COMPARING MARINE MAMMAL CO-MANAGEMENT REGIMES IN ALASKA:

THREE ASPECTS OF INSTITUTIONAL PERFORMANCE

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A

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Abstract

Arctic marine mammals and the communities that depend on them for subsistence are facing unprecedented rates of environmental change. Comparative studies of policy implementation are necessary in order to identify key mechanisms of successful environmental governance under challenging conditions. This study compares two federal agencies responsible for the conservation of Arctic marine mammals. Drawing on multiple methods, I develop in-depth case studies of the policy implementation process for managing bowhead whale and polar bear subsistence hunting. I examine how and why agency approaches to conservation differ and assess policy effectiveness.

The analysis focuses on three aspects of institutional performance as drivers of policy outcomes: historical events, organizational culture, and structural relationships with stakeholders. The study begins by tracing the development of marine mammal management in Alaska through time. I find that definitions of subsistence developed under previous eras continue to shape debates over wildlife management in Alaska, confounding ecologically relevant policy reform. I next examine the roles of agency culture, policy history, and relationships with stakeholders in influencing how agencies implement contemporary harvest assessment programs. Findings suggest that the internal orientation of the U.S. Fish & Wildlife Service makes it more likely to retain control over management programs than the more externally oriented National Marine Fisheries Service. Furthermore, these policy approaches affect the development of social norms at the local level. Through a social network analysis, I demonstrate that the extent to which policy programs are integrated into the existing social networks of a village affects policy success. Hunter participation in and support for policies is stronger when there are local centers of coordination and meaningful policy deliberation.

Finally, I assess existing policies regarding both species to examine whether or not contemporary policy approaches address key drivers of system change and provide effective feedback channels. Findings demonstrate that both agencies have focused on regulating harvests; I argue that in order to foster resilience of the system into the future, policy actors must re-configure management approaches and policies towards the protection of functional seascapes. I propose two strategies in order to govern for recovery (polar bears) and resistance (bowhead whales).

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Chapter 1: Introduction

Global warming and the rapid loss of summer sea ice have impacted Arctic communities and ecosystems at an unprecedented rate, requiring adaptive and novel institutional responses (Arctic Council 2005). Marine mammal management in the United States based on the Marine Mammal Protection Act and its implementing regulations recognize the connection between marine mammals and Alaska Native livelihoods and, as such, lend themselves to an important and novel analysis of policy responses for coupled human and ecological systems (i.e., social-ecological systems). At the present time, marine mammal conservation in Alaska is governed by overlapping rules: local rules developed by Alaska Native cultures and communities, regional rules developed by co-management boards, federal rules stemming from Congress and federal agencies, and international treaties. Achieving a level of compatibility amongst rules at all levels is important to successful outcomes (Berkes 2002; Anderies et al. 2004). However, two federal agencies, the U.S. Fish & Wildlife Service and the National Marine Fisheries Service, negotiate and administer co-management institutions differently for marine mammals under their separate jurisdiction, potentially confounding the ability of all policy actors to move towards an ecosystem management paradigm.

This study focuses on public policy processes as well as outcomes through tracking three critical aspects of institutional performance: the influence of historical events on current policy concepts, organizational culture as a driver of policy approaches, and the extent to which structural relationships with stakeholders determine policy dynamics. Marine mammal management partnerships between hunters and two federal agencies, the U.S. Fish & Wildlife Service and the National Marine Fisheries Service, are compared through case studies across scales of social organization: the local village, regional co-management boards, and federal agency policies. I evaluate policy success through an examination of the match, or "fit" (Young 2002a) of institutions to social-ecological system dynamics and diagnose potential mismatches of policy strategies and policy problems.

This study is innovative in that the Marine Mammal Protection Act has not before been evaluated in the public policy literature for its performance based on identifiable outcomes for its ecological and cultural goals. I use the goals developed in co-management contracts as well as goals modeled on endangered species' recovery plans to identify policy tools that best fit policy

problems. The key argument of this dissertation is that the differences between the agencies in managing these two situations, and the larger regimes of which they are a part, are emergent properties of agency-community relations rooted in historical, structural, and cultural approaches to governing resources. They are emergent in that all three factors interact in a configural, versus additive, way (Ostrom 1999) to create agency approaches. Furthermore, these differences in approach can be traced from policy on the page to practices on the ground with consequences for governing for sustainability in a time of rapid change. The extent to which an agency shares power, the institutional structures they operate through, and historical legacies of prior policy regimes shape patterns of governance and could make the difference between success and failure in mobilizing collective action for conserving resources.

