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Innovative and integrated watershed management programs : an analysis and evaluation

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INNOVATIVE AND INTEGRATED

WATERSHED MANAGEMENT PROGRAMS:

AN ANALYSIS AND EVALUATION

A Thesis Presented To

The Faculty of the Department of Geography

and Environmental Studies

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of the Requirements for the Degree

Master of Science

By

Kristin Jensen Sullivan

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ABSTRACT

INNOVATIVE AND INTEGRATED WATERSHED MANAGEMENT PROGRAMS: AN ANALYSIS AND EVALUATION

by Kristin Jensen Sullivan

Comprehensive watershed management approaches are needed in order to solve the problems created by nonpoint source pollution. It is estimated that the United States spends $40 billion annually to protect and restore our polluted waterways. Nonpoint source pollutants account for more than 50% of the pollution of our nation's waters.

This research analyzed ten innovative and educational watershed-based programs to determine their most effective components. Research results revealed the prevalent program strategies which were analyzed in light of the standards derived from the environmental education and watershed planning literature. The most effective strategies were identified and included collaboration, partnership development, community involvement, strategy integration, sense of ownership, program design, and long-term program considerations.

Recommendations are offered to assist resource managers, agencies, organizations, and other parties who are involved in watershed program development and implementation. These recommendations offer specific suggestions on how to implement the most effective strategies.

ACKNOWLEDGEMENTS

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Definitions of Terms

Clean Water Act Reauthorization and Amendments- Specifically, the 1987 reauthorization and the 1988 amendments which provide 50 million dollars per year to states for the preparation of assessments and plans to control nonpoint source runoff.

Cooperative Programs- Programs which use interagency interactions in order to solve problems (in this case, "problems" are those involving nonpoint source pollutants within watersheds).

Coordinated Resource Management and Planning Groups (CRMPs)- Planning groups which are set up to solve problems by way of interagency interaction and cooperation. 61 CRMPs exist in California. The report discusses two California CRMPs which are watershed-based.

Environmental Awareness Programs- Programs which are set up to help people develop a sense of stewardship toward their environment and community. Programs which provide skills which individuals may use to make educated, informed decisions regarding wise resource management.

Environmental Education- Educating persons with respect to their natural surroundings.

Nonpoint Source Pollution- Pollutants which enter waterways from broad land areas as a result of the way the land is used. Pollutants which are not released at one specific, identifiable point but from a number of points that are spread out and difficult to identify and control. Pollutants include those from failing septic systems; improper use and disposal of pesticides, oils, and chemicals; and sedimentation caused by erosion.

Plan- Ordinarily more extensive than a program; in fact, it usually includes many programs and projects. A plan may also precede a program.

Program- Ordinarily it is quite extensive and may include many projects; yet it is normally not as in depth as a plan. Usually it is broad based and long term.

Project- May result from a plan or program or it may be established separately from a plan or program. Usually it is more narrowly based and short term.

Watershed- Land area that delivers runoff water, sediment, and dissolved substances to a major river and its tributaries.

Abbreviations

3 1 9 The Clean Water Act's Water Quality Act of 1987, Section 319, provided funds to states for the preparation of assessments and plans to control nonpoint source runoff

A-A-S Adopt-a-Stream Foundation Program in Everett, Washington

A-A-W *Adopt-a-Watershed*, in Hayfork, California

CRMP Coordinated Resource Management and Planning Groups

KIDS *Kids in Creeks* Program in Alameda County, California

KING King County Department of Public Work's, *Surface Water Management Public Involvement Program*, in King County, Washington

METRO *Metro's Water Quality Awareness Program*, in Seattle, Washington

RTCA National Park Service's, "Rivers, Trails, and Conservation Assistance Program's, general *Creek Care Guide For Residents and Businesses*, in Martinez, California

NPS National Park Service

P-B CRMP *Pescadero-Butano Creek Watershed Coordinated Resource Management Plan*; Pescadero, San Mateo County, California

REDWOOD The Natural Resource's Division of the Redwood Community Action Agency's, *Stream Care Guide*, in Eureka, California

S-F CRMP *San Francisquito Coordinated Resource Management Plan*, in San Mateo, California

SAN LEANDRO *San Leandro Watershed Awareness Program*, in San Leandro, California

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CHAPTER I

INTRODUCTION

Significance

In the United States, many resource managers and watershed experts have
recently attempted to solve our erosion and surface water problems using an
integrated watershed management and awareness approach. This comprehensive
watershed-based approach is thought to be necessary in order to contend with
some of the following concerns: compliance with nonpoint source (NPS) pollution
regulations; the need to solve the problems of such broad-based watershed issues
as flooding, erosion, sedimentation, and water quality; and, the public's
interest in protecting and enhancing our stream and watershed resources.
A comprehensive approach to solving watershed-based problems is crucial for at
least two reasons: nonpoint source pollutants are the largest surface water
pollution problem facing the United States today (Bernard and Iivari 1993) and,
traditional methods that have been used to solve our nonpoint source pollution
problems have not been effective (Hansen 1994).

Historically, attempts to ameliorate our nonpoint watershed-based
problems have not been integrated, the undertakings have been unfocused and
fragmented. Traditional methods used for protection and management of our
surface waterways rarely have taken into consideration the landscape as a whole
(Strnad 1993). In the 1970s, many watershed-based programs were
implemented; however, the majority of these programs emphasized regulation
and technical solutions which, when taken alone, are not conducive to solving
nonpoint source pollution problems (Hansen 1994, Newman 1993).

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Attempts in the 1970s to solve NPS pollution problems emerged as national policy only after the relative success in solving point source pollution problems (Hansen 1994). However, as Hansen (1994) stated, after two decades of attempts to solve the nonpoint source pollution problems, there has been no effective control of these pollutants. Hansen believes that nonpoint source pollution problems do not lend themselves to technical solutions mandated through "the 'command and control' policies that have been the historic approach to pollution problems" (Hansen 1994, 1). Although it was effective to solve point source problems with this technique, NPS problems require a variety of solutions due to their complex and diffuse nature.

Currently, there are numerous possible approaches for preventing and decreasing our NPS pollutants. For example, Hansen (1994) suggests the need to shift from technical solutions to changing the behaviors and practices of individuals and organizations. Hansen quoted from Novotny (1988) who suggested that NPS abatement requires cooperation between competing groups (Hansen 1994). Hansen (1994) also quoted from Water Quality 2000, which stated that few contemporary solutions address the basic economic and social forces at the root of water problems.

There are many other suggested approaches for solving NPS pollution problems. For example, professionals speaking at the Soil and Water Conservation Society's California Annual Conference, "Watersheds in Transition...Keys to Successful Planning," made numerous suggestions. J. Peterson (1995) suggested that a multi-disciplinary planning approach is needed. J. Pajarillo (1995) stated that the EPA is concentrating on prompting states to voluntarily set up programs. Pajarillo stated that since every watershed is different, it is important to take into account the various social and cultural needs. Lastly, D. Bowker (1995) suggested that the old ways did not take into account the complexity of NPS pollution and

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that new approaches should include interest-based planning and implementation, stewardship, and education. Bowker stated that regulation is needed but that it is ineffective alone for dealing with the complexities of systems. In addition to regulation, Bowker asserts that partnerships and behavioral changes are necessary to solve the complexities of NPS pollution problems.

These more comprehensive approaches for solving our NPS pollution problems are best summarized in "A Blueprint for Water Quality" (Newman 1993). Newman (1993) cites a three-year experiment that involved more than 80 different public, private, and nonprofit organizations. The mission of the experiment was to determine the best methods to use to resolve the primary water quality issues. The recommendations, detailed in *A National Water Agenda for the 21st Century*, were released in November, 1993 by Water Quality 2000, the umbrella organization for this effort. This report calls for an integrated, holistic national water resources policy and proposes a mix of regulations, educational programs, institutional reorganizations, incentives, and voluntary programs. Water Quality 2000 also recommended "increased individual and collective responsibility for actions affecting water quality, and watershed planning and management" (Newman 1993, 223).

The Water Quality 2000 report reaffirmed what many organizations, agencies, and others already believed: In order to assist in solving the problems of nonpoint source pollution and other related watershed-based issues, managers must implement watershed management and/or awareness plans and programs at the state and local level. These watershed-based programs must provide education and experience to the affected segments of society so that the individuals are motivated to willingly protect and restore water resources.

Overview of the Research

There are many causes of nonpoint source pollution in a watershed including pollution from farming, logging, ranching, quarrying, development, and residential use (rural and urban). This research focused on various watershed management and/or awareness plans and programs that were set up, wholly or in part, using education to address nonpoint source pollution within watersheds.

The purpose of this research was to: 1) examine ten watershed plans, programs, and projects which varied in terms of scale, size, type, location, age, stage, and planner/coordinator experience; 2) identify strategies that are most prevalent, least prevalent, and most effective; and, 3) make recommendations for developing an effective watershed protection education program by comparing and contrasting strategies from the ten programs.

Ten watershed plans and programs were examined and they were divided into four categories as follows:

1) Programs for School-Aged Children:

   a) *The Adopt-a-Stream Foundation* in Everett, Washington

   b) *Adopt-a-Watershed*, in Hayfork, California

   c) *Kids in Creeks*, in Alameda County, California

2) Community-Based Watershed Programs:

   a) King County Department of Public Works, *Surface Water Management's Public Involvement Program*, in King County, Washington

   b) *Metro's Water Quality Public Awareness Program*, in Seattle, Washington

   c) *San Leandro Creek Watershed Awareness Program*, in San Leandro, California

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3) Coordinated Resource Management Plans (CRMPs):

   a) The Pescadero-Butano Creek Watershed Coordinated Resource Management Plan (P-B CRMP), in Pescadero, San Mateo County, California

   b) San Francisquito Coordinated Resource Management Plan (S.F. CRMP) in San Mateo County, California

4) Programs with Guide Booklets (Guides):

   a) The Natural Resource's Division of the Redwood Community Action Agency's *Stream Care Guide* in Eureka, California

   b) National Park Service's, "Rivers, Trails, and Conservation Assistance Program's" general *Creek Care Guide For Residents and Businesses* in Martinez, California

These watershed management/awareness plans and programs were examined to ascertain the following types of information: 1) how the plan or program was regulated and funded, 2) how the plan or program was implemented, 3) the educational aspects of the plan or program and, 4) the success and effectiveness of plan and program strategies.

In order to analyze the 10 watershed-based programs, coordinators of programs were asked to respond to 16 investigative questions. Responses to the investigative questions were summarized and categorized in matrix form; the results of this research are found in Chapter V and Appendix H. To gain further information on the effectiveness of these watershed-based programs, other questions were asked of funding and regulatory agencies. Responses were summarized in matrix form. Results of this research appear in Chapter V and Appendix J.

The 10 programs were analyzed (Chapter VI) to determine the most and least prevalent methods and the most effective strategies. Chapter VI presents conclusions regarding effective program strategies. Finally, in Chapter VII, recommendations are suggested that may increase the effectiveness of watershed programs.

These summaries and analyses are designed to be used by resource managers and other parties interested in watershed plan and program development. Specifically, project summaries, matrices, and analyses may be used by various directors and coordinators to: 1) provide information about the variety of innovative watershed efforts within Northern California and Washington; 2) provide assistance in initiating a watershed program or in altering an existing program; 3) help interested agencies (i.e., Environmental Protection Agency, National Oceanic and Atmospheric Administration, Natural Resources Conservation Service, water agencies, planning departments, Public Works), organizations (i.e., local watershed coalitions and groups), private sources (i.e., educational groups), or community groups begin their own watershed management/awareness plan or program; 4) provide current information concerning the most effective watershed-based strategies.

This information regarding effective watershed-based program strategies is designed to help resource managers and other interested parties save time, energy, and cost, while attempting to mitigate the various watershed-related problems.

Critical Assumptions And Limitations

Several critical assumptions were made to accomplish this analysis. First, it was assumed that the information, provided through informational packets and phone interviews, was accurate. This assumption is common in survey research, though it may have limited the accuracy of the analysis. It is likely that the phone interview responses were forthright and factual. Secondly, it was assumed that the investigative answers were provided by competent directors, coordinators, and other program experts. Thirdly, it was assumed that the additional questions were answered by competent funding and regulatory representatives. With regard to the above two assumptions, it was assumed that respondents were honest, accurate, and professional.

This research was subject to at least four important limitations. First, the 10 programs vary in stage, from planning to implementation phases. Additionally, these programs varied widely from what may be called "true" watershed programs to smaller "pieces" of watershed programs. However, these 10 programs have more important features in common. For instance, it was found that though the programs differed in whole, many of the program strategies were quite similar.

A second limitation is that since the studied watershed-based programs are (at least in part) educational, and less than ten years old, success was not easy to define; educational programs are difficult to evaluate and often take years to show their effects. Long term studies of these types of programs are needed to determine whether or not citizens are receiving the message and/or changing their behaviors with respect to NPS pollutants and other watershed-based issues.

Third, the investigative and additional research questions, which were asked of coordinators and other program representatives, were open-ended. Therefore, the most and least prevalent strategies reported in the results may not

be fully accurate; some programs may include a particular effective strategy but the program representative may not have been mentioned it in their response(s). However, the open-ended questions had the benefit of not leading subjects into specific responses and thereby biasing the results.

Lastly, numerous innovative and integrated watershed management and/or awareness plans and programs were not examined in this research. This research investigated a small sample of the plans and programs which are ongoing in California and Washington (see Appendix A for a selected list of many other ongoing watershed-based programs).

CHAPTER II

THEORETICAL FRAMEWORK AND RELATED RESEARCH

Introduction

The primary focus of this research was to examine, analyze, and evaluate ten watershed management and/or awareness plans and programs in order to: 1) determine the usefulness of education in watershed-based management and/or awareness programs, 2) determine ways in which watersheds may be managed, 3) determine how various watershed-based programs are funded and implemented, and, 4) to explore the ten varied watershed-based programs to determine the most successful and effective components. The watershed planning and environmental education literature provides a framework for analyzing the programs and answering those questions. In turn, this thesis provides important information on ways to evaluate the effective and successful components of watershed programs based on educational and watershed planning methods.

This chapter is divided into three major sections. The first two sections, Theoretical Framework in Environmental Education and Theoretical Framework in Watershed Planning, provide the theoretical framework for the thesis. The third section, Related Research, is further subdivided into two sub-sections, one discussing various measures of evaluating success of watershed programs and the other discussing the agencies involved in supporting watershed programs.

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Theoretical Framework in Environmental Education

Watershed Efforts—History and the Importance of Including Education with Watershed Programs

Integrated watershed management plans and programs that include educational components are desirable because they are likely to decrease both the amount of nonpoint source pollutants entering our waterways and the amount of money spent to clean up our polluted waterways. As a society, we have invested a considerable amount of resources in an attempt to minimize sedimentation and maximize quality of our surface waters. Geologists from the USDA-Natural Resources Conservation Service (formerly the Soil Conservation Service) assert that "sedimentation is the largest pollutant, by volume, of surface waters of the United States and for many parts of the world. Sediment and other nonpoint pollution sources account for more than 50 percent of the pollution our nation's waters, 65 percent of our rivers, 45 percent of our estuaries, and 76 percent of our lakes" (Bernard and Iivari 1993, 1456). According to Robert Wayland of the U.S. Environmental Protection Agency (EPA), "As a society, we are spending $40 billion annually to protect and restore the quality of our rivers, streams, estuaries, and lakes" (Wayland 1993, 263).

In addition to economic costs, there are also social, environmental, ecological, and political costs. Society pays for nonpoint source pollution in terms of lost recreational opportunities and lost aesthetic benefits; many waterways are so polluted that we are not able to swim, fish, or enjoy the beauty of a clean river, stream, or lake. We are affected environmentally and ecologically since increased amounts of sediments and other pollutants in surface water adversely affects the health of the ecosystem as a whole. These pollutants result in a decline in numbers of species, both plant and animal. Nonpoint source pollution then

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becomes a political issue as we enact, implement, and enforce laws to address these watershed-related problems.

Politically, the United States has attempted to solve problems of polluted waterways by passing legislation such as the Clean Water Act of 1972. According to Alvin L. Alm, "In many respects, the Clean Water Act has been the most successful of the environmental statutes. Most industrial firms and municipalities have installed treatment facilities" (Alm 1991, 1369). However, Alm admits that though we have taken measures that have improved water quality with regard to point sources of pollution, our most serious problems are that of nonpoint source pollution.

The first attempt to contend with NPS pollution at the federal level came about in 1972 under the Clean Water Act's Water Pollution Control Act Amendments (Hansen 1994). These 1972 amendments contained language concerned with NPS pollution and were designed to identify NPS pollutants from agriculture, silviculture, mining, and construction (Hansen 1994). In 1977, the Rural Clean Water Program was added to the Clean Water Act. The purpose of this program was to implement best management practices on agricultural lands. However, due to the priority of point sources, little was accomplished with this program. The Rural Clean Water Program did "identify water quality problems and explore voluntary compliance measures, but few institutional mechanisms were put in place to ensure implementation" (Hansen 1994, 20). In 1980, funding for this program ceased.

Not much had been accomplished with NPS pollution throughout the 1970s and early 1980s. In the mid 1980s, renewed interest in NPS pollution resulted in the 1987 reauthorization of the Clean Water Act, and the 1988 amendments to it. These additions provided $50 million per year to states for the preparation of assessments and plans to control nonpoint source runoff (Alm 1991). However, as

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Hansen pointed out, under section 319 (1987 Water Quality Act reauthorization) the "EPA was granted no formal enforcement procedures for states failing to prepare the mandated management program" (Hansen 1994, 21).

Although section 319 has not been fully implemented, many agencies, organizations, and communities have received grant funds to set up watershed management and/or awareness plans and programs. In addition to this, NPS pollution has been addressed at the state and local level "through some combination of voluntary action, economic incentives and disincentives, and regulatory approaches" (Hansen 1994, 22). Also, a rekindling of interest in the watershed based approach has occurred during the 1990s so as to promote watershed protection efforts (Hansen 1994).

However, though there has been some progress in combating NPS pollution, the efforts are far from adequate. There is general agreement that there are many obstacles which must be overcome in order to manage our NPS pollution problems; one of the many obstacles includes the lack of attention that has been given to public education, outreach, and involvement (Hansen 1994).

Standards for Environmental Education in Watershed Awareness and Management

Education is one method used to address the watershed-related problems of nonpoint source pollution. Because watershed management is a dynamic, ongoing process that can never take place through one time actions (Santa Cruz County Planning Department 1979), education becomes critical to solving watershed-based pollution problems. Education is capable of leading to more long-term and dynamic solutions. Watershed management plans and programs that include educational components assume that this approach can increase awareness and change behavior so that resources may be protected. Several studies show the

importance of including environmental education in watershed management and/or awareness plans and programs.

Upton and Kumabe (1993) discuss the Department of Fish and Wildlife's Aquatic Education Program. Two of the 12 objectives of the program are to extend public education outreach, and to foster the idea of understanding that resources belong to the public and to promote a greater sense of stewardship of the resources. The premise of this program is to establish a firm environmental education foundation so that citizens may then assist in the preserving of natural resources. The program involves a wide variety of agencies, schools, and communities, all of which promote environmental awareness. The Department of Fish and Wildlife's campaign has established the support of the local media and many educators. One purpose of the Aquatic Education Program is to "continue to build on the work done in the past and move toward a higher profile information dissemination campaign for the present and future" (Upton and Kumabe 1993, 2761).

Fuller (1993) discusses a study that examines motivating factors behind environmental activism. The study found that educational programs should be designed to "create awareness and understanding [and to] enable the receiver of the information to become involved" (Fuller 1993, 3083). Fuller's article examines the studies linking attitude and behavior and concludes that "attitude can be predictive of behavior" (Fuller 1993, 3084). The author goes on to assert that knowledge strongly influences behavior. Therefore, Fuller suggests that attitude and behavior can and do change through the educational process, and, "if education can create an awareness, then an individual may make a verbal commitment" to change his or her behavior (Fuller 1993, 3091). "This verbal commitment then [to change behavior, would need] to be translated into actual commitment" (Fuller 1993, 3091).

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Fuller provides evidence from other studies which show a moderately high correlation between verbal commitment and actual commitment. Such data indicate that environmental problems can be addressed and ameliorated through an active educational process by establishing verbal and actual commitments on the parts of citizens involved.

Many other environmental education articles suggest ways to change a learner's behavior toward the environment. For instance Hungerford (1988) cites numerous studies regarding learner behavior. Variables found to be associated with responsible environmental behavior include knowledge of issues, knowledge of action strategies, locus of control, attitudes, verbal commitment, and individual's sense of responsibility. Studies show that student learners should have problem identification skills, environmental sensitivity, issue investigation and evaluation skills, knowledge of and perception of skill in use of action strategies, and an internal locus of control. Internal locus of control, as defined by Hungerford and Volk (1990), is when a person believes that s/he will experience success and that s/he will be reinforced for exhibiting a certain behavior. Overall, Hungerford emphasizes that knowledge alone will not be sufficient; education must be active to provide the learner with ownership of the issues and empowerment to do something about them.

Hungerford and Volk (1990) suggest critical educational variables needed to change learner behavior. These variables expand on knowledge, ownership, and empowerment variables. The authors propose the following successful strategies for changing learner behavior: the need for reinforcement strategies, sensitivity, issue investigation, action, and knowledge components.

