program at least every five years.

While these criteria are largely procedural, they do demonstrate at least some continuing effort on the part of both EPA and the states to improve state nonpoint source programs in the directions defined by the Clean Water Act.

2. The term "Total Maximum Daily Load" (TMDL) refers to the maximum amount of a pollutant that a water body can receive and still meet water quality standards established for that water body. Under section 303 of the Clean Water Act, reductions in the releases of pollutants into receiving waters are required in cases where water quality standards are not met. The required releases are determined based on an allocation (typically carried out by the state) that may apply to both point and non point water pollution sources. While these provisions have been in the Federal Clean Water Act since 1972, EPA and state implementation of these provisions was quite lax until the 1990's, when a series of court decisions effectively forced more active efforts to implement them. Since that time, EPA has sought – with at best only partial success – to issue more stringent regulations implementing the TMDL program. One effect of these regulations, and recently proposed regulations that make the program more stringent still, are to call attention the contributions of non point source water pollution to degraded waters. In fact, since 1999, approximately $100 million of total amounts appropriated for the Section 319 program are to be targeted specifically for TMDL program planning and implementation (Sutfin, 2001). EPA currently estimates that over 30,000 receiving water segments are in need of TMDLs. For more information on TMDLs, see Part II of this work, Houck, 1999, and the EPA World wide Web site (www.epa.gov).

3. Ringquist's 1993 work evaluated overall water program strength, based on two sets of rankings provided by non-profit groups – Ridley, 1988 & Hall and Kerr, 1991. His dependent variable specification did not differentiate specifically between point source and non-point source aspects of state water pollution programs, but rather combined the two to form a single measure (See Ringquist, 1993, p. 157). While Lowry (1992) did differentiate quite clearly between point and non-point source aspects of

state water pollution programs, it appears that he used a ranking system that combined non-profit group rankings that are not very well documented (Ridley, 1988) with his own ranking system that is described generally in his published work (see pages 107 and 108 and associated footnotes for this general description). To my knowledge, the dependent variable used in this work is the most current and well-documented measure of state non point source water pollution activism now available.

4. Given the joint EPA/State effort to upgrade their programs in the late 1990's and the continuing concern over non-point source water pollution, it is clear that a number of states have taken steps to improve their programs in recent years. These improvements, however, are probably counterbalanced – at least to some degree – by program cut-backs enacted by states as a result of widespread state fiscal crises taking place in 2002. Pennsylvania, for example, delayed full implementation of its Growing Greener Initiative to offset a $1 billion state budget deficit in 2002 (Pittsburgh Post Gazette, June 30, 2002). Because of widespread state budget deficits in the early twenty first century, it is quite likely that Pennsylvania is not alone in this regard.

5. It is interesting in this context to note that both EPA and the two major state associations representing state water programs (ECOS and ASIWPCA) have been engaged in a "GAP" study that is seeking to quantify the extent to which current state programs are under-funded relative to the requirements of the Federal Clean Water Act. While it is not stated anywhere explicitly that I am aware of, the underlying assumption in these efforts appears to be that it is the Federal government – not the states – that should feel an obligation to make up this "gap" since it is defined pursuant to federal requirements. The language of the Act, however, does not appear to make this assumption. In this interpretation, as in many others, the pendulum of interpreting federal-state roles in water pollution control has been swinging in a manner that favors the states in recent years.

6. Section 319 b (4) states explicitly that "a state shall, to the maximum extent practicable, develop and implement a management program under this subsection on a watershed by watershed basis within such State."

7. One adjustment to the was made to the table presented in the NCSL study. While Table 2 in the NCSL study does not include Wisconsin as have a statewide planning program, the narrative about Wisconsin appearing later in the work makes it clear that it did indeed have legislatively authorized statewide planning capacities in place. For this reason, Wisconsin is included as having had a statewide planning process in place for purposes of this analysis.