Vignettes of cross-scale governance

On May 30, 2007, whaling captains from rural villages across Alaska traveled to the assembly of the International Whaling Commission (IWC). This year the meeting was held in downtown Anchorage, Alaska, and the main event from an American perspective was a discussion over the reauthorization of aboriginal whaling quotas for ten Alaskan villages. Although the Commission, the whalers, and the U.S. government had held the same deliberations over the past thirty years of working together, the outcome was not assured. Rumors had been swirling in whaling communities for months about a possible Japanese procedural move to block the renewal of quotas. In the curious world of international environmental politics and U.S.-Japanese relations, a Japanese delegate had even previously notified Alaska Senator Ted Stevens about their intentions. Unlike the international crisis that threatened to shut down aboriginal whaling in the 1970s due to conservation concerns, in 2007 the Bering-Chukchi-Beaufort Seas population of bowhead whales was agreed to be strong in numbers. Japan, however, needed some bargaining leverage against the Americans if they were to move forward with their proposals for small-scale whaling off the coast of Japan. In a March 8, 2007 interview with the Anchorage Daily News, National Marine Fisheries Service director and U.S. Commissioner to the IWC remarked, "*What we've said is absolutely no deals here. We're not going to make a deal with you. We're not going to be blackmailed. We're not going to be held hostage.*" (Associated Press 2007).

Knowing the political stakes, whaling captains and their wives dressed in their best Iñupiaq anoraks and throughout the Commission meeting told the delegates what their vote meant for Alaska Native whalers. Surprisingly, the vote was relatively quick and the proposal passed

with consensus, with Japan dropping its objection prior to the meeting. When the vote was known, the Commission room "erupted in applause," (DeMarban 2007) whalers cheered, whalers and federal officials shook hands, and communities around Alaska expressed a sigh of relief. Whalers and their federal partners have come a long way since the 1970s in understanding each other, working together towards similar aims, and increasing their knowledge of bowhead whales. Although many challenges to bowhead whale conservation remain, on May 30, 2007 whaling families were beaming.

Contrast the collective sigh of relief, from both federal agency staff and whalers at the IWC with a hearing held in Barrow by the U.S. Fish & Wildlife Service. Community members were also at this meeting, but not as part of a governing body. They were there as an audience. The Service employees sat at the front of the room, with a table between them and the community. Microphones were placed on the table and people were encouraged to testify as to whether or not they possessed any additional information that could help the Service to determine whether polar bears should be listed as threatened under the Endangered Species Act. The Service had held private meetings earlier in the day with the North Slope Borough, and its Department of Wildlife Management. The Borough and the Service were not on the same page, even though no one could predict whether the Secretary of the Department of the Interior would eventually list the bears. Some members of the audience were involved with the Nanuuq Commission, the tribally authorized Alaska Native Organization, which was reluctantly supporting the listing. The mood of the audience was one of frustration at both the process and the potential outcome.

Both of these vignettes represent what institutional scholar Elinor Ostrom (1990) calls "action situations" – the combined places and processes in which decisions are made. When I first encountered different federal agencies managing similar categories of species (e.g., marine mammals) in the same communities and within the same or similar legal frameworks, I was struck by the similarities between the two situations. Each situation revolves around the subsistence practices of Alaska Native communities and the relationships they build with federal agencies tasked by international and national law with regulating the sustainable use of these resources. A deeper look, however, reveals significant ecological complexities and operational differences in each situation. The goal of this dissertation is to examine the internal workings of each situation, document and compare the differences of each, build a plausible explanation for

these differences, and determine whether the differences matter for the sustainability of both the resources and the communities living with them.

Co-management in Alaska

Over the past twenty years, co-management as a system of governance has received a lot of attention from both academics and practitioners examining ways to reduce conflict between state-ordered rules around resource use and the way people in indigenous rural areas genuinely live their lives[1]. Use of the term governance recognizes that various political actors, including those within and external to government bodies, are involving in decision-making, implementing, and sometimes, ignoring rules. In addition, for any particular resource in question, the state[2] may not effectively be "in charge." Despite the widespread recognition that agencies must work with subsistence communities to conserve resources, issues of power, funding, and who sets the agenda continue to be important threads of conflict in community-state relationships across Alaska. Many groups, even government agencies, have called for more or stronger co-management arrangements. However, Alaskan co-management arrangements have significant vulnerabilities as compared to their Arctic Canadian counterparts. The Canadian Arctic co-management boards (e.g., Nunavut Wildlife Management Board) were born out of lands claims processes that defined aboriginal-state relations through prolonged political negotiation. As the Nunavut board was developed, most if not all of the players[3] understood their legal obligations and opportunities.