The literature on environmental education is pertinent in assessing the long term success of watershed NPS pollution protection efforts. These educational strategies (Table 1) may be used as guidelines to assist resource managers in

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program planning and implementation. In this thesis, these environmental educational strategies will be used in conjunction with the planning strategies discussed in the next section below as standard strategies for watershed program analysis. For analysis purposes, these standard strategies then will be compared and contrasted with the strategies of the ten watershed programs.

Table 1
Environmental Education Strategies From the Literature

ENVIRONMENTAL EDUCATION STRATEGIES FROM THE LITERATURE	
STRATEGY	SOURCE
Knowledge and Awareness	Hungerford and Volk 1990, Hungerford 1988, Fuller 1993
Ownership and Stewardship	Hungerford and Volk 1990, Hungerford 1988, Upton and Kumabe 1993
Empowerment	Hungerford and Volk 1990, Fuller 1993
Program Design	Fuller 1993, Upton and Kumabe 1993, Hungerford and Volk 1990

Theoretical Framework in Watershed Planning

The educational literature provides one source of standards for watershed management and awareness programs. Another source of standards comes from policies and plans; several important watershed planning efforts are the National Estuary Program (NEP) and two specific NEP planning efforts, the Puget Sound Water Quality Authority and the San Francisco Estuary Project.

National Estuary Program (NEP)

The NEP is a program regulated by the Environmental Protection Agency (EPA) as part of the Clean Water Act amendments and reauthorizations. The NEP was established under the Water Quality Act of 1987 to protect our nation's estuaries. This program identifies nationally significant estuaries that are threatened by pollution, development, or overuse, and promotes the preparation of comprehensive management plans to ensure ecological integrity. The program's goals are to protect and improve water quality and enhance living resources (Environmental Protection Agency 1992). The NEP uses a collaborative problem-solving approach that involves appropriate agencies, elected officials, academic institutions, interest groups, and the public. The collaborative problem-solving approach includes problem identification, characterization, and a phased management process. The NEP program is based on the concept that collaborative planning, education, and research are essential components to long-term protection of estuaries (Environmental Protection Agency 1992).

The NEP suggests that flexibility is a key to organizing and managing an effective estuary program. Therefore, the NEP realizes the importance of including local needs when building a management framework. The framework of an NEP program includes local, state, and federal partnerships.

Once the management framework and characterization is complete, the estuary's committee members will complete a Comprehensive Conservation and Management Plan (CCMP). The NEP has three keys to implementation of the CCMP: public involvement and support, political commitments, and funding. The Water Quality Act specifically mandates that public participation must be provided for, encouraged, and assisted by the EPA and the states (Environmental Protection Agency 1989). The NEP lists components that are essential for a basic program. These include an experienced staff person, a comprehensive mailing list, a general program slide show, one written information piece (newsletter, news bulletin, or fact sheet series), public meetings, and a defined role for the citizens advisory committee. The NEP states that a credible public participation program can be conducted at a reasonable cost and must include all six components. The NEP program uses other strategies for success including integration, coordination, and collaboration.

The NEP program began in 1987 with six estuaries. By 1992, 11 estuaries were added. Although the Environmental Protection Agency is itself regulatory, it works with many other agencies (National Oceanic and Atmospheric Administration, Fish and Wildlife Service, Natural Resource Conservation Service, etc.) and citizens (local) in a cooperative manner to decide the best ways to manage individual estuaries. Individual estuary management conferences help to determine the best methods to use in order to solve problems. These methods may include regulatory methods, such as standards, permits, enforcement, zoning laws, and building codes, and/or, nonregulatory methods such as public education, agricultural best management practices (BMPs), and voluntary actions.

<u>Puget Sound Water Quality Authority (PSWQA)</u>

The PSWQA, a sub-state agency, was established in 1985 by the Washington State Legislature "to provide planning, coordination, and public outreach in addressing water quality issues in the 12 Puget Sound counties" (Hansen 1994, 25). In 1985, the Puget Sound Water Quality Authority Act was passed to oversee state and local implementation of the Puget Sound Water Quality Management Plan. The Authority issued its first management plan in 1987 and its revised plan in 1989. When Puget Sound became a charter member of the NEP in 1988, the already completed 1987 and 1989 plans were considered partial CCMPs for the NEP (Environmental Protection Agency 1992).

One broad priority in the Puget Sound plan is to contend with the nonpoint source pollution problem. "The management plan's nonpoint source pollution program contains the first fully integrated, watershed-based approach to nonpoint source pollution control in the United States" (Environmental Protection Agency 1992, 58). Washington's "Nonpoint Rule" states that each Puget Sound county must identify and rank their priority watersheds and then develop and implement action plans for these watersheds.

Hansen wrote her dissertation (1994) on four of Puget Sound's 12 early action watersheds. These early action watersheds, in essence, "served as 'guinea pigs' for the entire watershed planning program" (Hansen 1994, 63). Hansen examined these four early action watersheds by using a conceptual model of NPS planning. Hansen hypothesized that planning processes are more effective when behavioral solutions are implemented over technical solutions.

Hansen (1994) listed six general conclusions designed to assist in maximizing the effectiveness of the planning outcome. Pertinent conclusions relevant to this thesis include: expecting, anticipating, devoting attention to, and developing strategies to manage various common behaviors; paying more

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attention to long-term implementation of the plan; creating mechanisms for achieving greater ownership by all interests involved; and, realizing the critical nature of locally based long-term funding.

Hansen (1994) provided policy recommendations for watershed planning managers. The following includes some of the recommendations that were suggested to state leaders, specifically Washington PSWQA and the Department of Ecology, to strengthen the effectiveness of the planning process: ensure greater involvement of state agency and private sector stakeholders; place more emphasis on developing ownership and lasting involvement by participants (and do so early on); educational efforts should focus on long-term community stewardship; staff members should have strong collaborative decision-making and interpersonal skills; and, incentives should be provided for funding the implementation of watershed plans.

Hansen's local lead agency recommendations include the following: staff need to be highly skilled and trained; common behaviors such as defensiveness, finger-pointing, and turf protection should be anticipated, and strategies for dealing with these behaviors should be developed in advance; and, long-term implications of plans should be thoroughly analyzed (consider funding and community involvement for example).

Puget Sound watershed strategies that apparently are working (Hansen 1994), and the suggested strategies recommended to improve watershed planning and implementation, may be quite useful to compare and contrast with the 10 studied watershed programs.

San Francisco Estuary Project (SFEP)

The SFEP became part of the NEP in 1987. In 1993, the SFEPs Comprehensive Conservation and Management Plan (CCMP) was submitted and consequently approved. The CCMPs action plan includes many suggested strategies for management and implementation of the various natural resources of the San Francisco Estuary.

The CCMP has given priority to efforts that will assist in controlling pollutants from urban and non-urban runoff. Some of the CCMP recommendations that may be used to prevent and reduce pollutants include: focusing on preventing pollution at its source, encouraging and implementing incentives, and identifying non-regulatory approaches which can assist the public and private sectors to reduce their pollutants at their source.

For land use management, the CCMP action plan includes: suggesting that watershed protection plans be developed to protect stream environments and to reduce pollutants in runoff; educating the public about how human actions impact the Estuary by setting up Public Involvement and Education Programs; investigating and creating market-based incentives that promote active, cooperative participation by the private sector; creating a forum to improve communication and to resolve disputes among varying interest groups (San Francisco Estuary Project 1994).

Specifically, for public involvement and education, the CCMP goal is to "increase public involvement in the ongoing stewardship of the Estuary" (San Francisco Estuary Project 1994, 169). Since the CCMP sees public involvement as essential for effective implementation of the plan, one objective is to develop public involvement, education, communication, and advocacy programs.

Another CCMP objective is to promote direct citizen involvement in studying, restoring, and managing the Estuary. Actions to accomplish this

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objective include working with various groups, developing additional materials to be available to private landowners and other groups, developing criteria for evaluating existing environmental education programs, supporting successful programs and activities by providing funds, guidance, and in-kind support, assisting in the development of long-term educational programs designed to prevent pollution and, providing opportunities for hands-on citizen action in restoration activities (i.e., creek restoration, clean-ups).

In this thesis, watershed planning strategies (Table 2) and environmental educational strategies (Table 1) will act as standards for analysis to evaluate the most effective strategies of the 10 studied programs.

Table 2
Planning Strategies From the Literature

PLANNING STRATEGIES FROM THE LITERATURE	
STRATEGY	SOURCE
Collaborative and Integrative Planning	Environmental Protection Agency 1992, Hansen 1994
Staff Selection	Environmental Protection Agency 1992, Hansen 1994
Partnership Development	Hansen 1994, Stuart 1993
Funding Sources	Hansen 1994, Environmental Protection Agency 1992
Program Flexibility	Environmental Protection Agency 1992, Hansen 1994
Educational Information	Environmental Protection Agency 1992
Development of Public Understanding	Environmental Protection Agency 1992, Environmental Protection Agency 1989, San Francisco Estuary Project 1994
Community Involvement	San Francisco Estuary Project 1994, Hungerford & Volk 1990, Fuller 1993, Hungerford 1988, Hansen 1994
Regulatory and Nonregulatory Methods	Environmental Protection Agency 1992, San Francisco Estuary Project 1994

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Related Research

Measures of Success

The environmental education and watershed planning literature provide general standards for plan and program development and implementation. Standards for measuring the success of specific plans are often created on a plan-by-plan basis. For example, Steve Singer, one of the watershed analysts for the Santa Cruz, California, San Lorenzo River Watershed Management Plan (1979), stated that the requirements for success are included in the plan. Plans and programs must meet certain criteria; there are checkpoints under grants. Success may be judged in terms of short-term verses long-term changes, a changed attitude on the part of public participants, or whether the plan or program "worked or failed" (Singer 1994).

Kathy Kramer, from the Estuary Institute, stated that the success of a program may be judged by the number of participants enrolled, workshops run, letters received, or storm drains stenciled. Kramer noted that a major difficulty in evaluating program success is that it is not known how a participant behaves after leaving a training program, an awareness event, or another environmental awareness activity and, funding for such follow-up evaluations are difficult to obtain (Kramer 1994).

Susan Harris, of the National Park Service's, Rivers, Trails, and Conservation Assistance Program, who published the Alhambra Creek Care Guide, stated that the creek care guides have been found to be useful to creek residents. However, Harris states that it is difficult to measure the guide's success. Harris believes that it may not be possible to judge success until several years after a program has been completed. After several years, success could be judged by

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evaluating how much watershed information a resident or citizen retained (Harris 1994b).

"ECO-NEIGHBORHOOD and Citizen Action" (Barile and Zarillo 1993) is a program that is sponsored by Homeowner's Associations, citizen groups, or community organizations. This program provides an economical, practical, and effective means of taking already existing programs and information to those ready to take action. Barile and Zarillo (1993) suggest that the results of current action programs are usually broad, scattered, and non-quantifiable in terms of actual improvement in water conservation or water quality. Barile and Zarillo state that for most programs, success is rated by the number of meeting attendees, the amount of literature circulated, the number of information requests, or even the number of agency employees.

The authors go on to assert that the level of success for their program really depends upon "an active core of neighbors, commitment by neighbors, agency representatives who respond rapidly, and, a dedicated ECO-NEIGHBORHOOD Director who maintains communication and instills motivation" (Barile and Zarillo 1993).

The success of ECO-NEIGHBORHOOD programs are evaluated in terms of these objectives: 1) number of homes recycling, 2) amount of water conserved, 3) number of storm water retention/detention improvements, 4) erosion areas improved, and, 5) length of the shoreline cleaned and revegetated.

Evaluating program success is difficult and methods may be arbitrary and vague. However, standards in the literature do exist for watershed planning and environmental education and this thesis used those standards to analyze the 10 watershed-based management and/or awareness plans and programs (See Tables 1 and 2).

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Agencies, Funding & Implementation

It is important to watershed programs and studies to understand the agencies involved in regulation, technical, financial, and advisory support. Many agencies manage water as a resource, especially with respect to nonpoint source pollution. These agencies may regulate, advise, and provide technical or financial assistance for a watershed management plan or program. Listed below are just some of the ways that watershed plans and programs may be funded and implemented.

The Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Association (NOAA) are federal agencies involved with regulation; regulation may precede a watershed management and/or awareness plan or program. The major federal advisory, technical, and financial assistance agency is the Natural Resources Conservation Service (NRCS)(formerly known as the Soil Conservation Service). Other federal agencies include the National Park Service and the National Forest Service.

California state regulatory and/or advisory agencies include the following: Department of Water Resources (DWR), State Water Resources Control Board (SWRCB), Coastal Conservancy, Coastal Commission, Department of Fish and Wildlife, and the Department of Fish and Game. The Department of Water Resources, the Coastal Conservancy, and the Coastal Commission also provide for technical and/or financial assistance.

California regional agencies include the following: the Regional Water Quality Control Board (RWQCB) which regulates water quality; the Association of Bay Area Governments (ABAG), which provides advisory and technical assistance; and, flood control districts, which provides technical and financial assistance. California county agencies include: Resource Conservation Districts (RCD) which provides advisory and technical assistance; planning departments which are

regulatory and advisory; and, the Department of Public Works which provides technical assistance. Lastly, there may be many local agencies involved with watershed management plans and programs. Urban creek alliances are an example.

Sometimes, a plan or program is implemented when funding becomes available through grant monies. In California, agencies (such as the NRCS, DWR, Coastal Conservancy, and the Coastal Commission), as well as districts (such as regional flood control districts), are often instrumental in getting plans and programs started. Funding and implementation may also take place through private sources. Or, several agencies may be involved with funding and implementation of a plan or program. Also, once a plan or program has established funding, it may be implemented by an agency, an organization, a private group, a citizen group, an interested party, or a combination thereof.

Summary

This research explains the importance of education, planning, funding, implementation, and evaluation in watershed management and provides the reader with an up-to-date summary of current watershed management and/or awareness plan and program techniques.

The research also presents summaries, matrices, an analysis, and an evaluation of the 10 watershed management and/or awareness plan and program strategies. New plans and programs are constantly being developed and this thesis provides information on current plans which can help resource managers in several ways. First, if a plan or program can be modeled after existing successful program strategies, perhaps the cost of implementing the new program would be greatly reduced. Second, since one can learn a great deal by reading about the successes and mistakes of other programs, the project summaries, matrices,

analyses, and evaluations may help to ensure more informed decisions on which program (or program parts) would work best in a given watershed. Third, by evaluating program strategies and revealing the effective strategies, program recommendations may be made and available to planning and program managers.

CHAPTER III

METHODOLOGY

Introduction

This research examined, analyzed, and evaluated 10 watershed

management and/or awareness plans and programs. To meet these ends, 1) a

questionnaire was developed for program coordinators, 2) additional questions

were asked of regulatory and funding representatives, 3) standards for plan

success were developed from the literature, 4) programs were compared to each

other for similarities and differences, and 5) the ten programs were compared to

the literature standards so as to determine and evaluate the most effective

strategies.

Population and Sample

The ten watershed-based programs evaluated in the study were selected

utilizing pre-determined criteria. Recent, innovative plans and programs from

Northern California and Washington were examined.

The sample size of 10 plans and programs was selected for the following

reasons: 1) after examining informational packages pertaining to these ten plans

and programs it became apparent that this was the maximum number of plans

and programs that could be reasonably managed in terms of examination,

analysis, and evaluation; 2) examining, analyzing, and evaluating two to three

plans or programs in each of the four categories (school-aged, community-based

watershed awareness, Coordinated Resource Management Plans, programs with

guide booklets) allowed adequate evaluation of the effective program components;

and 3) there was adequate information available on the 10 programs.

Design

Three questions directed the design of this research: 1) How are the 10 integrated and innovative watershed management plans and programs managed, funded, and implemented? 2) How do educational components effect the success of these plans and programs? and, 3) What are some of the outcomes of the plans and programs in terms of success and effectiveness? Sixteen investigative questions (asked of coordinators) and five additional questions (asked of regulatory and funding representatives) were designed to assess these three questions.

Questionnaire for Program Coordinators

Sixteen investigative questions were answered from a review of program literature and/or by program coordinators. These questions were broken down into five categories to include the following sets of information from each of the watershed-based programs: logistical, implementation, educational, details of the plan or program, and effects of the program (see Appendix B for a list of these investigative questions).

Category 1- Logistical questions. The 10 watershed-based programs needed to be examined initially to determine some basic information on the plans and programs. Therefore, questions involving the following types of information were addressed: name, location, and type of plan or program; the year that the plan or program was written and/or initiated; and information regarding plan or program funding.

Category 2- Implementation questions. The programs were examined, analyzed, and evaluated in terms of implementation. The following investigative questions were addressed: why was the plan or program initiated, who implemented the program, how was the program implemented, and what were the goals, objectives, and products of the plan or program.

Category 3- Education questions. Since education is a component in all of the watershed-based plans and programs, coordinators were asked why education is necessary for a successful program, and, how the target audience was educated with regard to the related watershed problems and issues.

Category 4- Plan and Program questions. Details of the plans and programs were examined, analyzed, and evaluated with respect to the target population, the dissemination of program materials to targeted audiences, citizen receptivity to the plan or program, and unique strategies of the plan or program.

Category 5- Effects of the Plan or Program questions. The 10 plans and programs were examined, analyzed, and evaluated in terms of successful and effective strategies. The following investigative questions were asked of directors and/or experts of the various plans and programs: What criteria do you use to judge whether or not your plan or program has been successful? Do you consider your program successful? Why or why not? Is there anything that you would be sure to include or omit if you developed another plan or program and why? Are you willing to, and do you think that it is important to, share your program information with other agencies, organizations, or communities? What do you think will happen to your program should funding be cut? And, how can continuity of the plan or program be made more probable?

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Additional Questions Asked of
Regulatory and Funding Representatives

Five additional questions (with six sub-questions) were asked of regulatory and funding representatives in order to gain an additional perspective on the successful and effective components of the programs (also see Appendix C). To receive answers to the additional questions, representatives for each agency type (regulatory and funding) were contacted. Because not all programs are associated with a funding or regulatory agency, a total of nine regulatory representatives and seven funding representatives (six funding agents and one "friends" group leader from the RTCA program who was referred to by the city's planning department) were contacted and interviewed.

The first question and its corresponding six sub-questions were designed to determine if the agency representative felt that the program was successful and effective. The major first question was, "Do you think that the program is working?" Representatives were asked to qualify this answer by answering the following sub-questions: a) How important do you think education is for these types of programs? Does education change behavior? b) From your experience, do you think that this program has been successful? Are these kinds of programs effective in terms of educating the public about NPS pollution? c) Does this program increase watershed awareness and/or water quality? d) Are the program's goals realistic? e) How well do you think the program has been received? and f) Do you think the program has any unique and/or creative strategies?

The other four questions asked of agency representatives were as follows: 2) On what information are you basing your above responses? Do you do any follow-up? 3) How do you perceive the public has received the program? 4) What did you get out of the program? What seems to be the most effective? (Please be

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specific here), and 5) Would you suggest that the program be conducted in the same manner again?

Research Design and Data Collection

The plans and programs were examined, analyzed, and evaluated by: 1) examining the program materials prepared by the various agencies, institutions, organizations, departments, or groups, in order to answer the 16 investigative questions (Appendix B); 2) contacting the various agencies via letters and phone interviews to retrieve answers to unanswered investigative questions;

3) contacting the various regulatory and funding agencies in order to ask the five additional perspective questions (with six sub-questions)(Appendix C);

4) compiling all data in the form of summaries and matrices (Chapter V and Appendix H and J); and, 5) analyzing and evaluating all plans and programs to determine the most and least prevalent and the most effective program strategies. Program strategies were compared with strategies derived from the literature so as to evaluate the various program components (Chapter VI).

To collect the data for the 16 investigative questions, this procedure was followed: 1) the researcher answered as many of the investigative questions as possible by examining the individual plan and program informational packets (the information available from the various watershed management plans and programs generally included goals, objectives, descriptions, flyers, summaries, and justifications of the summaries); 2) the researcher telephoned the various plan and program directors and coordinators to inform them of the study (see Appendix D for a list of contact numbers and addresses for the ten programs);

3) the researcher sent out letters to directors or coordinators of the plans and programs. These letters included an explanation of the investigation, as well as a message about a future telephone call that would concern retrieval of answers to

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specific unanswered, investigative questions (see Appendix E for a sample of the initial letter which was sent to directors and coordinators of programs); 4) telephone calls were placed to the various directors and coordinators to ask the unanswered investigative questions; and, 5) letters with attached summaries of the investigative responses were mailed to directors and coordinators (see Appendix F for a sample of the follow-up letter which was sent to directors and coordinators of programs). Directors and coordinators were asked to respond to the researcher's interpretation of the 16 investigative question answers so as to ensure accuracy of plan and program information. In the cases where there was no response, a follow-up telephone call was placed to those specific directors and coordinators to verify that the compiled information was indeed correct.

To collect the data for the five additional perspective questions, this procedure was used: 1) coordinators were telephoned to obtain contact numbers for regulatory and funding agencies, and 2) regulatory and funding representatives were contacted and interviewed by telephone (see Appendix G for a list of contact numbers for the regulatory and funding agencies).