8. It is now quite apparent that a number of states have added various kinds of basin-wide permitting schemes. North Carolina, for example, has a rather well developed basin-wide permitting scheme in place. While this system has been in existence since the mid 1990's, legislation specifically authorizing it does not appear to have been enacted until after completion of the NCSL study, thus accounting for the fact that it was not referenced as such in the NCSL study. However, users of this work should recognize that integrated permitting practices now appear to be more common than they were in 1998 when the NCSL study was published.

9. While the Florida and New Jersey approaches appear to be designed to ensure that non-point water pollution sources are accounted for as a part of NPDES permit issuance, the Texas provisions appear to focus primarily on ensuring the all point source permits for a watershed are issued in a common cycle (Morandi et. al., p. 20).

10. For example, while supervisors of Soil and Water Conservation Districts in Georgia have authority to adopt enforceable regulations, they may adopt these regulations only with the approval by referendum of the owners of the lands within the district (ELI, 1998, p. 62).

11. A more detailed explanation of the bases for these estimates is provided in the Appendices.

12. Soil erosion prevention programs, for example, may help reduce non-point source water pollution, but they may be directed primarily toward maintaining an adequate supply of good soil for growing crops.

13. While this measure of state funding for non-point source water pollution programs may not be ideal, it is the best available. Furthermore, because it relies on three separate research efforts carried out by knowledgeable professionals in state government and environmental management rather than just one study, it is likely to be rather comprehensive. This is particularly true because two of the studies were developed by state associations which have an institutional interest in ensuring that active state non-point source water pollution control programs are identified and recognized. In addition, many state programs – particularly those with very large budget allocations targeted toward non point source water pollution control appear in more than one of the studies, thus suggesting that most (if not all) states with large expenditures in this area are identified. To ensure that states with very small expenditures are not counted the same as those with substantial expenditures, at least one of the studies cited must include documentation that the state is expending at least $500,000 on non point source water pollution control. This bright line cut-off figure is appropriate because the source studies do not include precise and comparable data for non-point source water pollution control expenditures. While this approach does not allow for the use of per capita figures to account for varying state size, the amount required is low enough that smaller states with significant non point source program expenditures should exceed it. Both Rhode Island and Delaware, the two smallest states in the country, have non point source water pollution control expenditures that exceed this figure. More explanation regarding the studies used and the state funding efforts identified by them is provided in the Appendices.

14. Both California and New York have approved bond issuances approaching $1 billion in multi-year commitments – although the funds from these bond issuances are not 100% devoted to non-point source water pollution control.

15. While the alpha is reported here to indicate that there is significant inter-item correlation among the various activism measures, it is important to recognize that the measures used may or may not be associated with one another on a one to one basis in actual practice. While it is likely that states that are active by budgetary criteria are also active by statutory criteria, there is no fool-proof reason why this should always be the case. Thus, while the alpha statistic is generally designed to measure correlations among estimated parameters, it is being applied here to separate manifestations of a broad concept rather than different quantitative estimates of a more narrowly defined concept. In this context, it should not be surprising that this alpha value falls a bit short of conventional practice regarding appropriate inter-item correlation for scaled variables (Carmines & Zellar, 1979). Put differently, while one would certainly expect some correlation between the statutory and budgetary indicators of state NPS policy activism used here, one would not expect that all active states would enact the same combination of these non-point source pollution control measures. Indeed, it would seem reasonable and appropriate to find variation among the states according to these indicators, and this expected variation – when combined in a common scale – would arguably lead to a more refined measure of the overall concept of activism than any of the single indicators viewed in isolation. For these reasons, the use of scale with an alpha in the .5 to .6 range seems quite appropriate for the current purposes – particularly given Carmines and Zellars' acknowledgement that the appropriate alpha values do vary depending on the substantive situations to which they are applied (Carmines & Zellar, p. 51).