In Alaska, the overlapping jurisdiction over wildlife management by the state, federal and tribal authorities is an ongoing political conflict, often mitigated through memoranda of understanding, rather than hard law. Alaska Natives living along the coast are exempt from the Marine Mammal Protection Act's moratorium on the take of marine mammals as long as they are taking these animals for subsistence use, the animal is part of a healthy population, and the use is not wasteful. Federal strategies for monitoring these conditions are a source of ongoing political contestation and negotiation with co-management boards, villages, hunters, and handicraft artisans.

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[1] Usher and Bankes (1986) use the terms *de jure* and *de facto* to illustrate these differences; Osherenko uses the term *dualism* (1988), and Pomeroy and Berkes discuss the *two solitudes* (1997).

[2] The term "state" is used in the sense of an ultimate sovereign, e.g., aboriginal-state relations. The term "State" is used in relation to proper nouns, e.g., State of Alaska.

[3] This was arguably not the case for many communities living far from Iqualuit, the new capitol.

Not all marine mammals are regulated under these exemptions, however. The taking of bowhead whales is regulated under international, federal, Alaska Native and local rules. Quotas are deliberated at the international level, designed and delivered through federal-Alaska Native processes and enforced at the local level. The differences in the bowhead whale and polar bear regimes – the use of hard quotas versus voluntary measures, histories of state-community relations, and different levels of power sharing offer a unique opportunity to study public policy from a comparative standpoint. The relatively narrow area of law also offers an opportunity to observe the policy process from rule development to implementation, as well as policy adaptation. The fact that only Alaska Natives can take marine mammals for subsistence, there are only two agencies responsible for their management (the U.S. Fish & Wildlife Service and the National Marine Fisheries Service), and the regulated community is fairly small allows for a somewhat controlled policy experiment that can inform larger or more complex policy problems.

The key challenge of marine mammal policy in Alaska is effective cross-scale governance, which is a fundamental element of aboriginal-state relations, as well as the local implementation of any federal or state policy. A significant amount of contemporary public policy implementation takes place through networks of people; increasingly, the role of federal agencies is to steer the network rather than directly implement the policy (Hufen and Ringeling 1990; O'Toole 1997). For wildlife management, however, agencies often maintain a more active role because of their responsibilities towards public resources as well as their scientific expertise. In the United States, as in other northern states, tribal organizations have increasingly taken on the delivery of public policy programs, e.g., early education, social services and resource management. The success of policies like these requires effective cross-scale governance (Cash et al. 2006).

Many institutional theorists have examined the idea of policy "fit" (Young 2002a) in terms of rules matching biophysical properties of the system in review. As a point of departure, this dissertation focuses on the social fit of rules to the place and people subjected to management. Importantly, the study focuses on the management of common-pool resources, or those resources that are collectively "owned" yet subject to overuse if access to them is not managed. The study makes four contributions to the study of common-pool resource management:

1. an in-depth longitudinal analysis of marine mammal management in Alaska across four eras of human-environmental relationships;
2. a contemporary comparative analysis of cross-scale public administration of two common pool resources;
3. two case studies evaluating resource management through social networks of people and an analysis of the relationship of network structure to policy outcomes; and
4. a causal explanation of how different agency cultures, histories and relationships with stakeholders shape policy approaches.

Outline of the chapters

The analysis unfolds over six chapters. Chapter two is a literature review of institutional analysis, common property theory, and co-management as a strategy to enhance the social fit between local indigenous common pool resource management and bureaucratic processes of resource management.

Chapter three conceptualizes modern marine mammal co-management as an emergent[4] property of federal – Alaska Native relationships. Using institutional theory, I build narratives of marine mammal management eras by illuminating differences in how actors manage to solve the same problem in multiple eras. Time periods are treated as case studies; I describe dominant forces affecting human-marine mammal relations in each era. I subsequently illustrate how Alaska Native Nations, the Russian and American Empires, the State of Alaska and aboriginal-state collaborative bodies have solved resource sustainability problems differently. In looking between time periods, when one regime becomes another, the research demonstrates that the combination of sovereignty, dominant mode of production (Wolf 1984; Caulfield 1997), and value orientation shaped the adopted dominant mode of governance over human uses of marine mammals, resulting in relative measures of sustainability. I then trace these outcomes and institutional trajectories through time to understand change and transformation of governance.