There were some problems with data collection by interviewing, such as when directors or coordinators were too busy to answer questions. In this case, the responses were gathered from other employees who were also knowledgeable about the plan or program. However, some plan and program questions still remained unanswered because some of these programs were so new.

Analysis

Answers to investigative questions and additional questions provided some of the data for analysis; the literature provided the rest of the data. The data were organized into matrices to reveal commonalities and differences between programs. Programs were analyzed for effective planning and success by comparing them to standards developed from the literature.

CHAPTER IV

DESCRIPTIONS OF PROGRAMS

Introduction

There are many different types of watershed plans and programs; they vary at least in terms of scale, size, type, location, age, planner/coordinator experience, and emphasis. Because this is the case, the 10 watershed plans and programs were separated into four "like" categories. These 10 studied watershed plans and programs are described in this chapter. Program narratives are arranged within their respective categories in the following order:

1) Programs for School-Aged Children:

   a) *The Adopt-a-Stream Foundation* in Everett, Washington

   b) *Adopt-a-Watershed*, in Hayfork, California

   c) *Kids in Creeks*, in Alameda County, California

2) Community-Based Watershed Programs:

   a) King County Department of Public Works, *Surface Water Management's Public Involvement Program*, in King County, Washington

   b) *Metro's Water Quality Public Awareness Program*, in Seattle, Washington

   c) *San Leandro Creek Watershed Awareness Program*, in San Leandro, California

3) <u>Coordinated Resource Management Plans (CRMPs)</u>:

    a) The Pescadero-Butano Creek Watershed Coordinated Resource Management Plan (P-B CRMP), in Pescadero, San Mateo County, California

    b) San Francisquito Coordinated Resource Management Plan (S.F. CRMP) in San Mateo County, California

4) <u>Programs with Guide Booklets (Guides)</u>:

    a) The Natural Resource's Division of the Redwood Community Action Agency's *Stream Care Guide* in Eureka, California

    b) National Park Service's, "Rivers, Trails, and Conservation Assistance Program's" general *Creek Care Guide For Residents and Businesses* in Martinez, California

Descriptions of programs follow a similar format. Information is provided on program name, location, type, funding source, year in effect, and program execution. Next, attention is given to program goals, program history, and reasons for program implementation. Information follows on program size, geographic location, major land use, major NPS pollutants, program boundaries, and beneficial uses of the area. Next, information is provided on the political, social, and economic climates of the area.

Programs For School-Aged Children

The three programs designed for school-aged children include *The Adopt-a-Stream Foundation, Adopt-a-Watershed,* and *Kids in Creeks.* These programs all integrate watershed awareness concepts into school curriculum. For example, the *Adopt-a-Watershed* program in Hayfork, California, involves students by having various grade levels adopt certain watersheds for the specific purposes of monitoring, educating, and cleaning-up. The idea of this "adoption" is to develop a level of responsibility in students so that they may become involved in helping to increase the health of that particular watershed.

Adopt-A-Stream Foundation

The Adopt-A-Stream (A-A-S) Program, located in Everett, Washington, is a school-aged and community-based environmental education and stream restoration program. Adopt-A-Stream was set up by director Tom Murdoch, in 1985, as a nonprofit organization. This program is currently independent of the county government, though in 1981 the Snohomish County Planning Department did set up and implement the Adopt-A-Stream program. The current nonprofit organization, however, allows for the promotion of environmental education and stream enhancement throughout the Northwest region (Cheo 1994). The A-A-S Foundation's existing arrangement also allows for a watershed boundary focus rather than a political one (Cheo 1994).

The program was initially set up to provide technical and financial assistance to schools and community groups who were interested in adopting streams. In 1981, 10 adopt-a-stream projects were initiated. During the next four years, 40 new projects were initiated in Snohomish County. The program focus began to shift to the private sector in 1985 due to an interest throughout the Northwest and the United States. Since 1985, education and enhancement has

been the A-A-S Foundation focus. Adopt-a-Stream produces educational materials, conducts workshops, and stages various events.

The A-A-S program aims to increase public sensitivity of the importance of Snohomish County's 3,000 miles of creeks, streams, and rivers (Adopt-A-Stream Foundation n.d.). However, this program is not limited to the county's surface water; therefore, this program is quite broad.

The county portion of the program includes a relatively large basin size; a large part of the Stillaguamish Watershed falls within Snohomish County. Snohomish County is North of Seattle and is in the area of Mid-Puget Sound. The major land use in the Stillaguamish Watershed is rural and the nonpoint source pollutants are mainly due to agricultural, silviculture, and septic tanks. The beneficial uses of surface waters in the area include fish habitat and recreation (Hansen 1994). Snohomish County also has many urban areas, and consequently, the watershed(s) shares urban-related NPS pollution problems as well as the aforementioned rural ones.

Adopt-A-Stream's long term goal is to provide watershed residents with the skills necessary to become stewards of their watersheds. Because A-A-S does not limit itself to one watershed (Snohomish County), nonpoint source pollution problems vary as does land use. Political, economic, and social climates vary as well.

The A-A-S program has been used as a model in many other programs throughout the United States (Cheo 1994). Overall, this program and the other two programs within the "Programs for School-Aged Children" category encompass a wider area than many of the other studied watershed plans and programs. The "Programs for School-Aged Children" category varies from many of the other studied programs in its approach; it does not concentrate on just one county, one watershed, or one watershed component. According to one source, the A-A-S

program is more of an educational type of program and it is not really a framework in watershed management. However, this same source added that A-A-S is an instrumental player in many watershed plans.

Adopt-A-Watershed

The Adopt-A-Watershed (A-A-W) program of Hayfork, California, is an applicable science program whereby students adopt-a-watershed in their kindergarten year and continuously learn about this watershed through grade twelve. The program was set up by Kim Stokely, a science teacher, in a cooperative effort with several public natural resource agencies, teachers, and school board members.

The A-A-W's implementation model includes the following components: it develops partnerships between schools, agencies, organizations, industry, and community members to provide for services and technical assistance; it leads schools and community members towards decisions about desired future watershed conditions; it establishes regional coordinators who will provide for communication between the schools and the community; it trains teachers in each curriculum unit; and, it sets up telecommunication networks which allows schools to compare data and communicate with one another (Adopt-A-Watershed Program n.d.).

A-A-W began in 1990 through funding from the Trinity River Task Force which is made up of fourteen state, federal, local, and tribal agencies (Adopt-A-Watershed Program n.d.). The program, initiated in Hayfork, California, is now operating in 13 California regions. A-A-W currently serves 8,000 students in 62 schools. Projections for 1994-95 show that the A-A-W program will serve a minimum of 23,250 students in 95 schools (Adopt-A-Watershed Program n.d.).

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The goals of the A-A-W program are to 1) provide an integrated, relevant, and applicable science curriculum, 2) help students develop a sense of stewardship toward their environment and community, 3) teach students how to make educated and informed decisions regarding responsible resource management, 4) provide a model of cooperation for solving difficult watershed issues, and, 5) encourage an ethic of service.

To meet these goals, students work closely with designated watersheds, community members, and public agencies. Teaching units involve a public education aspect so that students and community members may teach one another.

Since this program operates in 62 California schools, the studied watersheds differ in size, scale, geographic location, land use, amount and type of NPS pollutants, and in beneficial uses of the area. However, each curricular watershed unit does involve students in similar hands-on activities, long-term field studies, restoration projects, and community action/public education projects.

A-A-W's comprehensive science program has developed cooperative partnerships; these partnerships have assisted in providing services and technical assistance for creek and watershed projects. As in the A-A-S program, A-A-W also involves the community. For example, in the A-A-W program, students partake in action projects that they then communicate to their community members. The A-A-W program is similar to the other two programs within the School-Aged category in that it is educationally-based and involves a wide range of watersheds.

Kids in Creeks

The Kids in Creeks: A Creek Exploration and Restoration Program (KIDS) began in 1992 in two California counties, Alameda and Contra Costa. This program was initiated by Kathy Kramer, the Educational Director at the Estuary Institute in Richmond, California (formerly the Aquatic Habitat Institute). The Estuary Institute, a nonprofit organization, was established for coordination, research, monitoring, and education and it is a large player in the San Francisco Estuary Project. However, KIDS was funded by the Alameda County Urban Runoff Clean Water Program, Contra Costa County's Stormwater Program, Contra Costa's Clean Water Program, the EPA, the Educational Foundation of America, and the U.S. Fish and Wildlife Service's San Francisco Bay Program.

One of KIDS major funding sources, the Clean Water Program, has money allocated for local level programs for each city within each county. The Clean Water Program also has money allocated for its general information programs. One of these general information programs is the participation information program (PIP). The PIPs are public outreach programs; one particular PIP is the children/education outreach program. The KIDS program is but one of many programs operating under the children/education outreach program.

The KIDS program was initiated due to clean water concerns and since "public education, leading to behavioral modification, is the most viable way to minimize" nonpoint source pollutants, the KIDS program was implemented to provide urban creek training education for educators and, in turn, students (Kramer n.d. (b)). Teacher training workshops, which emphasize creek ecology and urban runoff pollution, are held in both the natural setting and the school site. These workshops are designed to teach teachers how to implement urban creek lessons into their teaching units.

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The goals of the KIDS program include educating, informing, and inspiring people to act on behalf of their communities to protect and enhance urban creeks (with special emphasis on preventing pollutants from entering creeks and San Francisco Bay), and teaching educators and students to respect water resources so as to change adverse behavior and better manage watersheds.

The KIDS program is designed to teach teachers who in turn teach students science, awareness, values, problem solving skills, and pride by providing them with active creek enhancing opportunities. Action projects are part of the program; they involve students in creek inventory and history, creek clean-up, and storm drain stenciling. Some outcomes of action projects include student creek reports, the "adopting" of creeks, and creek-based coalitions among schools and communities.

The KIDS program presently operates within two urban Bay Area counties. In the future, the Educational Director plans to expand this program into additional Bay Area counties. Currently, because the program operates in urban areas, the NPS pollutants are mainly from urban runoff. However, because teachers, students, and community members throughout two counties participate in the program, political, economic, and social climates vary as do watershed issues.

The KIDS program is similar to the A-A-W program in that it also indirectly targets community members with its action projects (KIDS projects are similar to A-A-W projects). The KIDS program also resembles the other two programs within this category in at least two ways: it is not limited to one watershed and it is educationally designed to get people to actively take part in protecting and restoring their surface waterways. The KIDS Educational Director hopes that this program will become a model for other similar watershed programs in the Bay Area.

Community-Based Watershed Awareness Plans and Programs

The three active community-based plans and programs that were examined include King County's, Department of Public Works, Surface Water Management's Public Involvement Program, Metro's Water Quality Awareness Program, and, the San Leandro Creek Watershed Awareness Program.

These programs are active with regard to community involvement as are many of the other researched programs, but these three programs are almost entirely community-based. All three programs use strategies to educate and empower the public; the hope is that the public will be more inclined to act in the stewardship of water resources.

Surface Water Management's Public Involvement Program

The Surface Water Management Division, of King County, Washington's, Department of Public Works, is in charge of planning and executing a program known as the Surface Water Management Public Involvement Program (KING). The KING program, initiated in 1990, is a community-based watershed awareness program that initially received funding through the Department of Ecology's Centennial Clean Water Fund (Cornell n.d.).

The KING program, initiated as a result of this Clean Water Fund, was set up as a program that would work to empower King County citizens to protect their watersheds. The KING program emphasizes the control and reduction of surface water runoff and the protection of water resources within unincorporated areas in the western third of King County. Seattle is one city within King County. Though the KING program is county-wide, its efforts concentrate on the western third of the county where impacts of growth and urbanization are most prevalent.

The goals of the KING program are as follows: 1) create and implement a program to encourage sustained involvement by the citizens of King County to

actively protect their watersheds, 2) recruit and involve citizens to help accomplish data collection and small capital improvement projects such as stream-side revegetation, and 3) raise awareness about the importance of watershed protection through widespread education so that the community begins to assume responsibility for education and protection (Cornell n.d.).

The KING program offers a range of opportunities for public involvement. These opportunities include public outreach and volunteer activities, education through hands-on training workshops, a variety of watershed projects, and community networkings. The KING program statistics show that the program had 638 individuals participating in its program in 1990 while the number of participants increased to 4,561 in 1992.

The KING program involves a variety of agencies, businesses, schools, and the citizens in its watershed efforts. KING's community stewardship directory acknowledges these ongoing watershed efforts (two involved efforts mentioned are METRO and A-A-S). KING's community-based program, since county-wide, is more broad-based (as is METRO) than SAN LEANDRO's city community-based program.

According to Bob Steelquist of NOAA's Olympic Coast National Marine Sanctuary, the KING program is ultimately an entity of the Green/Duwamish Watershed Management Plan (Steelquist 1995). The Green/Duwamish Watershed is one of the 12 early action watersheds under the Puget Sound Water Quality Authority's Water Quality Management Plan that was discussed in Chapter II. Some experts may not consider the KING program to be strictly watershed management because it has jurisdictional as opposed to watershed boundaries (Steelquist 1995). However, many experts would agree that since the KING program is a "subwatershed" public involvement program, it does contribute to the overall watershed management effort.

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Metro's Water Quality Awareness Program

Metro's Water Quality Public Awareness Program (METRO) is a community-based watershed awareness program existing within METRO's Water Pollution Control Department in Seattle, Washington. The METRO program began in 1990 when it was written into the communication program budget for the Water Pollution Control Department.

METRO's Water Quality Public Awareness Program was initiated in order to protect and enhance water quality. The METRO program was implemented, through the Department's public outreach program (which is guided by an employee committee), by applying the following educational methods: school education, community events, special publications, and paid advertising. METRO's major target includes rate paying individuals, businesses, schools, and communities within King County, Washington.

As with the KING program, METRO specifically targets Seattle and its surrounding urban areas. METRO is also similar to KING's program in that its NPS pollution problems mainly pertain to urban runoff. However, METRO specifically concentrates on reducing hazardous waste disposal and use, and it emphasizes advertising as an attempt to decrease NPS pollutants.

The goals of METRO's program are as follows: 1) encouraging and empowering individuals and businesses to act responsibly to protect water quality, 2) positioning METRO as an environmental leader by demonstrating actions to protect water quality, 3) demonstrating METRO's accountability for effective use of public money to protect and enhance water quality, 4) promoting environmental leadership within METRO through organizational and individual employee practices, and 5) promoting consistency in METRO's public information products (Metro's Water Quality Public Awareness Program 1994).

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METRO incorporates the following elements into its program: ads, displays, videos, bus ads, conferences for teachers, coloring books, and an interactive computer system. A METRO public relations expert recommended that METRO also include the following program elements: educate creek residents about water quality; develop and implement a media relations campaign to raise awareness of water quality; and involve realtors, gardeners, builders, and other professionals in water quality awareness and education.

According to telephone calls and responses from surveys, METRO's program is enabling citizens to receive and understand METRO's advertising messages and they are getting people interested in obtaining more information about the program. In addition, METRO works closely with Snohomish County in order to help A-A-S expand its A-A-S program into Seattle/King County.

This program, like KING's program, is ultimately an entity of the Green/Duwamish Watershed Management Plan (Steelquist 1995). As with the KING program, some experts may not consider METRO to be strictly watershed management because it has jurisdictional as opposed to watershed boundaries (Steelquist 1995). However, many experts would agree that since METRO is a subwatershed public awareness program, it too contributes to overall watershed management.

San Leandro Creek Watershed Awareness Program

The San Leandro Creek Watershed Awareness Program (SAN LEANDRO) of Alameda County, California is a community-based watershed program. The program, implemented in 1993 by the Estuary Institute, is funded by the Alameda County Flood Control District. In-kind assistance is provided by the City of San Leandro.

According to Sharon Gosselin of the Alameda County Flood Control District (District), the District provided the seed money for SAN LEANDRO's program and SAN LEANDRO has "taken the ball and run with it" (Gosselin 1994). Gosselin suggests that the program works well in the San Leandro community because the main Creek runs through the town and since the Creek has not been channelized. Also, Gosselin states that since the watershed is so small, it is easy to follow watershed boundaries (Gosselin 1994).

San Leandro, California is located east of San Francisco Bay. The City is highly urbanized, therefore, its major NPS pollutants are from urban runoff. SAN LEANDRO is the first program mentioned so far whose emphasis is on one creek within a small subwatershed. The social and political climate in San Leandro appears favorable to the program; the City, the District, the program, and the "Friends" group all seem to work well together (Fiorillo 1993-1994). The SAN LEANDRO program's "Friends" group acts as an advisory committee to the District. This "Friends" group is trying to obtain nonprofit status so as to continue the program once the SAN LEANDRO program funding expires.

The SAN LEANDRO program was initiated out of concerns for the health of the San Leandro watershed. The goals of the program are to 1) educate, inform, and inspire people to act on behalf of their communities in protecting and enhancing creeks, lakes, and wetlands in their watershed, 2) establish a community information exchange in order to increase knowledge and public awareness of the effects human activities have on streams, lakes, and Bay, 3) encourage and work with citizens, who, through their activity, help to raise awareness of the importance of watershed protection to others in their communities, and 4) to reduce pollutants in urban runoff.

The SAN LEANDRO program is considered a grass roots effort which attempts to protect its watershed. The program provides booklets, displays, city

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watershed signs, festivals, mailers, creek clean-ups, creek walks, and various other activities. The "Friends" group has grown from 15 members before the program to 300 members one year after the program's was implemented. The number of participants attending the various functions has also increased since the onset of the program. SAN LEANDRO was recently funded by the District for another year; this second year funding allows for a quantitative monitoring program.

The SAN LEANDRO program was modeled after many Seattle programs, one of which was KING and another which may have been METRO. SAN LEANDRO differs from the other two community-based watershed programs in that it is a city program that concentrates it efforts on one creek within a subwatershed; the KING and METRO programs are county-wide, they place emphasis on several creeks, streams, rivers, and Puget Sound, and they are more broad-based.

Coordinated Resource Management Plans (CRMPs)

The two CRMPs that were examined include the Pescadero-Butano Creek Watershed CRMP (P-B CRMP) and the San Francisquito CRMP (S.F. CRMP). CRMPs are set up as a process and they are usually accompanied by several programs and projects. There are 61 Coordinated Resource Management and Planning groups (CRMPs) in California. The first CRMP was established in Oregon in 1949 and involved the USDA-Soil Conservation Service (Anderson 1991). The CRMP process was first implemented in California in the late 1960s/early 1970s. Some CRMPs, such as the two studied ones, are watershed-based.

The Pescadero-Butano Creek Watershed Coordinated Resource Management Plan

The Pescadero-Butano Creek Watershed Coordinated Resource Management Plan (P-B CRMP) of Pescadero, San Mateo County, California is a multi-agency, multidisciplinary planning group that involves participation from community members. The P-B CRMP is funded through many different agencies including the Regional Water Quality Control Board, the Department of Water Resources, the Department of Fish and Game, and the Army Corp of Engineers.

The purpose of the CRMP's organizational format is to facilitate interagency relationships and lines of communication based upon a common mission and mandated responsibility for the watershed (Koenig 1993). Over 30 federal, state, regional, local, non-governmental, business and community members are involved in this watershed management effort. This association apparently allows for an efficient and effective use of agency resources, and enhances the cooperation and communication between these varied sectors (Koenig 1993).

The Pescadero and Butano Creeks and their respective tributaries make up the Pescadero Creek Watershed that is located in the Southern part of San Mateo County, approximately 35 miles south of San Francisco. Both creeks drain into Pescadero Marsh Natural Preserve, which empties into the Pacific Ocean. The town of Pescadero is the only major town within the planning area (Pescadero-Butano Creek Watershed Coordinated Resource Management Plan n.d.). The entire watershed covers approximately 81 square miles of land. The P-B Creek Watershed is in a rural area; its major portion is wooded. The major nonpoint source pollutants originate through silviculture, agriculture, ranching, and road building and use.

The P-B CRMP, originally set up in 1988, has proceeded (like many CRMPs) by following these steps: gathering information on resource management issues,

identifying problems, determining a course of action, identifying funding sources, setting up a public information and education program in order to keep people informed of the CRMP process, and preparing for subsequent evaluating so as to determine the success and effectiveness of various projects.

There have been, and are presently, several programs operating under the P-B CRMP, two of which are the Clean Water Act Nonpoint Source Pollution Mitigation Program (section 319) and the Pescadero Creek Rural Service Center (RSC) Project. The 319 has been set up for the demonstration of best management practices (BMPs) to mitigate NPS pollution. In addition to the four projects designed to demonstrate BMPs, there are accompanying workshops, certifications, and seminars which have been set up to provide a positive, supportive experience to the landowners and other parties who are involved. It is hoped that these demonstrations and activities will promote the future use of BMPs. The RSC Project involves a Creek Restoration, a Clean-up, and Flood Management Plan.

In addition to the above stated projects, the P-B CRMP interacts with community members through meetings, public education programs, tours, field trips, letters, flyers, a newsletter, and through CRMP-based local newspaper articles. The project director, Laurel Graham-Holsman, coordinates the meetings, arranges activities and projects, and authors the Channels Newsletter. The project director's tasks are not easy; there are several interests operating in Pescadero which makes the political and social climate quite contentious at times.