Chapter 11

1. While these models focus on the variables that were found to be strong predictors in the previously presented partial models for ease of interpretation, fully specified models utilizing all thirteen variables from these models yield results that are quite similar to those presented here. In addition, the integrated model results do not change appreciably when the public opinion measures developed by Brace et. al. (2002) are used in place of those developed by Norrander (2001).

2. Public opinion on the environment (Norrander, 2001) is correlated in statistically significant fashion with both per capita income (r = .628, significance = .000) and environmental group strength (r = .501, significance = .000).

3. This was not possible in the case of the logit model seeking to explain major state expenditures relating to non-point source water pollution control. Here, the sensitivity of the logistic regression models to numerous independent variables prevented the use of a fully specified model. An alternative approach was therefore used in this case, and it is explained in the text.

4. Indeed, the coastal state variable and the farming, fishing, and construction industry strength variable are negatively correlated with one another (-.445), and statistically significant at the .01 level.

5. For example, even Oregon and Washington – states with relatively active NPS water pollution programs – have laws on the books that effectively limit the extent to which their state environmental agencies can regulate non point source discharges emanating from forestry activities (a large industry in both states). Oregon law bars "the state Environmental Quality Commission and DEQ from 'promulgating or enforcing any effluent limitation upon non point source discharges of pollutants resulting from forest operations on forest lands' unless mandated under the federal Clean Water Act" (ELI, 1997, p. 59). Washington exempts forest practices from the state's water pollution law if they are conducted in conformance with the state's forest practices law (ELI, 1998, p. 271). As another example, Colorado "requires the use of non-regulatory mechanisms before regulatory approaches may be used for agricultural non-point sources and places express limitations on the use of permits or other control regulations against agricultural non-point source discharges" (ELI, 1998, p. 31). Kentucky and several other states also exempt agriculture specifically from their states' water pollution laws in favor of treatment under their agriculture laws. And these are just several examples of the kinds of provisions that can be identified which suggest that strong and specialized interests in particular states are able to influence the lawmaking process in order to gain treatment that is different than that which is accorded to other non-point source water polluting activities – precisely the kind of concerns that have pre-occupied "capture" theorists. While some have argued that this kind of disproportionate influence has declined in recent years (Graham, 1999), it does not appear to be gone altogether.

Chapter 12

1. The requirement that NPDES permits deal more actively with toxic pollutants came out of the court case, NRDC vs. Train ERC 2120 (DDC, 1976). For more information on this case, see O'Leary, 1993, Chapter 2.

2. A permitting strategy released by EPA in the year 2001 (USEPA, 2001D) estimated that the number of facilities covered by NPDES permits would number well into the hundreds of thousands in the coming years.

3. This pattern does not extend to general permits, however.

4. It is appropriate to note here that one of the criteria that some states are now using to prioritize permit issuance involves a move toward "basin-wide" permitting, a permitting approach now being used in North Carolina and a number of other states. This involves developing water pollution control strategies on the basis of watersheds, and issuing all NPDES permits in the same basin at the same. This kind of approach can lead to more efficient and effective water pollution control strategies overall, but it can also lead to backlogs of expired permits during transition years.

5. Testing for WET is one of the most expensive analytical procedures required in NPDES permits. The EPA's 1996 NPDES Permit Writer's Manual outlines costs for various analytical procedures (EPA, 1996, p. 128), and estimates the costs of acute WET tests to be $750 and chronic WET tests to be $1500. Of the 20 other cost estimates for analytical procedures estimated here, only priority toxic pollutant scans are more expensive ($2000).

6. There are many different exemptions that may be used to arrive at pollutant limits more lenient than technology based permit limits. These include economic variances, variances based on local environmental factors, marine discharge variances, fundamentally different factors variances, thermal discharge variances, and net credits. See EPA, 1996, chapter 10 for more complete explanations.