Chapter four examines agency culture as a driver of policy outcomes. I develop a framework to facilitate analysis through amalgamating 1) elements of Easton's (1965) theory of the policy process and its relationship to performance; 2) Ostrom's Institutional Analysis and Development framework (1990) which aids in organizing the identification of policy actors,

[4] The term "emergent" is meant to convey that co-management as a process is a function of repeated interactions across time; this is in comparison to seeing co-management as an endpoint.

situations and outcomes; and 3) Young's (2002a) concept of fit between policy strategies and the social and ecological aspects of policy problems. I argue that organizational culture affects policy outcomes through the choice of policy instruments and an agency's willingness to share authority for decision-making within its discretion. Using the method of policy narrative analysis, I begin with a discussion of the interplay of agency history, structure and culture as forces affecting policy decision-making. I next build cultural profiles for the U.S. Fish & Wildlife Service and the National Marine Fisheries Service in their roles as co-management partners. I then discuss the results of a survey of agency employees focused on organizational culture and relationships to stakeholders. The implications of each cultural type for co-management are explored through an institutional analysis of harvest assessment methodologies for bowhead whales and polar bears.

Chapter five examines how well institutions for marine mammal management fit the local social context of resource users through a policy network analysis. I compare the self-organizing capacity of hunters across marine mammal management regimes and relate differences in social network structures and authorities to differences in outcomes. I examine networks created between hunters and agencies to test propositions of effectiveness stemming from literatures on policy networks, network governance and co-management in networks. I argue that the extent to which federal institutions use policy networks that mirror local self-organized networks increase their effectiveness and is a measure of how well policies policy fit within communities as social systems.

Chapter six presents a comparative analysis of the two marine mammal policy regimes using a complex systems approach with an applied focus on critically evaluating contributions of current policy to resilience. I build upon the Chapin et al. (2006a) social-ecological system framework which graphically illustrates how different types of institutions act as feedback loops between social and ecological drivers at multiple spatial and temporal scales. I review pertinent literature and develop a heuristic for identifying policies that act as effective feedback channels. I next describe key drivers affecting the availability and usage of each animal as an ecosystem service. Using efficacy and feasibility as components of overall policy effectiveness, I analyze the scale and effect of institutions responsive to the main threats to bowhead whale and polar bear populations.

Chapter seven concludes the dissertation by reiterating the key themes of the previous chapters and linking them to a concept of resilience management. Managing for resilience places

an emphasis on the ability of actors within a system to adapt to ecological and social surprises. Because actors at all scales of governance have different institutional, financial and social strengths to draw on, a resilience management approach is one that enhances the interconnections between actors in order to act in concert. In conclusion, I consider the challenges of governing human activities in the Arctic marine environment and propose governance strategies for enhancing collective action.

Chapter 2: Theoretical grounding for the study: common-pool resources, institutions, and organizational culture

Introduction

This chapter reviews literatures relevant to a comparative analysis of the National Marine Fisheries Service and the U.S. Fish & Wildlife Service in their co-management strategies for marine mammals. A framework to facilitate analysis is developed by integrating concepts from complementary bodies of scholarship: institutional analysis, common property theory, organizational culture theory, co-management practice and resilience thinking. This chapter surveys the aforementioned literature in order answer this dissertation's key research questions: why do two federal agencies implementing the same wildlife management laws in Alaskan villages create different types of relationships with locals, and do these differences matter for conservation outcomes? Furthermore, what role do institutions play in the resilience of social-ecological systems in Northern Alaska?

Part one of this chapter surveys key developments and seminal works in the study of institutions and common pool resources, beginning with Garrett Hardin's "The Tragedy of the Commons" (Hardin 1968) and ending with a discussion of the Institutional Analysis and Development framework as a tool to conceptualize the components of the system of interest. Part two explores literature relevant to studies of organizational culture, stemming from sociology, organizational studies and anthropology. The integration of concepts from all fields helps to conceptualize the development of agency approaches and their subsequent effect on resource management outcomes. Part three examines works on social-ecological resilience, especially as they relate to resource management institutions.

Defining the study area: institutions, organizations and the management of common pool resources

As marine mammal management in Alaska has been, to greater or lesser extent, self-regulated (without privatization or direct government control) by Alaska Native communities for generations, marine mammals can be considered resources held "in common." Sustaining the marine commons is a challenge that is appreciated across the state, across cultures, and through

collaboration with government agencies. The collaborations are institutions – a convention explained below through this section tracking the history of political and sociological thought about how people work together to sustain resources.