The project director believes that experience must be provided to individuals so that they will be given the opportunity to make healthy choices. Furthermore, the project director believes that healthy behaviors must be institutionalized and that incentives must be given to individuals who positively change their behaviors and their actions toward erosion and water quality issues.

The P-B CRMP program operates within one watershed. The CRMP philosophy is similar in some ways to the National Estuary Program, the Puget Sound Water Quality Authority, and the San Francisco Bay Estuary Project; among other similarities, the P-B CRMP is based on sound collaborative and cooperative planning. The P-B CRMP is a broad-based planning effort that realizes the importance of an institutionalized watershed-based approach. The P-B CRMP is being examined as a potential California CRMP model. In fact, the P-B CRMP progress had so impressed the County that it suggested initiating a CRMP in the nearby San Francisquito Creek Watershed.

The San Francisquito Creek Watershed Coordinated Resource Management and Planning

The San Francisquito Creek Watershed Coordinated Resource Management and Planning (S.F. CRMP) process was initiated November 30, 1993. More than 60 agencies and organizations were invited to participate in this CRMP whose watershed abuts both San Mateo and Santa Clara Counties. The Peninsula Conservation Center (PCC) is both coordinator of the S.F. CRMP and the lead agency for the watershed planning project. Funding for the S.F. CRMP is made available through the Fish and Wildlife Commission of the San Mateo County Parks and Recreation Department, the U.S. Fish and Wildlife Service, and Hewlett Packard. Mini-grants have been provided by the Santa Clara Valley Audubon Society and the Evergreen Resource Conservation District.

The S.F. CRMP was initiated due to a concern over the management of the natural resources in this politically complex watershed area. Individuals initiating the CRMP process felt that, because political boundaries often ignore the complex reality of natural systems, managing this watershed according the natural boundaries would be more efficient and holistic. Also, several federal and state

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regulations, such as the 1990 Coastal Zone Act Reauthorization and the proposed reauthorization to the Clean Water Act, now require local government agencies to work together to create watershed-based programs (Peninsula Conservation Center Foundation n.d.).

San Francisquito Creek's watershed encompasses over 40 square miles in San Mateo and Santa Clara Counties (a small portion in Santa Clara County). This watershed is situated on the eastern flank of the Santa Cruz Mountains (Johnson n.d.). More than 20 small tributaries flow through forests, ranches, farms, towns, and cities. Although it is mainly urban, the S.F. watershed encompasses rural, suburban, and urban areas within two counties; consequently, the social, political, and economic climate varies as do the type and amount of NPS pollutants.

The S.F. CRMP is in the early stages of watershed plan development. Goals of the S.F. CRMP include: fostering a diverse and healthy watershed that is valued as a community resource; protecting, improving, and maintaining natural resources while ensuring public health and safety; and, presenting a watershed plan that will describe the resources, list the problems in managing them, and outline a strategy for implementing needed changes.

To meet the goal of presenting the watershed plan, the S.F. CRMP has set up task force groups whose responsibilities include identifying, prioritizing, and providing solutions to the various watershed problems. There are six task force groups, each in charge of contending with one of the following watershed issues: natural resources, flood and erosion control, pollution prevention, land development, social issues, and public education.

The S.F. CRMP and the P-B CRMP are alike in that they share similar philosophies, they have broad-based watershed plans, and they are programs with efforts within one watershed. Also, both CRMPs involve numerous different agencies, organizations, non-governmental entities, businesses, and community

members. However, these programs differ in many ways as well: the P-B CRMP is set up in a rural area while the S.F. CRMP is mainly in an urban area; the P-B Creek Watershed falls within one county while the S.F. Creek Watershed falls within two counties; and, the P-B CRMP has implemented many components of its plan while the S.F. CRMP is still working on its watershed plan.

As with the P-B CRMP, the S.F. CRMP philosophy is also much like that of the National Estuary Program, the Puget Sound Water Quality Authority, and the San Francisco Bay Estuary Project. Similarly, the S-F CRMP is also based on sound collaborative and cooperative planning, and its members also realize the importance of an institutionalized watershed-based approach. The S.F. CRMP is the first urban CRMP in California and it, like the P-B CRMP, is also being looked upon as a potential CRMP model.

Programs with Guide Booklets

The two programs with guide booklets take place in the California cities of Eureka and Martinez. Programs and projects that have produced guide booklets have been increasing in numbers during the 1990s. These guides are written and made available through many different avenues including planning departments, Resource Conservation District's, National Park Service Programs, The National Forest Service, and Department of Fish and Wildlife. Many of these guides are distributed to individual residents.

Redwood Community Action Agency's, *Stream Care Guide for Streamside Property Owners and Residents*

The Natural Resources Services (NRS) Division of the Redwood Community Action Agency's, *Stream Care Guide for Streamside Property Owners and Residents* (REDWOOD guide) was funded through a grant provided by the State

Coastal Conservancy in 1986. This landowner/educational creek care guide was set up for Humboldt and Del Norte Counties, though it is applicable in any forested watershed (Madrone 1994).

The NRS division of the Redwood Community Action Agency plans and implements a wide range of projects all with the common theme of integrating natural resources stewardship with community well-being (Redwood Community Action Agency n.d.). The REDWOOD guide was initially developed for a specific project (MacDonald Creek); this guide has subsequently been used in conjunction with many other projects.

REDWOOD projects, initiated through the NRS division of the Redwood Community Action Agency (a nonprofit organization), take place in Humboldt and Del Norte Counties. These counties are in Northern California along the Pacific Coast; Eureka is one major town in this area. These counties lie mainly within forested areas. The North Coast streams are considered a valuable resource whose beneficial uses include fishing and wildlife watching (Reichard 1988). The social, political, and economic climate varies depending upon the project area; but, projects tend to be implemented in communities that are receptive to a restoration or an educational project.

The initial REDWOOD guide project was implemented through existing grants, the largest grant came from the Department of Water Resource's Urban Streams Restoration Program. Goals of that project included providing a guide that previously had not been available to landowners, and teaching private landowners to properly take care of their streams. Initially, 2,000 copies of the guide were printed and distributed. Subsequent to this, many associated REDWOOD projects have been set up to assist landowners, community members, and local schools in managing, adopting, and monitoring creeks.

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The REDWOOD guide and associated projects emphasize education. Sungnome Madrone (1994), the director of the NRS division, states that success is dependent upon education since lots of people want to do the right thing but they do not necessarily have the information they need. Madrone states that staff decision making is also important; the staff determines, as a group, what project will be undertaken next. This consensual decision-making process is based upon the community needs, the availability of resources, and the level of community support (Madrone 1994).

The REDWOOD guide was the first of its kind ever published; it has served as a model throughout the United States and in many places throughout the world. REDWOOD is similar to the Programs for School-Aged Children category in that it emphasizes education in schools. The NRS division projects are like the P-B CRMP projects in that they provide experience and education to key landowners. Lastly, REDWOOD is similar to the community-based category programs in its dealings with community members.

The Rivers, Trails, and Conservation Assistance Program's *Creek Care Guide for Residences and Businesses*

The Rivers, Trails, and Conservation Assistance Program (RTCA) of the National Park Service provided funding for and published the *Creek Care Guide for Residences and Businesses* (RTCA guide) during the Summer of 1994. This initial guide for Alhambra Creek and the City of Martinez, California, was proposed during 1993. The project's implementation date was Fall of 1994.

The RTCA guide was initiated in response to concerns of both the "Friends of Alhambra Creek" group and the City of Martinez. Another plan, known as the Alhambra Creek Enhancement Plan, had been in place prior to RTCA's involvement but it only emphasized the stream segment which runs through

Central Martinez. RTCA's program, on the other hand, is to provide for technical assistance while working towards "promoting creek care and streambank protection among creekside property owners" (Harris 1994b). This RTCA program is to be undertaken on a larger portion of the creek.

Martinez, California, is located on the Northeast side of the San Francisco Bay, northeast of the City of Oakland. Martinez is an urban city; its NPS pollutants originate mainly from urban runoff. Since many residents and businesses are located along the stream, one program goal is to educate these individuals about stewardship and values of a healthy creek.

The RTCA guide has recently been distributed to individuals along the Creek. It is hoped that by educating creekside property owners and businesses, attitudes and actions will change so as to prevent and reduce NPS pollution. The RTCA guide was initially targeted for Martinez; however, it was also designed as a general guide to be used in various other communities. In fact, the RTCA guide is now being distributed in two new areas, one area of which is San Leandro.

The RTCA program is really considered a small subwatershed effort since it only concentrates on one creek within a city. In this respect, RTCA is similar to the San Leandro program, though the San Leandro program is a much more involved watershed awareness program. The RTCA program was set up according to jurisdictional rather than watershed boundaries; however, the RTCA program does play a role in overall watershed managements efforts. For instance, this RTCA guide may assist in NPS pollution prevention and reduction efforts in Martinez as well as in other watersheds. So, like the REDWOOD guide, the RTCA guide can be used, and is used, in conjunction with many other watershed projects.

CHAPTER V

RESULTS

Introduction

The results of this research are described in five sections:

1) Highlights of the Sixteen Investigative Responses Obtained Through Program

Materials and Program Coordinators, 2) Results from Each Investigative Question,

3) Highlights of Regulatory and Funding Representatives Responses From the

Additional Questions, 4) Results from Each Additional Question, and 5) Summary

Highlighting the Commonalities and Differences of the Investigative and

Additional Responses.

The investigative questions may be found in Appendix B while the

additional questions are found in Appendix C. Program matrices presenting

responses to the sixteen investigative questions and the additional questions are

found in Appendices H and J.

Data Presentation

Highlights of the Sixteen Investigative Responses Obtained Through Program
Materials and Program Coordinators

• **Implementation** All programs used a variety of activities to educate

their target audience with regard to nonpoint source (NPS) pollutants. Activities

included workshops, conferences, printed materials, videos, computer programs,

training, outreach, technical assistance, projects, or events (Table 4). The major

responses were as follows: educated their target audience by using printed

materials, training, and/or outreach (100 percent); included projects, events, or

other activities into their programs (80 percent); and used workshops and/or

provided technical assistance to help get the word out about NPS pollutants in a

watershed (50 percent).

- **Education** All of the 10 programs contained a goal that similarly stated that education is necessary to change behavior so as to increase stewardship and protection of watersheds. The major responses were as follows: education is needed in order to increase awareness so as to change attitudes and actions (50 percent), education leads to positive choices (30 percent), and hands-on training will lead to positive actions toward solving problems (20 percent).

- **Educational Approaches** The 10 programs use similar educational approaches: the use of supplemental guide books and the media, the setting up of watershed projects, hands-on education, the creation of partnerships, and the involvement of the community (Table 5). Sixty percent of programs use projects to teach their target audience about NPS pollutants, 50 percent involve the community in activities which impart the NPS pollution message, and 30 percent use books, other materials, and/or the media to educate their audience.

- **Unique/Creative Program Strategies** Coordinators varied in their responses. Answers included that the program used active educational programs which "belong" to the citizens (50 percent), used watershed boundaries, integrated workshops with field training, had follow-up assistance, had long-term watershed studies for students, made sure that there was collaboration between all parties, used a holistic approach, used community outreach which considered various audience needs, used advertising, and had unique guide booklets (20 percent).

- **Suggestions/Recommendations** In 40 percent of programs there are plans for a more extensive evaluation system (methodological, analytical, and monitoring data) and, 30 percent have plans to use more computers, advertising, and newly published materials.

• For Program Continuity Most program respondents said that to
ensure continuity, programs should obtain nonprofit status, train others to seek
funding, train others to get sponsors, rely upon sales, institute healthy behavior,
and include incentives.

Results from Each Investigative Question

#1. Location-
   • California = 7
   • Washington = 3

#2. Program categories-
   • 3 = Mainly school-aged programs (though A-A-S is really a combination
       program which is also highly community-based)
   • 3 = Largely community-based
   • 2 = Coordinated Resource Management Plans (CRMPs)
   • 2 = Programs resulting in the production of creek/stream care guides

#3   Funding source(s)-

TABLE 3

PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE QUESTION 3: FUNDING SOURCES

program	corporation	publications/sales	non-profit organization/foundation	grants	contributions	budget/contracts
A-A-S		X	X	X	X	X
A-A-W	X		X	federal, state		
KIDS			X	federal, county		
KING				state		
METRO						X
SAN LEANDRO				county		
P-B CRMP			X	state, reg'l, others	X	
S-F CRMP	X		X	federal, RCD		
REDWOOD				state		
RTCA				federal		
TOTAL=	2	1	5	9	2	2
%=	20%	10%	50%	90%	20%	20%

Abbreviations for Table 3-

RCD=   Resource Conservation District
reg'l=   regional

#4.   Year in effect-
 • Less than ten years old = 10
 • Less than four years old = 8

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#5. **Why program was initiated-**
  - clean water concerns
  - enhance citizens to protect their watershed
  - protect and enhance water quality
  - decrease NPS pollutants
  - over concerns of management of our natural resources
  - a comprehensive watershed program is needed

#6. **How program was implemented and resulting products/projects-**

TABLE 4

PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE QUESTION 6:
HOW THE PROGRAM WAS IMPLEMENTED AND
ITS RESULTING PRODUCTS AND/OR PROJECTS

program	workshops	conferences	printed materials	video/ computer programs	training/ outreach/ education	technical assistance/ supplies	projects/ activities/ events
A-A-S	X	X	X	X	X	X	X
A-A-W			X		X	X	X
KIDS	X		X		X	X	X
KING	X		X		X		X
METRO		X	X	X	X		X
SAN LEANDRO			X		X	X	X
P-B CRMP			X		X	X	X
S-F CRMP	X		X	X	X		
REDWOOD		X	X		X		X
RTCA	X		X		X		
TOTALS=	5	3	10	3	10	5	8
%=	50%	30%	100%	30%	100%	50%	80%

#7. **Goals-**
  - hands-on education is essential to change behavior so as to stimulate stewardship for watershed protection = 10
  - "adoption" of watersheds = 2

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#8. Why is education necessary?-
- hands-on training leads to positive actions toward solving problems = 2
- need to increase awareness in order to change attitudes and actions = 5
- education leads to positive choices = 3

#9. Educational approach-

TABLE 5

PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE QUESTION 9: THE PROGRAM'S EDUCATIONAL APPROACH

program	guide books/media	projects	hands-on education	creating partnerships (through ads)	involve community
A-A-S	X	X	X		
A-A-W			X		
KIDS		X			
KING		X			X
METRO				X	
SAN LEANDRO		X			X
P-B CRMP		X			X
S-F CRMP	X				
REDWOOD		X			X
RTCA	X				X
TOTALS=	3	6	2	1	5
%=	30%	60%	20%	10%	50%

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#10. program receptivity

TABLE 6

PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE
QUESTION 10: HOW IT IS KNOWN THAT THE TARGET
AUDIENCE IS RECEPTIVE TO THE PLAN OR PROGRAM

program	growth of program/ demand for program	audience response/(+) FB / (+) FB participant evaluations	outside interest	receptivity is based upon values/fears of audience	not yet known
A-A-S	X	X			
A-A-W	X	X			
KIDS	X	X			
KING	X				
METRO		X	X		
SAN LEANDRO	X	X	X		
P-B CRMP				X	X
S-F CRMP		X	X		X
REDWOOD		X			
RTCA					X
TOTALS=	5	7	3	1	3
%=	50%	70%	30%	10%	30%

Abbreviations for Table 6-

(+)=   positive
FB=   feedback

#11. Who is the target population and how is the program information
disseminated to that target audience?-
For the most part this question turned out to be redundant. The
coordinator answers to this question showed up in other investigative
answers.

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#12. Unique, creative, and valuable strategies-
- A-A-S=   use watershed boundaries, integrate workshops with field training, follow-up assistance
- A-A-W=   long term watershed study for students, partnerships with agencies, schools, businesses, and community members
- KIDS=   holistic approach
- KING=   community outreach considers various needs
- METRO=   advertising
- REDWOOD, RTCA=
  guide booklet
- KIDS, KING, METRO, SAN LEANDRO, S-F CRMP=
  use active educational programs which "belong" to the citizens

#13. Judging Success-

TABLE 7

PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE
QUESTION 13: HOW PROGRAM SUCCESS IS JUDGED

program	project completion/ program work/ projects discussed at meetings	responses to questionnaires/ evaluations/ assessments/ surveys	growth of program/ response to program	when natural resources are preserved	not yet determined
A-A-S	X	X			
A-A-W		X	X		
KIDS		X	X		
KING			X		
METRO		X	X		
SAN LEANDRO			X		
P-B CRMP	X		X		
S-F CRMP				X	
REDWOOD	X		X		
RTCA					X
TOTALS=	3	4	7	1	1
%=	30%	40%	70%	10%	10%

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#14. Include in next plan-

TABLE 8

PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE
QUESTION 14: WHAT THE PROGRAM COORDINATOR
WOULD INCLUDE IN A FUTURE PLAN OR PROGRAM

program	longer training sessions/ more projects	more extensive evaluation system/ methodological and analytic data/ monitoring	computers, ads, new guide booklets	all public involvement & educational opportunities to meet the variety of needs/more proactive	experience for citizens so that they have the opportunity to make healthy choices	not yet known
A-A-S	X					
A-A-W		X				
KIDS		X	X			
KING				X		
METRO		X	X			
SAN LEANDRO		X				
P-B-CRMP					X	X
S-F-CRMP				X		
REDWOOD			X			
RTCA						X
TOTALS=	1	4	3	2	1	1
%=	10%	40%	30%	20%	10%	10%

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#15. Important to share program?-

TABLE 9

PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE
QUESTION 15: WHETHER OR NOT IT IS IMPORTANT
TO SHARE PROGRAM INFORMATION

program	share information & resources with others- all benefit	yes, an educational program	program based on negotiating/share ideas to solve problems
A-A-S	X		
A-A-W	X		
KIDS		X	
KING	X		
METRO	X		
SAN LEANDRO		X	
P-B CRMP			X
S-F CRMP			X
REDWOOD	X		
RTCA	X		
TOTALS=	6	2	2
%=	60%	20%	20%

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#16. Continuity of program-

TABLE 10

PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE QUESTION 16: HOW THE PROGRAM COORDINATOR IS ATTEMPTING TO ENSURE PROGRAM CONTINUITY SHOULD FUNDING RUN OUT

program	obtain non-profit status	train others to seek funding/get sponsors	rely upon sales	provide incentives; attempt to institution-alize (+) beh	positive messages sent to funder	$ already written into budget	would continue due to strong involvement
A-A-S		X					
A-A-W			X				
KIDS	X				X		
KING						X	X
METRO						X	X
SAN LEANDRO	X						X
P-B CRMP				X			
S-F CRMP							X
REDWOOD			X				
RTCA (not known)							
TOTALS=	2	1	2	1	1	2	4
%=	20%	10%	20%	10%	10%	20%	40%

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Additional Questions

To gain perspective on success of the 10 programs, questions were asked of funding and regulatory representatives of all programs (Appendix C). A total of nine regulatory representatives and seven funding representatives (six funding agents and one "friends" group leader) were contacted and interviewed. The results of the interviews for each of the programs are summarized in matrix form and appear in Appendix J.

Highlights of Regulatory and Funding Representatives Responses From the Additional Questions

- **Importance of Education- Does it Change Behavior?** Responses were similar in that all representatives felt that education was an important part of these programs. The major responses included: education is very important (56 percent regulatory), the program changes individual behavior by involving the community (57 percent funding), education is necessary to decrease NPS pollutants (56 percent regulatory, 57 percent funding), and education leads to an awareness of options, a changed behavior, and/or action (33 percent regulatory, 43 percent funding).

- **Success and Effectiveness of the Program** Major responses included the following: effectiveness of education depends upon how it is implemented and this program is executed in a proper manner since it is integrative and uses a variety of activities to involve the community (67 percent regulatory, 71 percent funding); the program is successful in terms of educating the public but whether NPS pollutants are decreasing is tough to quantify (33 percent regulatory); and, the program is successful but limited to certain target populations and areas (29 percent funding).

- **Does the Program Increase Watershed Awareness and/or Water Quality?**

The major responses were: the program has activities that promote both (11 percent regulatory, 43 percent funding); the program is both an awareness and educational program which leads to participant action (56 percent regulatory, 14 percent funding); the program does increase awareness but it is difficult to say if it is increasing water quality (although one representative said that the watershed is showing some effects of decreased sediment and another said that by decreasing sediment and changing agricultural practices water quality will be increased) (33 percent regulatory, 29 percent funding); and, the program must educate first to ensure that NPS pollutants are decreased in the future, and/or, the program is a watershed involvement one which educates beyond watershed awareness (44 percent regulatory, 29 percent funding).

- **Unique and/or Creative Strategies** The major responses have been grouped into three categories as follows: 1) the watershed-based program is a new concept and so has lots of spin-offs (33 percent regulatory, 14 percent funding), 2) the program gets citizens involved by: asking the local people what they want to get out of the program, having on-site stewards, having citizens help come up with problems and solutions, integrating materials with teaching, getting citizens to take over, or, by targeting in the right area (33 percent regulatory, 71 percent funding), and, 3) materials used are short, concise, geared toward the layman, have good illustrations, are written in humanistic terms, and, are simple yet apply to a broad number of constituents (11 percent regulatory, 29 percent funding).