Chapter 13

1. This separated analytical approach contrasts with the unified scale approach used in chapter 11 for NPS policy activism. It is appropriate here for three reasons. First, unlike the NPS activism indicators used in the previous chapter, Congress's intentions can be measured effectively on a pollutant by pollutant basis, rather than a broad scale that encapsulates several different forms of activism. Second, because the measures used here differentiate between different classes of pollutants and dischargers, appropriate measures of need and group strength vary across the two dependent variable measures as well. And third, there is very little correlation between the two measures of permit restrictiveness used here, so it is not possible to develop a statistically reliable scaled variable.

2. In past efforts to analyze the effect of agency form on environmental policies (Hunter & Waterman, 1996; Ringquist, 1993), the general expectation has been that the Health agency form would lead to less aggressive environmental efforts than occurs with Environmental or Natural Resource Agencies. This expectation was further supported by the results in Chapter 11 of this work. In this Chapter, however, the findings are opposite of these original expectations.

3. It is appropriate to point out that some of these pressures for the use of WET requirements by state agencies may stem from the fact that EPA has already included WET requirements in permits it has issued within the state prior to the time that the NPDES authorization is granted to the state. Under anti-backsliding provisions of the FWPCA, permit requirements are generally not supposed to be made more lenient than existing requirements. To the extent this is the case, then, the high proportion of WET requirements used in states with recently authorized programs may stem from the state's acceptance of permit requirements that were originally established by EPA. Even if this is the case, however, it would still attest to the importance of federal influences on state permitting practices. For, in this case, EPA's statutory pre-emptive powers relating to direct permitting authorities leads to altered policy outputs rather than the strength of its oversight role, per se. In either case, however, it is the statutory strength of powers granted to EPA that leads to the policy outputs identified in the analysis.

4. I use this measure because it focuses specifically on the release to toxic substances to waters of the United States. I ran these same analyses using the percentage of waters impaired or threatened within the state, and the results were similar to those for this measure.

5. I also tested the model using an alternative measure of polluting industry strength, *the pounds of toxic pollutants* per dollar of Gross State Product. This alternative specification did not substantially alter the results presented later in this section.

6. See Note 3 in this Chapter for additional information relevant to the interpretation of this finding.

7. While one might argue that all statistically significant variables from the previous models should be included in the models that follow, I chose a more restrictive criterion that required the existence of a sound theoretical reason for inclusion of a variable in the subsequent analyses. As noted in the text, a number of the mathematically significant results appeared not to have any sound theoretical justification.

8. It is worth noting that the results presented here for the integrated models do not change appreciably with the additional of controls for all of the other variables used in the WET related portions of this chapter.

9. However, even with these results, it is worth emphasizing once again that there are reasons for skepticism about this relationship because of the means by which it was discerned.

10. When all of the variables hypothesized in this chapter to have a potential relationship with conventional pollutant permit restrictiveness in major municipal permits are included in the model, the results are similar to those presented here except that the federal influence variable falls just outside of the .10 significance criterion. In all likelihood this results from insufficient degrees of freedom, as this "fully specified" model includes fourteen variables (and has a sample size of 41).

11. The FWPCA has established numerous sets of federal-state accountability structures that are appropriately interpreted as "fence posts." These include federal guidance and oversight on NPDES permitting, enforcement, development and establishment of state water quality standards, implementation of 106 grants supporting state program operations, implementation of construction grant and Shared Revolving Fund support for infrastructure development, non-point source pollution programs and grants, total maximum daily load (TMDL) program implementation, and estuarine program implementation. A *major* difficulty in implementing sound programs at the state level involves the coordination of these various sets of accountability structures created by the federal program.

12. The statistically significant negative correlations uncovered were -.375* for all individually issued major permits (significance = .012), -413** for major industrial permits (significance =.005), and -.351* for major municipal permits (significance = .020). As is noted in the text, there was no statistically significant relationship uncovered between state NPS policy activism and restrictive permit requirements relating to conventional permits.

Chapter 14

No Explanatory Footnotes.

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