Tragedy of the commons and the development of common-pool resource literatures

How do user groups sustainably harvest resources held in common? In her book *Governing the Commons*, Elinor Ostrom notes that this issue is old as Western philosophy itself. She cites Aristotle's *Politics,* Book II, ch.3 "*...what is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, hardly at all of the common interest,*" (1990: 2). In modern academic circles, one often cited work is H. Scott Gordon's 1954 paper, "The Economic Theory of a Common-Property Resource: the Fishery." Gordon (1954) modeled a fishery to argue that resources were exhaustible because they are owned in common, "yield no economic rent" and are exploited under conditions of "individualist competition" (p. 124). Gordon was answering user groups and managers who were at the time arguing against regulating fisheries, in the belief that the resource could withstand unlimited fishing pressure. Gordon's suggested framework became the basis for bioeconomic analyses in fisheries and was influential in shaping early academic opinion of the commons. During the ensuing decade, discussions of the commons became widespread in the United States along with growing awareness of environmental issues.

Academic interest in "common property resources" was heightened after the publication of Garrett Hardin's 1968 provocative essay "The Tragedy of the Commons." Essentially, Hardin (1968) posited that resource users on public lands lacked institutional mechanisms to keep each other from overexploiting the public resources. He argued for a system of "mutual coercion, mutually agreed upon" (pg. 1247) by all parties to enforce a measure of sustainability. He argued for "social arrangements," systems of rules, to manage exploitation of the commons.

Many scholars refer to common property resources, but I will use the term common pool resources to distinguish between a system of ownership which is analogous to the concept of property, and a system of stewardship or connection that indigenous communities have with a resource that may not be recognized as a property right by legal institutions or perhaps by the communities themselves. For example, in *People of Togiak v. United States*[5], the court found that the United States has a fiduciary responsibility to protect the harvest practices of Alaskan

[5] 470 F. Supp. at 423, 427, n.9 (D.D.C. 1979).

Eskimos who hunt walrus but did not make a finding on the nature of the "right" of Alaskan Eskimos to take walrus. Susan Buck (1998) defines common pool resources as those subtractable resources managed under a property regime in which a legally defined user pool cannot be efficiently excluded from the resource domain. Subtractability refers to the nature of a resource; resources "subtracted" from a population through hunting or other mortality events are not available to other users. Common pool resources are neither private nor public goods. Common pool resource arrangements do not allow access open to all but to a finite and specified group of users who hold their rights in common (Runge 1981; Bromley and Cernea 1989; Bromley 1992).

While Hardin spent much of his article arguing against overpopulation of the planet, the topic of "the commons" in general sparked an ongoing debate about "commons" and institutions designed for or emergent from the commons. In fact, the Comprehensive Bibliography of the Commons housed at Indiana University contained 57,885 references on the commons by 2009 (Indiana University 2009). A review of this literature is obviously out of the scope of this paper. However, Dietz et al. (2002) helpfully synthesize the key findings on the commons since Hardin. The authors argue that Hardin made two assumptions that have not been supported by research to date: 1) that only government-controlled or private property arrangements can protect from overexploitation, and 2) that user groups have no mechanisms by which to regulate their own behavior. Widespread resource degradation has occurred under Hardin's two favored solutions, and many small-scale resource users have developed institutional arrangements favoring sustainability.

In another response to Hardin and ongoing conceptions of the "tragedy of the commons" McCay and Acheson (1987) argue that "open access" resources are rarely open to all, and have been sustainably managed by small collectives (i.e., communities) without full government control or privatization. How this management happens in the absence of government coercion or privatization (as Hardin proposed) is the focus of much of the common property work of the past twenty years (Ostrom et al. 2002). The systematic interactions of resource users and governance providers over time create routinized expectations (rules) of how transactions will be accomplished. These "rules of the game" are known as institutions. Institutions are sets of rules, decision-making procedures, and programs that give rise to recognized practices, assign roles to the participants of these practices, and govern the interactions of participants in these roles (Young 1994). Institutional arrangements (formal and informal rules of the game) affect user

behavior and incentives to coordinate, cooperate and contribute in the formulation, implementation and enforcement of management regimes (Young 1994). Organizations should be understood as groups of individuals bound by some common purpose but are not institutions per se (North 1990). However, organizations operate within the framework - the rules and constraints - set by institutions. Examples include government departments or local whaling captains' associations that administer sets of formal and informal "rules of the game."