- **What Did You Get Out of the Program?/What is the Most Effective Part of the Program?**

The like responses are grouped together as follows: 1) variety of activities, many people are involved (including locals), public support and involvement

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(55 percent regulatory, 43 percent funding), 2) the opportunity to deal with

landowners, establishing neutrality with all parties (which leads to credibility)

(22 percent regulatory), 3) gratifying to see that people care, feel the "sense of

community," having the landowners see that their efforts are paying off

(11 percent regulatory, 43 percent funding), and, 4) it takes a long time for

educational programs to show their effects, it is a cost-effective way to solve

problems (11 percent regulatory, 29 percent funding).

- **Should the Program be Conducted in the Same Manner Again?**

Major responses have been grouped into the following three categories: 1)

yes, but there are some limitations such as the program needing more funding,

watershed boundaries, city/county/state partnerships, and, a change in tone so as

to involve more landowners (33 percent regulatory, 14 percent funding), 2) yes,

but the program could be done in less time and with money (29 percent funding,),

3) yes, the program should "spread and multiply," the program is used as a

model, the program involves all early on and is open to hearing the communities

needs, the program should follow the directors lead, the program set-up, and the

watershed trainings (44 percent regulatory, 71 percent funding).

Results from Each Additional Question

Tables 11-20 display matrices for each of the additional perspective

answers. However, not all programs have funding or regulatory agencies

associated with them; therefore, a total of nine regulatory representatives and

seven funding representatives were contacted and interviewed. Additionally,

since the regulatory and funding responses fit nicely into similar categories, they

are depicted together on matrices.

FUND=	funding representative response
NPS=	nonpoint source
REG=	regulatory representative response
w/=	with
W=	watershed

TABLE 11

REGULATORY AND FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER 1A

question #1a	ASKED OF FUNDING & REGULATORY AGENCIES: IS EDUCATION IMPORTANT? DOES EDUCATION CHANGE BEHAVIOR?				
PROGRAMS	yes, very important	yes, difficult to assess- hard results are long term	change behavior by involving the community	needed to decrease NPS pollutants	education leads to: awareness of options, a changed behavior, action
A-A-S	REG				
A-A-W		FUND			
KIDS	REG		FUND	REG	FUND
KING					REG
METRO	REG			REG	
SAN LEANDRO	REG		FUND	REG	
P-B CRMP				REG FUND	REG FUND
S-F CRMP				REG FUND	REG FUND
REDWOOD	REG		FUND	FUND	
RTCA			FUND	FUND	
*TOTALS	5=REG	1=FUND	4=FUND	5=REG 4=FUND	3=REG 3=FUND
*REG %	56	0	0	56	33
*FUND %	0	14	57	57	43

*   number of regulatory representative respondents = 9;
    number of funding representative respondents = 7

TABLE 12

REGULATORY AND FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER 1B

question #1b	ASKED OF FUNDING AND REGULATORY AGENCIES: IS THE PROGRAM SUCCESSFUL? IS IT EFFECTIVE IN TERMS OF EDUCATING THE PUBLIC?				
PROGRAM	yes, effective	yes, but education depends upon how it is implemented: this program is integrative, it uses a variety of activities, &/or, it involves the community	go by what program reports say; it is hard to quantify scientifically	to be successful & effective, coordinators, etc. must remain neutral	limits: does not reach all; only works in certain areas
A-A-S	REG	REG			
A-A-W		FUND	FUND		
KIDS	FUND	REG	REG		FUND
KING		REG			
METRO	REG				
SAN LEANDRO	FUND	REG	REG		FUND
P-B CRMP		REG FUND		REG	
S-F CRMP		REG FUND			
REDWOOD	REG FUND	FUND	REG		
RTCA		FUND			
*TOTALS	3=REG 3=FUND	6=REG 5=FUND	3=REG 1=FUND	1=REG	2=FUND
*REG %	33	67	33	11	0
*FUND %	43	71	14	0	29

* number of regulatory representative respondents = 9;
number of funding representative respondents = 7

TABLE 13

REGULATORY AND FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER 1C

question #1c	ASKED OF FUNDING AND REGULATORY AGENCIES: DOES THE PROGRAM INCREASE WATERSHED AWARENESS AND/OR WATER QUALITY?			
PROGRAMS	includes activities which promote both	awareness, educational program, program gets key people to spread the word, awareness leads to action, some have changed their habits	monitoring projects; difficult to say if they are increasing water quality; do see some effects of decreased sediment	educate first to decrease future pollutants; program is a watershed involvement one which goes beyond awareness
A-A-S	REG	REG	REG	
A-A-W				FUND
KIDS	FUND	REG	REG	
KING				REG
METRO		REG		
SAN LEANDRO		REG	REG	FUND
P-B CRMP	FUND	REG	FUND	REG
S-F CRMP		FUND		REG
REDWOOD			FUND	REG
RTCA	FUND			
*TOTALS	1=REG 3=FUND	5=REG 1=FUND	3=REG 2=FUND	4=REG 2=FUND
*REG %	11	56	33	44
*FUND%	43	14	29	29

* number of regulatory representative respondents = 9;
number of funding representative respondents = 7

TABLE 14

REGULATORY AND FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER 1D

question #1d	ASKED OF FUNDING AND REGULATORY AGENCIES: ARE PROGRAM GOALS REALISTIC?			
PROGRAMS	yes	yes, but broad goals are tough to measure	yes, but it may take a long time to accomplish the goals	did not respond
A-A-S	REG			
A-A-W	FUND	FUND		
KIDS	REG FUND			
KING	REG			
METRO				REG
SAN LEANDRO	REG FUND			
P-B CRMP	REG FUND			
S-F CRMP	REG FUND		FUND	
REDWOOD	REG FUND			
RTCA	FUND			
*TOTALS	7=REG 7=FUND	1=FUND	1=FUND	1=REG
*REG %	78	0	0	11
*FUND%	100	14	14	0

*   number of regulatory representative respondents = 9;
    number of funding representative respondents = 7

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TABLE 15

REGULATORY AND FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER 1E

question #1e	ASKED OF FUNDING AND REGULATORY AGENCIES: HOW WELL IS THE PROGRAM RECEIVED?				
PROGRAMS	positively	positive with community members &/or landowners who are interested &/or see the benefits of the program	not as positive with some- a few board members or key landowners see program as a threat	do not know	survey results say that the program is positively received; written materials are well received
A-A-S	REG				
A-A-W				FUND	
KIDS	REG FUND				
KING	REG				
METRO					REG
SAN LEANDRO	REG FUND				
P-B CRMP		REG FUND	REG		
S-F CRMP	FUND	REG	REG		
REDWOOD		REG FUND	REG		
RTCA					FUND
*TOTALS	4=REG 3=FUND	3=REG 2=FUND	3=REG	1=FUND	1=REG 1=FUND
*REG %	44	33	33	0	11
*FUND %	43	29	0	14	14

* number of regulatory representative respondents = 9; number of funding representative respondents = 7

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TABLE 16

REGULATORY AND FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER 1F

question #1f	ASKED OF FUNDING AND REGULATORY AGENCIES: DOES THE PROGRAM HAVE ANY UNIQUE AND/OR CREATIVE STRATEGIES?			
PROGRAMS	is a new concept-lots of spin-offs; these types of programs are so new that almost anything is unique; program is full of creative ideas	kept governmental ties; remaining neutral is important so that program appeals to all groups	on-site stewards, getting landowners/ community members involved, came up w/problems & solutions in a large W., integrated materials w/teaching, effective where implemented, getting citizens to take over, designed after a model	materials are: short, concise, geared toward the layman, have good illustrations, are written in humanistic terms, are simple yet apply to broad numbers of constituents
A-A-S	REG	REG		
A-A-W			FUND	
KIDS	REG		FUND	
KING			REG	
METRO				
SAN LEANDRO	REG		FUND	
P-B CRMP			REG FUND	
S-F CRMP			REG FUND	
REDWOOD	FUND			REG FUND
RTCA				FUND
*TOTALS	3=REG 1=FUND	1=REG	3=REG 5=FUND	1=REG 2=FUND
*REG %	33	11	33	11
*FUND %	14	0	71	29

* number of regulatory representative respondents = 9;
number of funding representative respondents = 7

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TABLE 17

REGULATORY AND FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER TWO

question #2	ASKED OF FUNDING AND REGULATORY AGENCIES: HOW DO YOU KNOW THAT THE PROGRAM IS WORKING?			
PROGRAMS	first hand observations: out there, attending meetings, talking to people, always involved, helped to distribute materials, knows W, & community members/landowners	issued permits for projects, is on board of directors, is in touch w/program director & program, has discussions about program w/board members	sees if Clean Water Programs are happening, supports these public education programs, sees program reports	do not know; it is not their job to follow-up
A-A-S		REG		
A-A-W		FUND	FUND	
KIDS	FUND		REG	
KING			REG	REG
METRO		REG		
SAN LEANDRO	FUND			
P-B CRMP	REG FUND			
S-F CRMP	REG FUND			
REDWOOD	REG FUND			
RTCA	FUND			REG
*TOTALS	3=REG 6=FUND	2=REG 1=FUND	2=REG 1=FUND	2=REG
*REG %	33	22	22	22
*FUND %	86	14	14	0

*   number of regulatory representative respondents = 9;
    number of funding representative respondents = 7

TABLE 18

REGULATORY AND FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER THREE

question #3	ASKED OF FUNDING AND REGULATORY AGENCIES: HOW HAS THE PUBLIC PERCEIVED THE PROGRAM?		
PROGRAMS	very supportive & positive; embraced the program; well: especially w/schools and conferences, have sell out audiences, public comes to events & meetings, lots of citizen action, community members are involved	do not know	a few board members and key landowners see program as a threat
A-A-S	REG		
A-A-W		FUND	
KIDS	REG FUND		
KING	REG		
METRO	REG		
SAN LEANDRO	REG FUND		
P-B CRMP	REG FUND		REG
S-F CRMP	REG FUND		REG FUND
REDWOOD	REG FUND		
RTCA	FUND	REG	
*TOTALS	8=REG 6=FUND	1=REG 1=FUND	2=REG 1=FUND
*REG %	89	11	22
*FUND %	86	14	14

* number of regulatory representative respondents = 9;
  number of funding representative respondents = 7

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TABLE 19

REGULATORY AND FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER FOUR

question #4	ASKED OF FUNDING AND REGULATORY AGENCIES: WHAT DID YOU GET OUT OF THE PROGRAM? WHAT IS THE MOST EFFECTIVE PART OF THE PROGRAM?			
PROGRAMS	variety of activities,many people are involved, on-going support to residents, deal with many issues at one time, distribution of materials to those interested, integrate materials into teaching, involvement, the way the materials were put together	opportunity to deal with landowners; maintaining neutrality leads to credibility; reached an uninformed crowd without finger pointing	gratifying to see that people care; "sense of community;" seeing changes in the watershed; landowners see that their efforts pay off; working closely with community	long time for educational programs to show their effects, but they will; cost-effective way to solve problems; success will lead to other like programs; small W. makes it easier to follow W. boundaries
A-A-S			REG	REG
A-A-W	FUND			
KIDS	REG FUND			
KING	REG			
METRO				
SAN LEANDRO	REG		FUND	FUND
P-B CRMP	FUND	REG		
S-F CRMP	REG			FUND
REDWOOD	REG	REG	FUND	
RTCA			FUND	
*TOTALS	5=REG 3=FUND	2=REG	1=REG 3=FUND	1=REG 2=FUND
*REG %	55	22	11	11
*FUND %	43	0	43	29

*   number of regulatory representative respondents = 9;
    number of funding representative respondents = 7

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TABLE 20

REGULATORY AND FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER FIVE

question #5	ASKED OF FUNDING AND REGULATORY AGENCIES: SHOULD THE PROGRAM BE CONDUCTED IN THE SAME MANNER AGAIN?				
PROGRAMS	yes, but limitations include needing: more funding; watershed boundaries & city/county/state partnerships; and, change in tone to involve more landowners	yes, but it could be done in less time and with less money	yes, keep on it- "spread & multiply;" absolutely- it is used as a model elsewhere; follow: the directors lead, the program set-up, and the watershed trainings: involve all early, be open, & hear comm	no major changes; as with any process, may make some future program changes in this W. &/or in another W.	not familiar enough to say
A-A-S	REG				
A-A-W			FUND		
KIDS		FUND	REG		
KING	REG				
METRO					REG
SAN LEANDRO		FUND	REG FUND		
P-B CRMP			REG FUND		
S-F CRMP	REG		REG FUND	FUND	
REDWOOD	FUND			REG	
RTCA			FUND		
*TOTALS	3=REG 1=FUND	2=FUND	4=REG 5=FUND	1=REG 1=FUND	1=REG
*REG %	33	0	44	11	11
*FUND %	14	29	71	14	0

* number of regulatory representative respondents = 9; number of funding representative respondents = 7

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Summary Highlighting the Commonalities and Differences of the Investigative and Additional Responses

- **Education** In order to solve the related watershed problems, coordinators, regulatory representatives, and funding representatives stated that education was necessary. Correspondents stated that education leads to awareness, a changed behavior, and action. However, some of the representatives added that the effectiveness of education depends on how it is implemented. These and other representatives added that these particular programs are being executed in an appropriate manner since they are integrative and use a variety of activities to involve the target audience (67 percent regulatory and 71 percent funding).

- **Variety of Educational Activities** Program coordinators also affirmed that programs need to use a variety of activities in order to educate their target audience. Coordinators added that hands-on education and experience is necessary in order to provide options, change behavior, develop a sense of stewardship, and/or to protect watersheds. The educational approaches that these programs use to involve their audience include the use of printed materials, the media, training, projects, outreach, the creation of partnerships, and the involvement of the community.

- **Are These Watershed-Based Programs Effective?** Regulatory and funding representatives stated that these watershed-based programs are effective because they are implemented in a sound manner; coordinators and employees are educating (through public involvement) to promote both awareness and behavioral changes in order to promote healthy watershed function. With regard to water quality, one representative stated that it is difficult to measure an increase in water quality especially with respect to changes to a small segment of a creek. This same representative expressed the necessity of using these kinds of watershed-based public involvement programs though, in order to eventually

increase the total water quality. Other representatives asserted that education is difficult to assess since its effects tend to be long term, but these representatives added that these programs will ultimately result in an increase in water quality.

Representatives stated that they know that the program is working because they observe it first hand (33 percent regulatory, 86 percent funding). They stated that they are out in the field, attending meetings, talking to people, are always involved, they help to distribute materials, and/or, they know the watershed and the community members/landowners.

- **Unique Program Strategies** When asked about the program's unique or creative strategies, coordinator responses were that the program uses watershed rather than political boundaries, they integrate workshops with field training, they have follow-up assistance so that more projects are completed, they have long-term watershed studies for students and citizens, they make sure that all parties collaborate, they use a holistic approach, they use community outreach, they consider various audience needs, they use advertising, their guide books are unique, and/or, they have an active educational program which belongs to the citizens (50 percent gave this last response).

When regulatory and funding representatives were asked that same question, they responded with the following: they have managed to retain their governmental ties and remain neutral, they involve the citizens, and they use short, clear, concise materials which appeal to a broad number of constituents.

- **The Most Effective Parts of the Programs** Regulatory and funding representative responses were as follows: 1) the variety of activities, support, and involvement and the way materials were put together, distributed, and integrated with teaching (55 percent regulatory, 29 percent funding); 2) the way the program coordinators and employees deal with landowners; 3) the sense of

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community; and, 4) these programs are cost-effective and may be used as models.

- **Include in a Next Plan, or Conduct Program in the Same Manner Again?**

Coordinator responses were as follows: continue to include the program's proactive approach with its strong public involvement and numerous educational and experiential opportunities; plan to include a more extensive evaluation system that would allow for analysis of the more quantitative data; include more written materials and other media; and, include longer training sessions and more projects.

Major regulatory and funding representative responses were: 1) yes-keep on it- this program is a model; follow the directors lead, the program set-up, and the watershed trainings; get people involved early and be open to suggestions (44 percent regulatory, 71 percent funding); 2) yes, but do it in less time and with less money next time around; and, 3) yes, but there are some limitations such as needing more money, needing to have watershed boundaries, needing city, county, and state partnerships, and needing a slight change in the tone so that more key landowners become involved.

CHAPTER VI

ANALYSIS

Introduction

The results of this work highlight the prevalent program strategies and can be interpreted in light of recommendations developed from the environmental education and watershed planning literature. This literature provides standards for assessing the effectiveness of program planning and implementation.

This chapter has been divided into three sections: Most Prevalent Program Strategies, Least Prevalent Program Strategies, and Analysis of Effective Program Strategies. Since the investigative and additional questions were posed in an open-ended fashion, the analyzed research results listing the most and least prevalent strategies may not be fully accurate; some programs may use a particular strategy but correspondents may not have mentioned it in their response. However, respondents presumably gave features of programs that they thought were the most important. So, though programs may in fact apply some of the other listed strategies, they did not communicate them when answering the questions.

Data Analysis

The data, which was used to determine the number of programs using a particular strategy, came from all surveyed respondents. For example, with the informational materials strategy, at least one coordinator, one regulatory representative, or one funding representative needed to mention that they applied that strategy in order for it to be counted. This method of analysis was used to determine the most and the least prevalent program strategies. This

gathered information will be expanded upon in the third section titled Analysis of Effective Program Strategies.

Most Prevalent Program Strategies

The program strategies which are most prevalent are informational materials, training programs, community outreach, strategy integration, sense of ownership, partnership development, and program evaluation (Table 21).

TABLE 21

MOST PREVALENT PROGRAM STRATEGIES

MOST PREVALENT PROGRAM STRATEGIES	
STRATEGY	# OF PROGRAMS USING STRATEGY
Informational Materials	Ten
Training Programs	Ten
Community Outreach	Ten
Strategy Integration	Eight
Sense of Ownership	Eight
Partnership Development	Ten
Program Evaluation	Nine

Informational Materials. All 10 programs analyzed in this research use printed materials as a program strategy. Additionally, three programs include adjunctive media strategies such as advertising, videos, and computer programs. Two of the studied programs use creek care guide booklets.

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These types of educational materials are a necessary component for effective watershed management; it is important to disseminate critical information. However, the informational materials strategy alone will not provide adequate impetus to produce a significant reduction of NPS pollutants (Harris 1994b, Cornell 1994).

Training Programs. All 10 programs utilize some type of training program as a strategy for watershed management. Training programs include projects, workshops, conferences, and meetings.

Like the previous informational materials strategy, training programs are important for conveying information to the target audience. Unlike the materials strategy, training programs further increase the level of target audience involvement; therefore, training is more likely to increase awareness and result in behavioral changes. Training programs may be a crucial component in the development of watershed management programs. However, unless the training program includes informational materials and provides active involvement, behavioral modifications are not likely to occur through the use of training programs alone.

Community Outreach. All 10 watershed programs use some form of community outreach to involve their target audience. Community outreach includes action projects, involvement of landowners and participation of community members, watershed awareness events, the adoption of creeks, the use of on-site stewards, long-term watershed studies which are set up for students and citizens, and educational and experiential opportunities.

Community outreach strategies are more likely to involve personal investment, responsibility, actual commitment, and environmental sensitivity, all of which lead to ownership and stewardship (Hungerford and Volk 1990, Fuller 1993, Hungerford 1988). According to the literature, the community outreach

method is critical to changing the long-term behavior of individuals. It is important to provide informational materials in order to increase knowledge of an issue and it is important to provide training programs in order to increase watershed awareness, however, involvement is an essential component in changing the target audience's behavior for the long-term. Ownership and empowerment are necessary components for long-term stewardship (Hungerford and Volk 1990, Hungerford 1988).

The use of community outreach action strategies is an effective technique which may be used to accomplish stewardship; these experiences demonstrate to an individual that change can be promulgated through individual efforts.

Strategy Integration. Integrative strategies combine one or more of these watershed management strategies. Eight program representatives stated that their watershed management program combines watershed management strategies such as workshops with field training, community outreach with training programs, and informational materials with training programs. These integrative approaches are more likely to increase knowledge, awareness, and understanding and change target audience behavior than the utilization of any of the watershed management strategies singularly. Since the integrative strategy combines at least two of the watershed management strategies, there is an increased probability of advancing citizen involvement and stewardship.

Sense of Ownership. Program respondents of eight of the watershed programs stated that the effectiveness of the individual watershed management program is dependant upon consideration of various audience needs, emphasis that the program belongs to the citizens, development of a sense of ownership in their target audience, provisions that motivate the citizens to take over, working closely with the community, early involvement of all affected parties, inspiring influential citizens to disseminate critical information, establishing a caring

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audience, and developing a feeling of sense of place (or community) within the citizenry.

This sense of ownership strategy is crucial, as the planning literature states, in promoting public understanding of the watershed problems so that the public may assist in supporting solutions (Environmental Protection Agency 1992, Environmental Protection Agency 1989). Additionally, the environmental education literature states that it is necessary for the watershed management program to be designed in a manner which promotes awareness and understanding and, thereby, a sense of stewardship (Fuller 1993).

Partnership Development. The goal of the partnership development strategy is to establish group partnerships within the community. The partnership development strategy differs from the sense of ownership strategy. The partnership development strategy provides an important liaison between the watershed management program and the community; these associations are critical to watershed management problem-solving. Stuart (1993) notes that partnerships are needed to achieve greater ownership and lasting involvement by all participants.