The development of institutional theory

Over the past two decades, the study of institutions has gained popularity among the social sciences. The study of how institutions shape behavior is labeled "new institutionalism." Sociologists Paul J. DiMaggio and Walter W. Powell (1991) argue this development is a reaction against behavioralists – scholars who interpret collective political and economic behavior as the aggregate consequence of individual (rational) choice. Ostrom (1990) notes that new institutionalism, in contrast to "old" institutionalism, is pragmatic, empirical, and marked by emphasis on "rules in use." Old institutionalism, she writes, left its analysis at the formal provisions of contracts, constitutions, treaties, or other constitutive documents (Ostrom 1990). The political actors in these situations were considered to be rational actors maximizing utility. New institutionalists look for the actual role that institutions play in peoples' actions. Putnam (1993) reminds us that most new institutionalists agree on two major points: 1) institutions shape politics by structuring political behavior, and 2) institutions are shaped by history as previous choices influence rules created by subsequent generations. In trying to explain how individual actions create collective responses, Schelling (1978) defined institutions as the link between micromotives and macrobehavior.

DiMaggio and Powell (1991) note that previous works neglected social context as well as the persistence of social institutions. This neglect created a large gap in understanding as social theorists argue, "*...social, political and economic institutions have become larger, considerably more complex and resourceful, and prima facie more important to collective life*" (March and Olsen 1984: 734 as cited in DiMaggio and Powell 1991). DiMaggio and Powell also link "new" institutionalism to an older tradition of political economy that focused on mechanisms through which social and economic action occurred. The authors note the current effort to meld the research foci of these traditions with contemporary developments in theory and method is an

attempt to "*...provide fresh answers to old questions about how social choices are shaped, mediated, and channeled by institutional arrangements*" (1991:2).

Dimaggio and Powell (1991) break down institutional analysis into several disciplines: economics, political science, and sociology. Within political science, the authors further delineate the streams of positive theory (focused on domestic political institutions) and regime theory (focused on international relations). DiMaggio and Powell interpret positive theory to be mostly concerned with how political structures or institutions (mostly related to domestic political bodies such as Congress) shape political outcomes. In contrast, regime theory probes the conditions under which international cooperation occurs, and examines how regimes promote cooperation or fail to. Under both of these streams, DiMaggio and Powell discuss the limitations of the rational choice theory and build a case for including sociological formations of problems into institutional analysis. In their view, sociology and "organization theory" are uniquely situated to evaluate institutions as emergent rules ordering social action. Sociology especially focuses on shared cognitions (i.e., the mental process of knowing) and how they work to shape social interactions so that the way one interacts is interpreted as the correct way to act.

DiMaggio and Powell stress that after a while, interactions become routinized and the way they are accomplished is often taken for granted, whether or not it accomplishes any particular goal or not. For those not sharing the same values as promoted by the institution, they may nevertheless acquiesce. The authors note:

> *...individuals do not choose freely among institutions, customs, social norms, or legal procedures. One cannot decide to get a divorce in a new manner, or play chess by different rules, or opt out of paying taxes* (DiMaggio and Powell 1991: 9-10).

In the same way, Alaska Native co-managers may chair meetings consistent with Roberts Rules of Order[6] regardless of the subject at hand or the influence of other forms of indigenous decision-making. Organizations are institutionalized to the extent that they persist regardless of whether or not they fulfill their original intent. For instance,

DiMaggio and Powell write:

> *Studies of organizational and political change routinely point to findings that are hard to square with either rational-actor or functionalist*

[6] Roberts Rules of Order is a style manual for parliamentary debate.

> *accounts...Administrators and politicians champion programs that are established but not implemented; managers gather information assiduously, but fail to analyze it; experts are hired not for advice but to signal legitimacy* (1991: 3).

According to the authors, past theories overly reliant on "rational" actors have proven insufficient to explain many facets of organizational life. Denzau and North (1994) note that institutional models reliant on rationality lack explanatory power especially when problems and solutions are characterized by uncertainty, as they are in most complex systems. In addition, terribly inefficient institutions persist despite efficient alternatives. Sociological explanations of institutionalism have tended to focus on the development and persistence of institutions and have not approached aspects of performance, per se, that interest environmental policy scholars. New institutionalists in political science, however, have in the last decade turned towards the task of evaluating the performance of institutions (Underdal and Young 2004).