The 10 programs build partnerships by applying at least one of the following: by ensuring that various parties collaborate (i.e., agencies, school, businesses, community), by approaching problems and arriving at solutions together, by involving many groups of people, by facilitating cooperation amongst all partnerships involved, by sharing information between agencies and organizations and citizens, by building watershed coalitions, and by creating partnerships through advertising.

Program Evaluation. Nine of the 10 watershed management programs have developed criteria through which they evaluate, in some fashion, their program's progress. The most prevalent methods which are used to judge

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program success include audience receptivity, completed projects, program growth, attendance at various functions, or responses to surveys, evaluations, or questionnaires. In addition to these evaluation measures, four watershed management programs have also included water quality monitoring techniques as a basis for program evaluation.

Though program staff members do evaluate their watershed programs to some degree, four program representatives stated that their programs need to apply more methodological and analytical data, more monitoring, or a more extensive evaluation system. Most resource managers can appreciate the importance of evaluation, but as two watershed management program representatives stated, it is difficult to obtain follow-up funding for evaluation. One of these spokespersons asserted that program funding dollars are usually spent on implementation of programs; programs rarely have any leftover money for evaluation.

However, as Britt and Hunter (n.d.) note, the evaluation of programs should be built into the program framework itself. It is important to include ongoing evaluation, such as monitoring, otherwise it is difficult to evaluate program success.

Least Prevalent Program Strategies

Program strategies that were not mentioned as frequently included utilizing watershed boundaries, assistance, incentives, and support, and remaining open to all persons (Table 22).

TABLE 22

LEAST PREVALENT PROGRAM STRATEGIES

LEAST PREVALENT PROGRAM STRATEGIES	
STRATEGY	# OF PROGRAMS USING
Utilizing Watershed Boundaries	Four
Assistance, Incentives, & Support	Four
Remain Open To All Persons	Three

Utilizing Watershed Boundaries. Four programs apply watershed rather than political boundaries. One program regulatory representative stated that its program would be of greater significance if it employed watershed boundaries.

The importance of applying watershed boundaries is well supported in the literature (Steelquist 1995, Hansen 1994). However, overcoming political boundaries is not easy to do, especially for many small subwatershed programs. Large scale watershed planning is more conducive to planning by watersheds. For example, a state level planning program may be arranged such that institutional changes may be written into laws and/or agreements. Unless a large scale plan is already in place, it may be difficult for a subwatershed planning area such as a small creek watershed effort to establish watershed boundaries; but they should do the best they can.

Hansen (1994) stated that significant hurdles must be overcome before the watershed approach is to be successfully applied. However, even given the

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political constraints, there are some approaches even smaller watershed programs could follow in order to further apply watershed boundaries. Hansen (1994) suggested overcoming institutional obstacles by applying such planning tools as involvement, collaboration/facilitation, education, information, and commitment.

Assistance, Incentives, and Support. Four program coordinators or representatives stated that they use assistance, incentive, or supportive strategies in their programs. These strategies include follow-up assistance to allow for the completion of more projects, technical assistance, incentives, ongoing support to residents, or community and institutional assistance. Not all of these strategies will significantly decrease NPS pollution for the long term, but most are important in helping to mitigate NPS pollution problems at least for the short term.

The planning literature states the importance of combining a variety of non-regulatory methods (BMPs, voluntary actions, and incentives) as well as identifying nonregulatory approaches which can assist in decreasing NPS pollution (Environmental Protection Agency 1992). Therefore, additional nonregulatory approaches, such as assistance, incentives, and support, may serve as important adjuncts to effective watershed programs.

Remain Open To All Persons. Three watershed program spokespersons stated that it is important for program staff members to retain governmental ties, remain neutral to all (leads to credibility), and reach an uninformed crowd without finger pointing. Remaining open to all persons is purported to be a crucial strategy in watershed management (Hansen 1994); at least two representatives mentioned this strategy as a major factor leading to program success.

The literature stressed the importance of remaining open to all persons. For instance, Hansen (1994) suggested one method that may be used to assist in ensuring neutrality: anticipate certain common behaviors (those which will surely

be manifested) of the target audience prior to planning or implementation of the program and then develop advanced strategies so as to contend with these problems in a professional manner.

Analysis of Effective Program Strategies

Based upon the environmental education and planning literature (see Tables 1 and 2), the effective strategies of the 10 watershed programs can be evaluated utilizing the following classifications: collaboration, partnership development, community involvement, strategy integration, sense of ownership, program design, and long-term plan and program considerations (Table 23).

TABLE 23

EFFECTIVE PROGRAM STRATEGIES BASED UPON THE
ENVIRONMENTAL EDUCATION AND PLANNING LITERATURE
AND THE TEN WATERSHED PROGRAMS

EFFECTIVE PROGRAM STRATEGIES (based upon the environmental education and planning literature and the ten watershed programs)	
STRATEGY	PROGRAM KNOWN TO BE EMPLOYING THE STRATEGY
Collaboration (solve problems cooperatively, cooperation, sharing information)	solve problems cooperatively- P-B CRMP, S.F. CRMP cooperation- A-A-W, S.F. CRMP sharing information- A-A-S, A-A-W, KING, SAN LEANDRO, RTCA
Partnership Development (developing partnerships, involving many people, building watershed coalitions, advertising)	partnerships- A-A-W, REDWOOD involve many people- P-B CRMP, S.F. CRMP, REDWOOD build watershed coalitions- KIDS advertising- METRO
Community Involvement	all ten programs especially A-A-S, KING, METRO, SAN LEANDRO, REDWOOD
Strategy Integration	at least eight programs- A-A-S, A-A-W, KIDS, KING, METRO SAN LEANDRO, P-B CRMP, REDWOOD
Sense of Ownership	all ten programs
Program Design (one component is flexibility)	flexibility- A-A-S, P-B CRMP, REDWOOD
Long-Term Plan and Program Considerations (i.e., staff selection, funding sources, program evaluation, utilizing watershed boundaries)	staff- P-B CRMP, S.F. CRMP funding for evaluation is needed- especially concerned- KIDS, SAN LEANDRO, RTCA apply watershed boundaries- A-A-S, SAN LEANDRO, P-B CRMP, S.F. CRMP

Collaboration. This strategy is essential for long-term protection of

watersheds (Environmental Protection Agency 1992). Hansen (1994) stated that

it is crucial to use this planning tool so that the watershed program will be

responsive to outside social, political, and economic forces. Hansen also advised

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that, since plans are the beginning stages of programs and the program's implementation stage is long-term, those persons who implement the plan should be involved early on in the planning process. Hansen's research showed that the collaborative approach exhibited varying degrees of success but the success seemed to be contingent upon the staff's capabilities, the individual participants, and the degree of established trust among committee members (Hansen 1994).

Hansen also found that the watershed plan that achieved the most effective collaboration with the state had a project director who put forth extra effort to work with local field offices to develop plan recommendations. Although this thesis did not directly ask about staff's capabilities, some regulatory and funding agencies did mention the importance of their adept project director (i.e., P-B CRMP representatives).

Since the collaboration strategy is closely linked with the partnership development strategy, it is not precisely known how many programs actually employ this strategy. However, one coordinator (A-A-W) and one funding representative (S.F. CRMP) mentioned cooperation as being critical to program success whereas five coordinators stated that their programs share information with others (A-A-S, A-A-W, KING, SAN LEANDRO, RTCA). Additionally, two program correspondents have stated that their program solves problems cooperatively (two coordinators from P-B CRMP and S.F. CRMP, one regulatory representative from S.F. CRMP, one funding representative from S.F. CRMP). Therefore, approximately seven programs employ this strategy.

Partnership Development. Though closely related, a distinction is made between the collaboration and the partnership development strategies. While collaboration is interpreted as cooperation and sharing information with others, partnership development is interpreted as developing co-ownerships and associations.

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The literature cites numerous reasons that the partnership development strategy is a necessary strategy to apply to both planning and implementation of watershed management programs. Hansen (1994) cited the need to develop ownership and lasting involvement by all participants. Stuart (1993) emphasized the need for involvement of all concerned early on in the planning process. Many sources expressed the need for federal, state, and local partnerships.

Six of the 10 programs employ the partnership development strategy. Two programs mentioned that they have developed strong partnerships with community members, schools, businesses, organizations, and/or agencies (one coordinator from A-A-W and one funding representative from REDWOOD). Three program representatives stated that their program involves many people. Two other representatives stated either that their advertising creates partnerships or that their program builds watershed coalitions.

Community Involvement. The community involvement strategy is a crucial strategy which may be used to decrease nonpoint source pollutants for the long-term. The community involvement strategy is more likely to encourage personal investment, responsibility, actual commitment, and environmental sensitivity, all of which tend to lead toward ownership and stewardship (Hungerford and Volk 1990, Fuller 1993, Hungerford 1988). This strategy encourages increased public involvement in ongoing stewardship by directly involving the citizen in a hands-on situation which, according to the environmental literature, increases the chance of ownership, stewardship, and empowerment on the part of the participant.

The planning literature recommends that certain long-term implications of planning, such as community involvement, be considered (Hansen 1994). Like the environmental education research, the planning literature also suggests that programs increase their public involvement in ongoing stewardship by promoting

direct citizen involvement in the studying, restoring, and managing of the waterway (San Francisco Estuary Project 1994). The NEP also promotes providing opportunities for hands-on citizen action, providing public outreach, and providing, encouraging, and assisting public participation.

The 10 programs are apparently applying this strategy. When asked about educational approaches, the importance of education, and/or unique or creative program strategies, eight programs coordinators (80 percent), four funding representatives (57 percent), and five regulatory representatives (56 percent) responded by stating that public involvement is necessary to an effective, educational program. Programs such as A-A-S, KING, METRO, SAN LEANDRO, and REDWOOD appear to be particularly proficient with encouraging widespread community involvement.

Strategy Integration. The planning literature states that regulatory and nonregulatory techniques need to be used in conjunction with one another (Environmental Protection Agency 1992); eight program coordinators and/or agency representatives also recognized and communicated this need to combine strategies. Even though informational materials and training programs are crucial to program effectiveness, the impact of these strategies may be more apparent when combined. Additionally, methods of community outreach and education are also more effective when combined. Integrating such strategies as assistance, incentives, and support may also be imperative.

The environmental education literature stresses the importance of not only increasing knowledge and awareness, but also ownership, stewardship, and empowerment. The literature implies reasons why programs would want to combine strategies; combining strategies will increase the odds of lasting ownership, stewardship, and empowerment (Hungerford and Volk 1990, Hungerford 1988, Fuller 1993, Upton and Kumabe 1993).

Though eight programs combine strategies, A-A-S, A-A-W, KIDS, KING, and SAN LEANDRO specifically emphasized the importance of incorporating a variety of watershed strategies. Six programs stated that they use a variety of activities to reach their target audience. Additionally, two coordinators stated that they combine workshops with field training (A-A-S, P-B CRMP), one funding representative stated that the program integrates materials with teaching (A-A-W), and one regulatory representative stated that materials are manufactured, printed, and distributed (REDWOOD).

Sense of Ownership. Sense of ownership is an effective strategy which was communicated throughout the environmental and planning literature and is, to some degree, a component of each of the 10 programs. The environmental education literature suggests that environmental education must promote an in-depth knowledge and understanding of issues, a sense of individual responsibility, an environmental sensitivity perspective, a personal investment on the part of the individual, and an understanding that resources belong to the person (stewardship) (Hungerford and Volk 1990, Hungerford 1988, Upton and Kumabe 1993).

According to the literature, many of the following must be present in order for empowerment to take place: an internal locus of control, an intention to act, a sense that you can make changes, verbal and actual commitment on the part of involved citizens, knowledge of and perception of skills when using action strategies, and evaluation skills (Hungerford and Volk 1990, Fuller 1993).

One program coordinator (P-B CRMP) stated the importance of providing community members with positive experiences in safe, supportive environments so that these individuals would then feel comfortable in using the acquired skills again. This is the principle of internal locus of control. As defined by Hungerford and Volk (1990), this is when a person believes that s/he will experience success

and that s/he will be reinforced for exhibiting a certain behavior. Hungerford and Volk state that an internal locus of control may be developed when an individual learns action skills and applies them successfully in the community.

The sense of ownership strategy was also a component of the watershed planning literature. The Environmental Protection Agency (1992) cites the importance of gaining public understanding of problems and obtaining public support of solutions to problems. The literature also states that since success depends upon public understanding, planning and program materials must be translated into "plain English" (Environmental Protection Agency 1992, Environmental Protection Agency 1989). Also, according to the literature, because the public must be educated about problems and impacts of activities, Public Involvement and Education Programs must be implemented (San Francisco Estuary Project 1994).

In addition to the program's sense of ownership strategy, some of the watershed programs have also employed this strategy by establishing partnerships through partnership development and by involving the public in the problems and solutions process. In addition, some of the program representatives mentioned that their program guide booklets were written in simple, concise terms so that they appealed to a broad number of constituents. Therefore, whether or not the latter mentioned "guide booklet" program coordinators are consciously aware of this sense of ownership strategy, they are employing it by translating their guide booklets into "plain English."

Coordinators applying such strategies as sense of ownership, partnership development, training programs, community outreach, and strategy integration emphasized that these strategies were effective since they all established a "sense of belonging." However, though respondents indicated that their program

participants felt a sense of ownership, it is not clear if this strategy is assessed and if so, how it would be evaluated.

Program Design. The environmental literature emphasized the importance of the program design strategy. Programs need to be designed to promote the following: awareness and understanding so as to enable the receiver of the information to become involved (i.e., agencies, schools, and the community); reinforcement (learners need to be reinforced for positive environmental behavior over time); and cooperation (Fuller 1993, Upton and Kumabe 1993, Hungerford and Volk 1990).

Other watershed strategies may be incorporated into this program design category. For example, strategies such as flexibility, community outreach, sense of ownership, and partnership development are critical to consider in program design. Therefore, watershed program managers should devise ways to include these strategies from the onset.

A case in point may be made with the flexibility strategy. Initiating a flexible program is critical for long-term program success. The literature cites the importance of flexibility for optimal organizing, managing, and problem resolving. For example, a program that is designed for flexibility will take local needs into consideration, it will apply site specific and source specific measures, it will have an appreciation for varying perceptions, it will accept and develop strategic tools to contend with various behavioral personalities, and it will expect tensions and develop solutions to deal with these pressures in a sound and professional manner (Environmental Protection Agency 1992, Hansen 1994).

Though many programs may have considered the importance of program design, this question was not posed to respondents. Therefore, it is not known how many programs apply this strategy. However, A-A-S, P-B CRMP, and REDWOOD regulatory representatives specifically mentioned the importance of

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including measures for flexibility such as remaining neutral to all persons and reaching an uninformed crowd without finger pointing. This flexibility component appears to be a crucial factor in program success. However, in addition to not knowing how many programs actually apply the flexibility strategy, it is not clear if this strategy is assessed and if so, how it would be evaluated.

Long-Term Plan and Program Considerations. Other plan and program strategies need to be considered in program planning and implementation in order to ensure long-term watershed program success. These strategies include staff selection, funding sources, program evaluation, and utilizing watershed boundaries.

The planning literature stated the importance of selecting staff with experience, collaboration skills, and diplomatic prowess (Hansen 1994, Environmental Protection Agency 1992). Also, it is useful to consider employing staff members who intend to stay with the watershed program for the long-term. Long-term staff members tend to establish important ties with community members; these relationships are significant for the overall effectiveness of the programs.

Though this thesis research did not delve into information on staff members, the importance of watershed programs employing strong staff workers is noted. In fact, some program representatives felt it crucial to note just how necessary their program coordinator is in contributing to program effectiveness. For example, P-B CRMP and S.F. CRMP's regulatory and funding representatives specifically noted the significance of their competent watershed program staff members.

Funding is also critical for program longevity. For example, the NEP declares its need to assist in developing long-term educational programs; it states the necessity of supporting successful environmental education programs and

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activities by providing funds, guidance, and in-kind support. Hansen's (1994) research found that it is of consequence to make funding available for planning and implementation. Hansen also noted the significance of establishing local long-term funding sources.

Many of the 10 watershed program coordinators stated that they are attempting to ensure program continuity by obtaining nonprofit status, by training others to seek funding, by getting sponsors, or by selling various materials. These attempts are important for long-term watershed program continuity.

The idea of establishing local long-term funding is also a crucial factor in program evaluation. Funding often is only obtainable for planning and/or implementation. But, as Britt and Hunter (n.d.) note, the evaluation of programs should be built into the program framework itself. It is imperative that watershed management programs receive additional funding which could be allocated to ongoing program evaluation. Program coordinators from KIDS, SAN LEANDRO, and RTCA especially noticed the value of, and necessity for, program evaluation.

Although program staff members do evaluate their watershed programs to some degree, four program representatives stated that their programs need to collect more systematic and analytical data, conduct more monitoring, or implement a more extensive evaluation system.

Lastly, experts widely acknowledge that resource managers must manage according to watersheds so that nonpoint source pollutants are reduced for the long-term. Of the 10 programs, A-A-S and SAN LEANDRO representatives mentioned that they apply watershed boundaries. P-B CRMP and S.F. CRMP also apply watershed boundaries. Additionally, a KING representative mentioned that watershed boundaries should to be applied to their watershed program to make it even more effective.

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The environmental education and watershed planning literature suggest that watershed plans and programs have the potential to play a role in decreasing nonpoint source pollution. However, watershed plans and programs must be carefully planned and appropriately implemented in order to achieve reduction in nonpoint source pollution for the long-term. Measures of success must be developed and monitored to determine if programs are effective. Although some strategies may be effective at a majority of sites, others require a more site specific approach.

Recommendations

An evaluation of 10 watershed programs, in light of standards of effectiveness developed from the literature, indicates that these programs have strengths and weaknesses. Given this analysis, several recommendations for watershed-based programs are provided.

Recommendations Based on the More Commonly Employed Successful Strategies

Collaboration- Collaborative planning is needed for long-term protection of watersheds. Therefore, programs should be designed to be cooperative. This method includes selecting experienced staff members with strong collaborative decision-making and interpersonal skills (Hansen 1994); staff members are crucial to program success. Additionally, information about the watershed program should be shared with as many individuals as possible. Concerns of

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agencies, organizations, schools, and community member's should be taken into consideration to assist in solving problems cooperatively.

Watershed programs and efforts, regardless of their scale, should work together to pool resources so that information is shared. This measure can help to reduce program overlap, increase efficacy, and decrease the use of valuable resources allowing nonpoint source pollutants to be reduced more productively, in less time, and with less money. In a given watershed there may be many watershed plans, programs, activities, and/or groups involved in mitigating the effects of NPS pollution. When all these groups are aware of the individual group efforts, perhaps a more coordinated effort will result.

Partnership Development It is important to establish partnerships, with all concerns, early in the planning stages. Federal, state, and local partnerships are needed; these partnerships tend to develop a sense of ownership which may lead to long-lasting program involvement.

The 10 programs are run so that they provide some degree of involvement between community members, schools, businesses, organizations, and/or agencies. For example, some programs have involved school teachers, students, and/or community members in such watershed activities as creek clean-ups, water quality monitoring, storm drain stenciling, insect sampling, and plant identification; these activities are important in establishing partnerships with schools and community members. Also, program representatives have approached business persons and landowners in non-threatening ways. This strategy establishes partnerships and, at the same time, it increases NPS pollution awareness. Additionally, partnerships are established with organizations, both governmental and non-governmental.

Partnerships are also established with various agencies; here, support may be provided so that many people benefit. For example, partnerships between the

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P-B CRMP and one member agency, the San Mateo County Sheriff's Department, has allowed for the use of hand labor crews at various project sites. For example, these crews have removed log jams and vehicles from designated creek sites. This benefits the P-B CRMP, its community and community members, the sheriff's department, and the sheriff's honor crews.

Community Involvement- Citizens, and all affected parties, should be involved in studying, restoring, monitoring, and managing the watershed. Program coordinators and project directors should attempt to involve as many citizens as possible early on in the process; these varying groups should be involved in problem identification and group problem-solving from the onset. To keep individuals interested and involved in the program for the long-term, coordinators should remain neutral and reinforce positive watershed behaviors.

For example, community members could be involved in hands-on tasks such as creek hikes for the purpose of disseminating information regarding the local riparian habitats, regular water quality monitoring, watershed fair activities, and other pertinent projects. Similarly, for landowners such as farmers, ranchers, and timber harvesters, individuals could be involved in demonstration projects such as those that show tangible cost effective ways to decrease erosion and/or increase water quality. Hands-on experience and education especially tends to lead toward ownership, stewardship, and empowerment.

Strategy Integration- It is critical to apply regulatory and non-regulatory strategies, to combine assistance, incentives, and support, and to use a variety of strategic activities. Combining strategies increases the odds of lasting ownership, stewardship, and empowerment. Generally, the greater the variety of effective strategies applied, the higher probability that more people will be reached.

Additionally, combined effective strategies will differ from watershed to watershed. For example, an effective strategy for changing a landowner's

behavior probably will not be an effective strategy for changing a school-aged person's behavior. As a result, there should be at least one effective strategy to involve each group. Likewise, what may work in a rural watershed with a population of 700 people is not likely to be effective in an urban watershed populated by 50,000 people. Therefore, programs should recognize the diversity of the specific needs within the community and take advantage of the varying personalities, behaviors, and situations.

For example, a program that combines watershed fairs, demonstration projects, creek clean-ups, trainings, meetings, educational materials, workshops, hands-on activities, and educational outreach will reach far more people and personalities than one that only distributes printed materials.

Sense of Ownership- It is important to promote a sense of personal investment, an in depth understanding of issues, and a sense of individual responsibility in the target audience. Accordingly, for ease in understanding issues, program coordinators should see to it that printed materials are written for the target audience. Also, attempts should be made to develop an internal locus of control; this may be accomplished by involving individuals in such community tasks as learning action skills and applying action skills.

Other strategies must be applied in order to develop a sense of ownership. Strategies such as collaboration, partnership development, community involvement, and strategy integration may be particularly important.

This research did not determine how programs evaluated whether "a sense of ownership" existed. Long term studies are necessary to determine whether or not the target audience: was reached, became more aware of watershed issues, developed a sense of ownership, and/or changed their behavior with respect to NPS pollution issues.

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Recommendations Based on Effective Strategies Which Should be Widely Employed

Program Design-Flexibility Component- Flexibility is but one strategy to consider when designing a watershed program. As the planning literature states, flexibility is critical for long-term program success. It is important to be flexible in order to arrive at solutions to NPS problems. Watershed managers should, therefore, remain flexible when taking local needs into consideration. Since target audience members will inevitably have differing perceptions, certain common behaviors should be anticipated in advance so that it becomes easier to contend with these behaviors in a professional manner (Hansen 1994).

Though the question of flexibility was not posed to respondents, three program representatives mentioned that it is important for their program coordinator to remain neutral to all and to reach an uninformed without finger pointing. This facilitator role is crucial, especially when many differing views are present. One program coordinator found that some adults were skeptical of the program; possibly, the coordinator thought, this skepticism was due to governmental approaches in general. By being flexible, the coordinator was able to find out that these same adult landowners were more receptive to the program's projects when approached by children. So, by remaining flexible, the outcome turned out to be a viable solution.

It is also important to remain flexible when applying site specific and source specific measures. For instance, some strategies may be more effective than others at a given watershed site depending upon various factors such as the nature of the watershed, the type of nonpoint source pollutants, staff personalities, and target audience goals.

Long-Term Plan and Program Considerations- When designing a watershed plan or program, program managers should take into consideration staff selection, funding, evaluation, and watershed boundaries.

Staff selection- It is important to select diplomatic and experienced staff members who plan to be with the program for the long-term. Long-term staff members are vital to consider, especially program coordinators who develop important ties with community members.

Funding- To ensure program continuity, long-term funding approaches should be pursued. Locally-based funding is often important for long-term program survival. Programs might consider such options as obtaining nonprofit status, training others to seek funding, training others to get sponsors, selling materials, using incentives, or attempting to institute healthy behaviors.

Evaluation- More emphasis should be placed on analytical and quantitative program evaluation. Quantitative measures of success are crucial to determining whether nonpoint source pollution is being reduced. Programs should include long-term monitoring. Analytical data should be gathered on water quality, sedimentation, chemicals, and flow; data should be compiled and evaluated at regular intervals. Additionally, quantitative data should be compiled regarding the behavioral changes of individuals within the studied watersheds. These data are critical to revising current plans to better protect the environment and should be used to design new programs.

Watershed boundaries- It is important to follow watershed boundaries in order to protect watersheds for the long-term. In order to overcome the obstacles which tend to deter the use of watershed boundaries, Hansen's (1994) planning tools should be implemented; these tools are involvement, collaboration/ facilitation, education, information, and commitment.

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APPENDICES

Appendix A

Selected List of Ongoing
Watershed-Based Programs

SELECTED LIST OF ONGOING WATERSHED-BASED PROGRAMS

1. * Contact Sharon Gosselin in reference to:
   Urban runoff Programs, Stormwater Management Plans, Clean Water
   Programs, General Information Programs, Public Involvement Programs

2. * Contact Susan Handley in reference to:
   EPA region X's wide-ranging public education programs

3. ** Contact Deborah A. Cornell in reference to:
   Stewardship Directory which includes many ongoing Washington
   programs

4. ** Contact Kristi Silver in reference to:
   BMP Education Programs and Water Resources Applied Science Programs

5. * Contact Sara Denzler in reference to:
   Plumas County CRMP, Citizens to Restore Urban Waters (Anne Riley)

6. * Contact Richard J. Morat in reference to:
   San Francisco Bay Program, San Francisco Estuary Project, Santa Clara Valley
   Water District's Stream Care Guide for Santa Clara County, Napa County
   CRMP

7. * Mark Wheetley in reference to:
   "Groundwork"- Walker Creek Landowner Guide

8. ** Contact Susan Harris in reference to:
   Salinas River Watch, City of Capitola- creek care guide

9. Contact Dave Hope in Santa Cruz, California @ (408) 454-2580 in reference
   to:
   the San Lorenzo River Watershed Management Plan, Santa Cruz County
   STREAM CARE guide

10. Contact Thomas Mumley in Oakland, California @ (510) 286-0962 in
    reference to:
    watershed management programs

11. Contact John Yaskovic in Oregon @ (503) 229-5400 ext. 432 in reference
    to:
    The Stream Scene: Watersheds, Wildlife, and People

12. Fish and Game Programs-
    eg. STEP programs

*   Please see contact person in appendix G for the contact number and
     address
**   Please see contact person in appendix D for the contact number and
     address

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Appendix B

List of 16 Investigative Questions
(Answers Received Through Program Materials
and Program Directors and Coordinators)

16 INVESTIGATIVE QUESTIONS
(Answers Received Through Program Materials
and Program Directors and Coordinators)

1-4 are "logistical information" questions-

1. What is the name and location of the watershed management plan, program, or resulting project?

2. What is the plan, program, or project type (plan, creek care guide, school-aged, active community based)?

3. What agency or agencies, institution(s), organization(s), or private source(s) funded the plan or program?

4. When was the plan, program, or project written up (or how many years has the plan or program existed)?

5-7 are "implementation" questions-

5. Why was the plan, program. or project initiated? Was it as an attempt to solve a specific watershed management goal? In response to a law, an amendment, an act, a reauthorization, or another reason?

6. Who implemented the plan, program, or project? How was it implemented? What did this implementation entail?

*7. What are the short and long term goals of the plan, program, or project?

8-9 are "education" questions-

8. Does the director of the program feel that education is necessary for a successful program? Why or why not?

*9. How did the leaders, etc. of the program approach students or members of the community so that they could become educated with regard to nonpoint source pollutants, environmental awareness, and environmental understanding?

10-12 are "detailed plan or program" questions-

*10. Are students, citizens and/or residents receptive to the plan, program, or project? How is this known?

11. How do directors, resource managers, or others in charge decide who the "target population" will be? Who decides? How is the pertinent plan or program information then disseminated to the target population?

*12. What are some unique and/or creative strategies which helped to make the plan, program, or project more "valuable"? Why does the director or coordinator think this is so?

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<u>13-16 are "repercussions of the plan or program" questions-</u>
(The following questions are to be asked of directors or coordinators of programs)

*13.   How do you judge whether or not your plan, program, or project has been successful? What criteria do you use?

14.   Is there anything that you would definitely include in a "next" plan or program? Why? Is there anything that you would not include? Why?

15.   Would you be willing to share your program with other agencies, organizations, or communities? If yes, then: Do you think that this sharing of information is important? Why or why not?

*16.   What do you think will happen to your program after funding runs out? How can continuity of the plan or program be made more probable?

Appendix C

List of Additional Questions
(Questions Asked of Regulatory
and Funding Representatives)

ADDITIONAL QUESTIONS
(Questions Asked of Regulatory and Funding Representatives
From the Ten-Studied Programs)

Question one consists of six sub-questions:

1. Do you think that the program is successful and effective? Qualify this answer by answering the following sub-questions:

   a) How important do you think education is with these types of programs? Does education change behavior?

   b) From your experience, do you think that this program has been successful? Are these kinds of programs effective in terms of educating the public about NPS pollution?

   c) Does this program increase watershed awareness and/or water quality?

   d) Are the program's goals realistic?

   e) How do you think the program has been received by the target audience?

   f) Do you think the program has any unique and/or creative strategies?

The other four questions asked of agency representatives were:

2) On what information are you basing your above responses? Do you do any follow-up?

3) How do you perceive the public has perceived the program?

4) What did you get out of the program? What seems to be the most effective part of the program? (Please be specific here)

5) Would you suggest that the program be conducted in the same manner again?

Appendix D

List of Contact Numbers and Addresses
for the Ten Studied Programs

CONTACT NUMBERS AND ADDRESSES FOR THE TEN STUDIED PROGRAMS

1. The Adopt-A-Stream Foundation
    Box 5558
    Everett, WA 98206

    Martha Cheo   (206) 388-3487

2. Adopt-A-Watershed
    P.O Box 356
    Hayfork, CA 96041

    Kim Stokely or Charla   (916) 628-5334 or (916) 628-4608

3. Kids in Creeks
    Estuary Institute
    Richmond Field Station, # 180
    1301 S. 46th St.
    Richmond, CA 94804

    Julia Crawford   (510) 231-9539

4. King County Department of Public Works
    Surface Water Management Division
    700 Fifth Avenue, Suite 2200
    Seattle, WA 98104

    Deborah A. Cornell   (206) 296-8368

5. Metro
    Water Quality Public Involvement Program
    Mail Stop 95
    825 Second Ave.
    Seattle, WA 98104

    Mary Ramos   (206) 684-1464

6. San Leandro Watershed Awareness Program
    Estuary Institute
    Richmond Field Station, # 180
    1301 S. 46th St.
    Richmond, CA 94804

    Jessica Fiorillo   (510) 231-9539

7. Pescadero-Butano CRMP
    P.O. Box 754
    Pescadero, CA 94060

    Laurel Graham-Holsman   (415) 879-0603

8. San Francisquito CRMP
    Peninsula Conservation Center Foundation
    3921 East Bayshore Road
    Palo Alto, CA 94303

    Or Jim Johnson   (415) 364-3768

9. Redwood Community Actions Agency
    Natural Resources Division
    904 G. St.
    Eureka, CA 95501

    Sungnome Madrone   (707) 445-0881

10. United States Department of the Interior
    National Park Service
    Western Regional Office
    600 Harrison St., Suite 600
    San Francisco, CA 94107-1372

    Susan Harris   (415) 744-3975

Appendix E

Sample of Informational Letter Distributed to
Directors and Coordinators of Programs

11 August, 1994

Dear Ms. Martha Cheo,

As per our conversation on August 11th, I am writing to remind you of the research which is being conducted for my Environmental Studies Master's thesis at San Jose State University in San Jose, California. The study, titled, "Innovative and Integrated Watershed Management and/or Awareness Plans and Programs: An Examination, Analysis, and Evaluation", will focus on ten plans and programs in California and Washington (please see attached abstract). My thesis plan involves answering sixteen investigative questions about the individual plans and programs; questions are to be examined, analyzed, and evaluated (see attached investigative questions list). The evaluation portion of the project involves three of these investigative questions which are concerned with the success and continuity of the various plans and programs.

I would like to extend my appreciation for your cooperation in this study. Thank you for mailing the materials which I had requested with regards to your program. As I stated in our last telephone conversation, I will be telephoning you very soon to retrieve answers to specific investigative questions; those questions which I was not able to answer. I thank you for providing me with permission to contact you. The telephone conversation should not take much of your time (approximately one half hour).

Also, if at any time you would like to receive more information on this research, please let me know. Again, the final interpretation of your program will be mailed to you to ensure accuracy of the program information. Also, the results of the research will, of course, be shared with you as well as with all other participants.

I hope that this thesis will provide valuable information which will be helpful to program directors, coordinators, resource managers, agencies, organizations, citizen groups, or anyone else who is concerned with our nonpoint source pollution problems. I am convinced that programs, such as your Adopt-A-Stream Program, are absolutely essential in helping to solve our residential nonpoint source pollution problems. Thank you again for a fantastic educational watershed awareness program.

If you have any questions, please contact me at (408) 477-0571. Again, I will be contacting you soon to get the necessary investigative questions answered. Thank you very much for your time and attention.

Cordially yours,

Kristin Jensen Sullivan, researcher

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Appendix F

Sample of Follow-Up Letter Distributed to Directors and Coordinators of Programs

24 August, 1994

Dear Mr. Sungnome Madrone,

As mentioned in our telephone conversation on August 24th, I am writing to provide you with my interpretation of the answers to the 16 investigative questions which arise out of my thesis project titled, "Innovative and Integrated Watershed Management and/or Awareness Plans and programs: An Examination Analysis, and Evaluation". Again, I want to ensure accuracy of your program information. These answers are in no means in their final form. In fact, I have provided you with a rough draft for the following reason: I would like it very much if you could edit and/or change answers as needed for accuracy. These answers arise from your telephone responses as well as from program descriptions, goals, and other program information which you so kindly sent me. I do plan to change the wording of the answers once I am assured that these answers are correct.

Thank you again for your cooperation in this research. I am honored to be able to use your fine program as one of the ten watershed management and/or awareness programs represented in the thesis. Again, the results of this research will be shared with you as well as with all other participants. These results will be sent to you upon completion of the thesis (probably five to seven months from now).

Again, I hope that this thesis will provide valuable information which will be helpful to program directors, coordinators, resource managers, agencies, organizations, citizen groups, or anyone else who is concerned with our nonpoint source pollution problems. After studying your program, I am even more impressed with what you have done to alleviate the problems of nonpoint source pollution in your area. I commend you on your great program!

Attached you will find the investigative question answers. Please feel free to edit and/or change answers as needed for accuracy of information. A self-addressed stamped envelope is provided so that the final changes may be mailed back to me. If you have any questions, please contact me at (408) 477-0571. Thank you again for your time and attention.

Cordially Yours,

Kristin Jensen Sullivan,
Researcher

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Appendix G

List of Contact Numbers and Addresses for the Regulatory and Funding Agencies

LIST OF CONTACT NUMBERS AND ADDRESSES FOR THE
REGULATORY AND FUNDING AGENCIES

	PROGRAM	REGULATORY:	FUNDING:
1.	A-A-S	Mike Chamblin WA State Dept. of Fish & Wildlife 430 91st Ave. NE Everett, WA 98205 (206) 339-1718	———————
2.	A-A-W	———————	Kathleen Pickering National F & W Foundation 1120 Connecticut Ave. NW, Suite 900 Washington, D.C. 20039 (202) 857-0166
3.	KIDS	Dale Bowyer RWQCB 5th floor-2101 Webster St Oakland, CA 94612 (510) 286-1357	Sharon Gosselin Alameda Co. Water Resources 951 Turner Ct., Room 300 Hayward, CA 94545 (510) 670-6547
4.	KING	U.S. EPA- Region X Attn.: Susan Handley 1200 Sixth Ave., SO 143 Seattle, WA 98101 (206)553-1287	———————
5.	METRO	Ultimately EPA and NPDES permits but spoke with: Mary Getchell from DOE (206) 407-6157 (She represents DOE on the Water Quality Consortium)	———————
6.	SAN LEANDRO	Dale Bowyer RWQCB 5th floor-2101 Webster St Oakland, CA 94612 (510) 286-1357	Sharon Gosselin Alameda Co. Water Resources 951 Turner Ct., Room 300 Hayward, CA 94545 (510) 670-6547

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	PROGRAM	REGULATORY	FUNDING
7.	P-B CRMP	Douglas Straw San Mateo Co. RWQCB 2101 Webster St., Suite 500 Oakland, CA 94612 (510) 286-0431	Sara Denzler DWR Urban Streams Restoration Progra1 1020 Ninth St., Third Floor Sacramento, CA 95814 (916) 327-1664
8.	S-F CRMP	Douglas Straw San Mateo Co. RWQCB 2101 Webster St., Suite 500 Oakland, CA 94612 (510) 286-0431	Richard J. Morat U.S. Dept. of the Interior Fish and Wildlife Service 2800 Cottage Way, Room E-1803 Sacramento, CA 95825 (916) 979-2116 ext. 334
9.	REDWOOD	Carl Harral Dept. of Fish and Game (916) 225-2309	Mark Wheetley State Coastal Conservancy 619 Second St. Eureka, CA 95501 (510)286-3840
10.	RTCA	Cathy Nowicki Martinez City Planning Dept. (510) 372-3519	Kathy Radke NOT A FUNDING agent but a "Martinez friends" group leader (510) 370-0648

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Appendix H

Program Matrices for the Sixteen Investigative Questions:
Tables H-1—H-4

PROGRAM MATRICES FOR THE SIXTEEN INVESTIGATIVE QUESTIONS: TABLES H-1—H-4

Abbreviations for Programs-

A-A-S=	Adopt-A-Stream Foundation
A-A-W=	Adopt-A-Watershed
KIDS=	Kids in Creeks
KING=	Surface Water Management Public Involvement Program
METRO=	Metro's Water Quality Awareness Program
SAN LEANDRO=	San Leandro Creek Watershed Awareness Program
P-B CRMP=	The Pescadero-Butano Creek Watershed Coordinated Resource Management Plan
S-F CRMP=	The San Francisquito Creek Watershed Coordinated Resource Management and Planning
REDWOOD=	Redwood Community Action Agency's, *Stream Care Guide for Streamside Property Owners and Residents*
RTCA=	The Rivers, Trails, and Conservation Assistance Program's *Creek Care Guide for Residences and Businesses*

PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE QUESTION
NUMBERS 1-5

PROGRAM	LOCATION Q= #1	PROGRAM TYPE Q= #2	FUNDING SOURCE (S) Q= #3	YEAR IN EFFECT Q= #4	WHY PROGRAM WAS INITIATED Q= #5
A-A-S	Everett, WA	school-aged and community based	non-profit; funded through grants, contributions, contracts, fundraising, sales, publications	1985	Assist others in becoming actively involved in stream enhancement and environmental education
A-A-W	Hayfork, CA	school-aged (K-12)	Tides Foundation, Trinity River Task Force, Nat'l F & W, State Env. Ed. Grant, AmeriCorps.	1990	Needed a comprehensive science program with ready materials and training (hands on)
KIDS	Alameda and Contra Costa Counties, CA	school-aged (K-12)	Alameda Co. CWP, Contra Costa's CWP & Stormwater program, EPA, Educational Foundation of Amer., U.S. F & W Service	1992	clean water concerns. NPS pollution is a major cause of water pollution & education is the most viable way to minimize pollution
KING	King County, WA	community based	self-funded (was WA State Dept. of Ecol. Clean Water Fund)	1990	To empower King County citizens to protect their W.
METRO	Seattle, WA	community based	Written into Communication's Program budget	1990	To protect and enhance water quality
SAN LEANDRO	Alameda County, CA	community based	Alameda County Flood Control District, In-kind assistance from City of San Leandro	1993	Out of concerns for the health of the San Leandro watershed
P-B CRMP	San Mateo County, CA	CRMP	Many agencies including RWQCB, DWR, Dept. of F & G, Army Corp of Eng.	1988 [319 and DWR grant in 1994]	319 & DWR grants were set up to address flooding, NPS pollution, and/or surface water quality
S-F CRMP	San Mateo & Santa Clara Counties, CA	CRMP	F & W Commission, U.S. F & W Service, Hewlett Packard, Audubon Society, Evergreen RCD	1993	Concern over management of natural resources; federal and state agencies now require local agencies to work together to create W. based programs
REDWOOD	Humboldt and Del Norte Counties, CA	landowner/ educational creek care guide	State Coastal Conservancy, Dept. of Water Resources Urban Streams Restoration Program	1986	To provide the landowner with a manual on how to take care of their streams
RTCA	Martinez, CA and Alhambra Creek	residents/ businesses creek care guide	National Park Service (Rivers, Trails, and Conservation Assistance Program)	1994	Concerns of both the citizen's group and the City of Martinez

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PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE QUESTION NUMBERS 6 AND 7