Young (2002a) notes that institutions are both blamed for environmental problems like pollution (e.g., weak rules against pollution create incentives to pollute) and called upon to solve environmental problems. Thus, institutions can be both independent and dependent variables. An emphasis on institutions directs attention to a particular suite of independent variables or driving forces in contrast to the study of a specific kind of environmental change, such as the depletion of fish stocks. A focus on institutional design may consider institutional variables such as: the degree to which enforcement is devolved to local users, the scope of management, who are managers and how do they relate with the resource users? A focus on causality addresses to what extent is the state of the system (e.g., whale populations, sex ratio of animals, or availability of skin for skin sewers) attributable to the institution? A focus on performance evaluates why some institutional responses prove more equitable, efficient and/or sustainable.

Young tells us that institutions play more or less significant causal roles with regard to most environmental changes involving human action. However, institutions:

> *...seldom account for all of the variance in these situations. In the typical case, they are one among a number of driving forces whose operation, both individually and in combination, generates relevant environmental changes* (Young 2002a: 4).

The institutional scholar is tasked with separating the signals associated with institutional drivers from those associated with other drivers and understanding how different drivers interact to account for observed outcomes.

Modern studies of the commons and research frameworks

So how does one study institutions, especially those institutions created or evolved to coordinate collective behavior around common-pool resources (CPRs)? For the last twenty years, scholars at the Workshop on Political Theory at the University of Indiana have been compiling cases of CPR institutions to determine what factors or variables are most likely to result in sustainable harvests of renewable resources. After the 1985 National Research Council panel on the study of the commons, a research agenda emerged focused on unanswered questions. Research in the pursuant decades has changed the focus of commons work from a search for a correct overall theory of sustainable commons management to a search for understanding the conditions under which particular institutional forms serve user groups well in sustaining resources over long time periods.

A key development in this search was Elinor Ostrom's (1990) "design principles" for effective CPR management. Ostrom and other colleagues found the following eight principles common to hundreds of effective resource management institutions of common-pool resources:

- The resource has clearly defined boundaries
- Costs to participants are proportionate to benefits
- Collective choice arrangements exist to make and modify the rules
- The institution provides for monitoring
- Graduated sanctions exist for breaking the rules
- Participants have access to conflict resolution
- Rights to organize and tenure rights are not contested
- Management organizations are nested within larger governance structures when the resource is interdependent with other systems.

While these eight principles are common to most long-standing CPRs, spirited debate exists about their effectiveness as institutional prescription. For instance, Agrawal (2002) finds that scholarship subsequent to the development of the design principles has suffered from two types of

problems – many scholars have focused on the institutions themselves and not understood the role that context plays and affects the extent to which some institutions are more likely to be effective than others. The second problem Agrawal addresses is the lack of attention to testing which factors out of all identified factors are most important. Young (2002b) reminds us that institutions are also the result of bargaining, as actors work hard to advance their own causes during regime formation. McCay (2002) and Agrawal (2002) argue that institutions should be understood in context of the broader social, political, and ecological systems in which they are embedded. In her study of international resource regimes, Buck (1998) makes the point that history also shapes institutional responses. She traces the development and performance of several international commons legal regimes and finds that the regimes are somewhat path-dependent, in that precipitating events structure the problem definition and ongoing conflicts (Buck 1998). Also uncommon are studies that connect the different variables in causal chains or propose plausible causal mechanisms. These last concerns about causality echo those of scholars who developed the research program for the Institutional Dimensions of Environmental Global Change (Young et al. 1999) and will be discussed later in this chapter when I turn towards understanding institutional performance.

The task for this chapter is to build a framework to understand the institutions involved in marine mammal management in Alaska, a path to follow in order to map questions onto the institutional theory landscape. Elinor Ostrom is considered to be a leading authority on small-scale CPRs, and her group is credited with developing one of the most often-used frameworks employed in studying institutions, the Institutional Analysis and Development (IAD) framework (Ostrom et al. 1994). The elements described below form the framework of IAD analysis and will inform this work on marine mammal management. Once the components of the case studies are understood, I will turn to institutional aspects that McCay and Agrawal identify: context of the situation and conceptualizing causal mechanisms. Because of the multi-scale character of marine mammal management, two lenses are needed. The IAD lens is useful in order to examine institutional performance as it relates to the local, self-organized common-pool resource network. Young's institutional diagnostics (2002a) will help me to understand the institution's fit with context and international regimes.