PROGRAM	WHO IMPLEMENTED Q= #6	HOW IMPLEMENTED Q= #6	RESULTING PRODUCTS &/OR PROJECTS Q= #6	GOALS OF THE PROGRAM Q= #7
A-A-S	Tom Murdoch, A-A-S Foundation staff, others	provide workshops, conferences, handbooks, video, brochures, newsletters, training, tech. asst.	A-A-S Handbook and Streamkeepers field guide; resulting projects and products	stimulate stewardship, protect watersheds, "adopt" as many streams as possible, encourage "adopting"
A-A-W	Kim Stokely, natural resource agencies, teachers, school board members	partnerships between schools, agencies, orgs., industry, and community for services, tech. asst., cooperation, & communication	kits, teacher training, field and restoration projects	provide applicable science, help students develop sense of stewardship, teach for responsible res. man., solve watershed issues cooperatively
KIDS	Estuary Institute in Richmond, CA	by providing teacher training workshops. Teachers then teach students W. awareness, problem solving	curriculum, equipment, kits, assistance, action projects	educate, inform, and inspire people to protect & enhance urban creeks; change behavior.
KING	Surface Water Management Division of the Department of Public Works	range of activities:: outreach, volunteer activities, hands-on workshops, networking, projects	pamphlets, newsletters, directories, grant & other programs, workshops, activities, projects	citizen involvement programs and projects, educate for watershed awareness, protection, & responsibility
METRO	Water Pollution Control Dept.'s Public Outreach Program	school, education, community events, special publications, and paid advertising	ads, painted buses, displays, events, videos, conferences, newspapers, computer programs	encourage protection of water quality; leads by demonstrating protection, accountability, consistency, leadership
SAN LEANDRO	Estuary Institute's Educational Director	furnish citizens with information, ideas, & supplies; encourage protection at a grass roots level	booklets, traveling displays, city W. signs, festival, mailers, citizen group, events, act..	educate, inform, and inspire to protect W.; exchange information to increase knowledge & awareness
P-B CRMP	1) Rich Casale-USDA-SCS, 2) Director facilitated	hiring subcontractors & specialists, set up projects to involve citizens in BMPs, set up other projects	four treatment projects, flood control, monitoring projects, creek clean up, newsletter	projects demonstrate BMP's, implement projects, develop a public education program
S-F CRMP	Jim Johnson, PCC (especially Debbie Mytels), others	not yet implemented; set up groups to identify watershed problems and solutions	task groups have identified problems and solutions; color brochure, map, video	healthy W.; maintain, protect, & improve natural resources; present W. plan listing res., probs., & solns.
REDWOOD	Natural Resources Services Div. of the RCAA	printed/distributed SCG; awareness via projects, news, media, photos, conferences	local schools and community adopt and monitor creeks; SCG, projects	provide a novel SCG; teach landowners proper stream care management
RTCA	RTCA Program of the NPS; Susan Harris compiled CCG	not yet implemented-will distribute CCG and hold workshops	Creek Care Guide For Residences and businesses	Educate with regard to stewardship & health; change attitudes & behavior

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TABLE II-3

PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE QUESTION
NUMBERS 8, 9, 10, AND 12

PROGRAM	WHY IS EDUCATION NECESSARY? Q= #8	EDUCATIONAL APPROACH Q= #9	PROGRAM RECEPTIVITY Q= #10	UNIQUE, CREATIVE, & VALUABLE STRATEGIES Q= #12
A-A-S	inspiration & hands-on training leads to action towards solving problems	A-A-S handbook & streamkeepers guide & resulting projects which help to educate	program, once local, has grown and expanded internationally; "adoptee" response	use W. boundaries (not political); integrate workshops with field training; year follow up asst..
A-A-W	participating in hands-on activities makes the W. like a living lab so that science is applicable & relevant to ind.'s	students work with designated W, public education aspect, hands-on observation and monitoring	students feel sense of W. "ownership"; (+) FB comments by teachers/students; demand for and growth of program	long term W. study involving nature, politics, env, issues; collaboration with agencies, schools, businesses, & comm.
KIDS	necessary to change attitudes & actions, to build watershed coalitions, & to increase awareness	teachers learn & then set up action projects: inventory history, creek clean-up, storm drain sten	(+) participant evaluation statements, # of student activities, # of ind.'s involved	hands-on, watershed based, holistic approach to localized problems
KING	raise awareness/ stewardship issues	wide range of activities, methods, projects, and products to involve maximum number of individuals	1990 growth= 638 people involved 1992 growth= 4,561 people involved	comm. outreach program considers various needs/goals of agencies and comm; projects fit multiple needs
METRO	raise general awareness to improve water quality	advertising creates partnerships between rate payers and Metro	survey, telephone, and educational program response; requests for ad use; willingness to pay higher rates	advertisements are a more conventional form of public outreach since they reach more people for less $
SAN LEANDRO	active citizen educational program needed for long term health	involve citizens in creek groups, events, various programs	>"friends" group membership, citizen involvement; outside interest	an active education program belonging to citizens (not a political watchdog)
P-B CRMP	people need opportunities to make healthy choices and env. educ & experience for stewardship	involve community in meetings, educational programs, field trips & tours, clean-ups, demo. projects.	too early to tell.- program coordinator believes receptivity is based upon values & fears	
S-F CRMP	when educated about natural resources, history, and geography, people will voluntarily protect	Public Education Task group suggests radio, T.V., flyers, newspapers, videos, & handouts to help solve problems	not yet known but substantial interest and involvement	involving target audience in the process allows for more personal solutions (approach prior to regulation)
REDWOOD	most people want to do the right thing, and they will with proper education	staff decides on projects based upon comm. support and resource availability	teachers, students, & comm. have been (+) & supportive; like the hands-on	this first published guide booklet is a model in the U.S. and beyond
RTCA	education is needed to change citizen behavior & actions	distribution of guide; educational workshops	not yet known	general guide-for comm.'s in CA-made of many guides

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PROGRAM COORDINATOR RESPONSES TO INVESTIGATIVE QUESTION
NUMBERS 13-16

PROGRAM	JUDGING SUCCESS Q= #13	INCLUDE IN NEXT PLAN Q= #14	IMPORTANT TO SHARE PROGRAM? Q= #15	CONTINUITY OF PROGRAM Q= #16
A-A-S	completion of projects, questionnaires	longer training sessions, projects given more focus, project synchronization	shares info. and resources with other agencies, organizations, and citizens	by training others-trainees will often seek funding; encourage streamkeepers to get sponsors
A-A-W	assessing student outcomes, teacher evaluations, program growth (now in 62 sch)	a more extensive evaluation system	share with schools, agencies, organizations, industry, comm.	sales from curriculum materials, kits, trainings
KIDS	participant evaluations, student response (subjective), through funding (if like, will re-fund)	methodological & analytical data for high school students; computers	yes, since is an educational program	(+) teacher messages passed on to funding agent; attempting to gain foundation status to ensure continuity
KING	program growth, public receptivity	all public opportunities should be provided to meet diverse needs	shares with individuals, agencies, and organizations	$ written into budget; if $ cut, program would probably continue due to strong involvement
METRO	increase in requests for program information; increase in ad, program, and survey response	ads and a citizen monitoring program; exclude video (not seen much, expensive)	shares ads with org.'s & agencies-free of charge (the hope is to get the word out)	$ written into budget; if $ cut, program would probably continue due to strong citizen support
SAN LEANDRO	program receptivity & growth. In the future: can quantify since will add a monitoring data program	citizen monitoring program	active educational program; share information at conferences	citizen's group will hopefully take over; group now attempting to obtain non-profit status
P-B CRMP	by projects which decrease flooding; when BMPs have been institutionalized; when behaviors are changed	continue to provide experience to citizens so they are given choices	yes, the program is based upon negotiation; looked upon as a CA model	continue if healthy beh. institutionalized; must provide incentives for (+) behavior and actions
S-F CRMP	when natural resources are preserved, native steelhead populations are revitalized, & flooding is mitigated	trying to be more proactive by including businesses and developers (need to work w/them)	when ideas are shared, problem solving becomes easier	if cut several years from now, hopefully the in-place programs will continue with community & institutional assistance
REDWOOD	(+) FB, news articles written about program, SCG and projects discussed at Chamber of Commerce	soon to print new guide version, soon to publish riparian guide.; both used in sync	people, wildlife, and resources benefit from guide sharing in U.S. and beyond	RCAA hopes that the $ earned from selling the guides will eventually be enough to make the program self-funding
RTCA	has not yet been determined	not yet implemented so not yet known	one of RTCA's roles is sharing information	has not yet been determined

Abbreviations for Tables H-1—H-4 Above-

#=	number
$=	money
(+)=	positive
act=	activities
Amer=	America
asst=	assistance
beh=	behaviors
BMPs=	best management practices
CA=	California
CCG=	Creek Care Guide
Co=	county
comm=	community
CRMP=	Coordinated Resource Management and Planning
CWP=	Clean Water Program
dept=	department
div=	division
DWR=	Department of Water Resources
ed (educ)=	education
Eng=	Engineers
env=	environmental
EPA=	Environmental Protection Agency
F & W=	Fish and Wildlife
FB=	feedback
inds=	individuals
info=	information
K-12=	kindergarten through grade twelve
man=	management
nat'l=	national
NPS=	National Park Service
NPS=	nonpoint source
orgs=	organizations
PCC=	Peninsula Conservation Center
probs=	problems
Q=	question
RCAA=	Redwood Community Action Agency
RCD=	Resource Conservation District
res	resource(s)
RWQCB=	Regional Water Quality Control Board
SCG=	Streamcare Guide
solns=	solutions
sten=	stenciling
T.V.	television
tech=	technical
U.S.=	United States
USDA-SCS=	United States Department of Agriculture's Soil Conservation
w/=	with
W=	watershed
WA=	Washington

Appendix J

Program Matrices for the Additional Questions:
Tables J-1—J-4

NINE REGULATORY REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER ONE (SUB-QUESTIONS 1A-1F)

program/ regulatory agency	education important? changes behavior? Q= #1a	successful? effectiveness of education. Q= #1b	increases W. awareness and/or water quality Q= #1c	realistic goals Q= #1d	receptivity Q= #1e	uniqueness/ creative strategies Q= #1f
A-A-S/ Dept.. of F & W	yes, very important	yes, effective. education depends on how implemented - they are educating in the right way	does both- primarily educational: for schools, citizens, for key people to spread word. monitoring too..	yes	positively	new concept- lots of spin-offs; non-profit but w/governmental ties; remain neutral by appealing to all
A-A-W	N/A- In the future they will go through compliance with the Department of Education.					
KIDS/ RWQCB	extremely- with regard to NPS pollution & urban run- off, educ. is the primary issue	successful with teacher training & class teaching; hard to quantify scientifically; with educ., try as many things as possible	awareness=do not pollute; clean-up & restoration water qual.= hard to say if poll. in a small area is reduced	yes	positive reactions.- has heard no negative feedback.	these types of programs are new so almost anything is unique; program is full of creativity & new ideas;
KING/ EPA- region X	educ. can't stand alone but educ. leads to action	yes, education is tied to their activities and so program works well	a watershed involvement program (further than awareness)	yes	target = in specific basins-the interested attend; (+)	basin on-site stewards. This has become a model elsewhere.
METRO/ DOE= closest to regulatory.	very important- crucial to solving NPS problems	seems to be working	must educate the public to take care of waterways	-----	survey results from the public look good	------------------
SAN LEANDRO/ RWQCB	SEE KIDS	successful with meeting, events; SEE KIDS	SEE KIDS	yes	SEE KIDS	SEE KIDS
P-B CRMP /RWQCB	w/NPS,educ. is where most effort should fall; informed people will change beh.	yes, program director is able to talk with all community members while remaining neutral.	by educating first, future pollutants are prevented; some have changed their habits	yes	good= comm., members involved not good= some see as a threat	maybe not unique but are hitting where need to hit. key= are getting landowners involved
S-F CRMP /RWQCB	SEE P-B CRMP ABOVE	new, but different groups are educating	new, but educ. first to avoid future pollutants	yes	SEE P-B CRMP ABOVE	managed to come up w/ probs & solns.in a large W.
REDWOOD /Dept. of F & G	education is very important	yes, in terms of their obj which was to get SCG to prop. owners; has this changed beh?- no way to quantify	increased W. awareness & stewardship- hopefully will lead to increased water quality	yes, SCG fed info. to target	first set= mass mailed= not as (+): 2nd set=to interested = (+)	SCG= short, with lay person definitions for intimidating terms, short & concise illustrations.
RTCA/ Planning Dept.	------------	------------------	-----------------	------	----------	-----------------

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Abbreviations for Table J-1-

(+)=	positive
2nd=	second
beh=	behavior
dept=	department
DOE=	Department of Energy
educ=	education
EPA=	Environmental Protection Agency
F & G=	Fish and Game
F & W=	Fish and Wildlife
info=	information
N/A=	not applicable
NPS=	nonpoint source
obj=	objectives
probs=	problems
prop=	property
Q=	question
qual=	quality
RWQCB=	Regional Water Quality Control Board
SCG=	Stream Care Guide
solns=	solutions
w/=	with
W=	watershed

NINE REGULATORY REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBERS 2-5

program	How do you know program is working? Q= #2	How has the public perceived the program? Q= #3	What did you get out of the program? Most effective part? Q= #4	Should the program be done the same way again? Q= #5
A-A-S	-has issued 100's of permits for A-A-S projects. -is on A-A-S board of directors	well- especially w/schools and conferences; tough to get over general public apathy w/ any program -but they have done well	gratifying to see that people care & that restoration is occurring. It takes a long time for educational programs to show effects, but he thinks they will	limitations: funding is the limiting factor. Need big $ corporate sponsors.
A-A-W	N/A			
KIDS	not managing programs directly- is third hand - sees if clean water programs are happening	teacher trainings almost always sell out	program does lots of things- variety; lots of activities to keep people going	yes, keep on it. Get these programs to "spread and multiply".
KING	EPA region X has a public education program -they support & enhance public involvement programs; no follow up- not EPA's job	the watershed program fills a real need. People get a "sense of place"; lots of citizen action.	EPA is a sister to KING (more than vice versa); KING has ongoing support which it provides to residents	only is in King Co.- needs to have partnership w/ cities & state; needs W. boundaries (has political)
METRO	in touch with Metro & program director	well, according to survey results	have seen their products and they are really great	not familiar enough to say
SAN LEANDRO	SEE KIDS	the public comes to events and meetings	SEE KIDS	SEE KIDS
P-B CRMP	first hand observations: being out there, attending meetings, talking to people	good= community & CRMP members involved; not good=some board members see CRMP as a threat	opportunity to deal w/landowners- he is there to help & not to be feared; maintaining neutrality leads to credibility.	absolutely, used as a model across the state; follow director's footprints to the letter
S-F CRMP	first hand observations: being out there, attending meetings, talking to people	good= community & CRMP members involved; not good=some key landowners see it as not being good	enlightenment of how many issues that they are dealing w/at one time-it is a large W.; get to landowners- this CRMP needs work here	follow the set up of task forces; (+)- identified probs. & solns.; would change tone a bit
REDWOOD	read the SCG and helped to distribute it to schools, etc.	very supportive of the effort. SCG served a function that was not there before	-distributed to interested kids- gives new perspective about land & resource use; -laypersons terminology of tech. subject matter; -tried to reach an uninformed crowd without finger pointing	over the course of seven years any program would need changing but no major changes need be made.
RTCA	do not know-no one has asked for CCG yet (prog new)	do not know- no one has asked for permit yet	----------------	----------------

Abbreviations for Table J-2-

$=	dollars
CCG=	Creek Care Guide
Co=	county
EPA=	Environmental Protection Agency
N/A=	not applicable
probs=	problems
Q=	question
SCG=	Stream Care Guide
solns=	solutions
tech=	technology
w/=	with
W=	watershed

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SEVEN FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL QUESTION NUMBER ONE (SUB-QUESTIONS 1A-1F)

program/ funding agency	education important? changes behavior? Q= #1a	successful? effectiveness of education. Q= #1b	increases awareness & water quality? Q= #1c	realistic goals Q= #1d	recep-tivity Q= #1e	uniqueness/ creative strategies Q= #1f
A-A-S	Many different funding agencies- planning director too busy to talk.					
A-A-W/ National F & W Foundation	yes- difficult to assess as a grant maker- depend on descriptions & evaluations; hard results are long term	go by reports; yes, high hopes for curriculum since it is integrated into teaching lessons; approach is right	are > awareness -this may lead to increased water quality	yes, but broad goals tough to measure; state some goals more concretely?	do not know	in some ways is a common process; unique in that they are integrating env.'l educ. into an urban env.
KIDS/ Alameda Co. Flood Control District	Yes, doing more than need; chg. beh. via interest awareness, and participation; educ. prevents poor behavior	effective-doing what set out to do; limits: not all teachers go to workshops & it does not reach the gen. public	promotes activities for both	all except "manage W"- W. is big picture and one program can't do all	very well	lots of communication, involvement, & support for teachers-make it inviting, have reunions
KING	N/A since funding is now internal					
METRO	N/A since they get money through their sewage rates					
SAN LEANDRO/ Alameda Co. Flood Control District	yes, working to get community together- banking on community participation to get the word out	have done more than we thought. this program type works well in some social areas- like this community	both-are making people aware; cannot say if > wat. qual.	yes	very (+)	pushed "friends' group to take over; may not be unique but it works here. modeled after effective prog.'s
P-B CRMP/ Dept. of Water Resources	imp-people do not always know their options; w/educ., learn the impacts of their behaviors	yes, effective since promotes involvement of local people and they are being heard	both= a < in sed or chg in agr prac will > water quality	yes	yes-don't see as being out-siders	getting different parties involved & asking the local people what they want
S-F CRMP/ F & W Service	educ. is part of whole picture, Plays role in < pollutants; need educ. for balance & to get info. to target	yes, even prior to official CRMP people were communicating. have many partners working to solve probs.	W. awareness leads to action- see some effects right now	yes, may take a long time, but when all cooperate, progress is made	high amt. of inter-est thus far	anyone with a strategy is ahead; not unique, but developed plan to solve probs. at local level 1st
REDWOOD / State Coastal Conser-vancy	yes, eduction is needed w/any program- but it needs to be tailored to the W. so the comm. gets a sense of owner.ship	yes, SCG was transferred to many projects & so is used over & over again; effective-lots of educ. through word of mouth	SCG increased awareness ; have reduced some sediment in the W.	yes	very well - land-owner sees effort pays off	1st effort to actively involve landowners. SCG was written in humanistic terms,tailored to layman, & (+)ly received
RTCA	N/A since internal funding- author interviewed Martinez "friends" leader instead					
Martinez "Friends" leader	critical-the only way to change behavior but it depends on how the educ. is done	too early to tell- (+) initial response from educators and CCG receivers	both is the plan-educate kids & adults	yes	very well-CCG is well done	CCG is simple yet it applies to a broad # of constituents; it is useful in cities

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Abbreviations for Table J-3-

#=	number
(+)=	positive
1st=	first
<=	decreasing
>=	increasing
amt=	amount
beh=	behavior
CCG=	Creek Care Guide
chg=	change
Co=	county
educ=	education
env'l=	environmental
env=	environment
F & W=	Fish and Wildlife
gen=	general
info=	information
N/A=	not applicable
NPS=	nonpoint source
probs=	problems
prog's=	program's
Q=	question
qual=	quality
SCG=	Stream Care Guide
w/=	with
W=	watershed
wat=	water

SEVEN FUNDING REPRESENTATIVE RESPONSES TO ADDITIONAL
QUESTION NUMBERS 2-5

program	How do you know that the program is working? Q= #2	How has the public perceived the program? Q= #3	What did you get out of the program? Most effective part? Q= #4	Should the program be conducted in the the same manner again? Q= #5
A-A-S	N/A			
A-A-W	discussions w/board members; A-A-W reports; want additional funding to expand the success	do not know	hoping to get out a W. education curriculum & a process of integrating it in schools	yes, teacher training of W. in urban schools is important
KIDS	AHI does lots for the county so funding rep. is always involved; attends workshops, sees evaluations & program reports; teachers stay in touch w/the KIDS prog.	targets school kids= this is (+); since not targeted to gen. pub., not > gen. public knowledge	are successful in their goals to reach & inspire teachers to get involved in W. stewardship	could be done in less time & w/less $ next time (program should get less expensive in years two and three).
KING	N/A			
METRO	N/A			
SAN LEANDRO	funding representative has been very involved	very well	the "sense of community" is a real inspiration; small W. so easier to follow W.boundaries- this made it tangible	yes, what has been done here is a model; could cut some of the $'s & only fund pieces of the whole program
P-B CRMP	public meetings, tours, monitoring (in Plumas Co. CRMP she talks w/people about the program & the challenges they face in getting program started	they think it sounds like a good idea	many people are involved-CRMP reaches out, includes all peoples; the projects are getting done & are doing so using fewer resources.	yes, she thinks so.- the message that she is getting is that people need to be included early on; also, be open and hear the community
S-F CRMP	mailings from meetings, meeting attendance, asks others how it is going, senses that it is working well	response favorable from general public; a great many publics are involved	rep. is involved w/ estuary restoration - S-F W. is one piece; this CRMP is a cost-effective way to solve problems; this CRMP success will lead to other CRMPs.	process is doing just fine; things are getting done; as w/any process though, things may be done differently in the future and/or in another W. area.
REDWOOD	knows W., community, RCAA, and landowners well- has worked for many agencies & has worked intimately on the project which dovetailed in the SCG	embraced the program; activities have lead to many other efforts	seeing changes in the W.- thing are happening; landowners see that their collaborative effort are paying off- they see benefits	yes, but get upland landowners to participate immediately- they were reluctant to participate at first
RCAA	N/A since internal funding- author interviewed Martinez "friends" leader instead			
	as leader of "friends" group, she is very actively involved	public has been very positive towards the efforts. (residential owners esp.)	worked closely w/ the community to figure out what would be most effective; so, the CCG appealed to a broad audience	yes, is a generic CCG- yet it has flaps on front & back page for individual city insertions- makes it more personable to each city

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Abbreviations for Table J-4-

$=	dollars
(+)=	positive
>=	increasing
AHI=	Aquatic Habitat Institute
CCG=	Creek Care Guide
gen=	general
N/A=	not applicable
prog=	program
pub=	public
Q=	question
RCAA=	Redwood Community Action Agency
rep=	representative
SCG=	Stream Care Guide
w/=	with
W=	watershed

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