Because they are (to lesser or greater extent) a decision and power-sharing agreement between governments and resource users with proprietary rights (Pinkerton 1989; Pinkerton

2003), co-management agreements address three separate yet interrelated kinds of institutional regimes. The first is the local CPR with self-organizing principles, the second is the modern state with its legal mandates, and the third kind of regime is international. Maneuvering between the three levels and their different mental models, claims to legitimacy, and effectiveness, is a daunting challenge for the governing and the governed alike. In fact, evolving forms of multi-scale governance are becoming the norm, as more governments realize their enforcement limitations and the value of long-term local knowledge of the system to sustainable management. Many communities have also contested conventional top-down management. Some have embraced joint knowledge creation through linking local and scientific knowledge systems, others have assembled their own teams of scientists to look out for local interests in defining research agendas, monitoring local resources and engaging in scientific debates. As complex resource management problems are rarely solved at any one scale alone, successful co-management can provide the bridge that links critical actors together for collective action.

Key concepts in Institutional Analysis and Development

The Institutional Analysis and Development (IAD) framework grows out of new institutionalism and the study of institutions in political science. As a framework, IAD helps to organize diagnostic, analytical and prescriptive capabilities focusing on a resource management problem of interest (Ostrom 2005). The development and use of theories enable the analyst to specify which components of a framework are relevant for certain kinds of questions and to make broad working assumptions about these elements (Ostrom 2005). As illustrated in figure 2.1, the action arena is shaped by attributes of the world, attributes of community, and the rules-in-use. Said another way, action arenas (for instance, marine mammal management) are dependent variables affected by the nature of the community involved in the resource management action arena. The variable "attributes of community" will form the key independent variable later in this paper as I discuss the scholarship of organizational culture.

Ostrom (1999) writes that sociologists and anthropologists often use the attributes of community variable to analyze the effects of cultural values on structuring rules, incentives and sanctions. McCay (2002) cautions the institutional analyst to be critical about the concept of

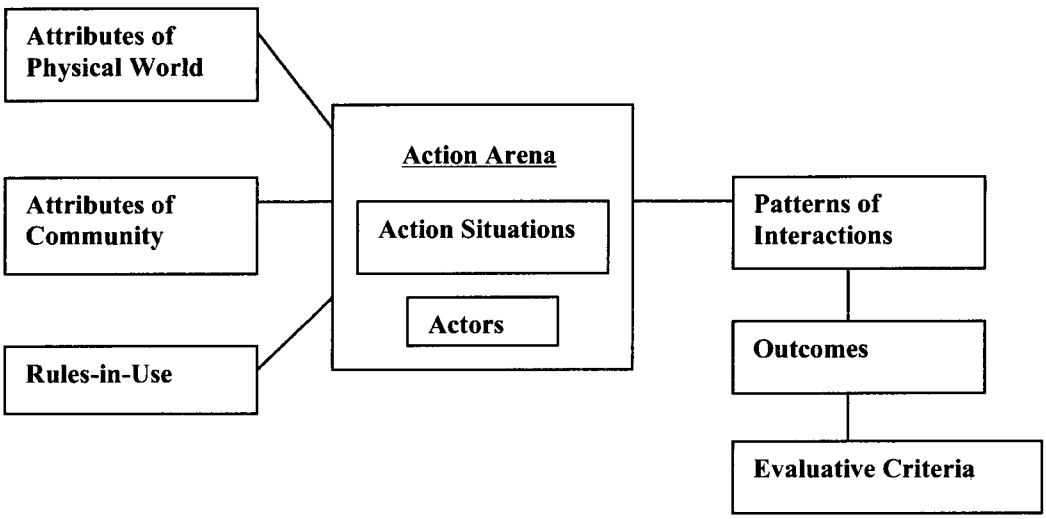

Figure 2.1 The Institutional Analysis and Development Framework (based on Ostrom et al. 1994: 37).

"community." McCay builds on definitions of community provided by Singleton and Taylor (1992) when she writes:

> *Community is measured by the presence, absence, or strength of shared beliefs and preferences; some stability in membership; some expectation of future interactions; and direct and multiple kinds of relationships among members. Mutual vulnerability refers to the extent to which members of the group can be affected by the contributions or withholdings of others; that is; the extent to which they are subject to peer pressure because they value the good opinion, friendship, or cooperation of others. Both attributes are essential conditions for the mutual monitoring and sanctioning that are widely acknowledged to be critical endogenous factors for managing local common resources* (McCay 2002: 385).

Community in this definition is not only a place where commons dilemmas are managed, but can also be found in created groups. Pretty (2003) reminds us that where social bonds and norms are high in formalized groups, people have the confidence to invest in collective activity toward sustainability. Even in situations where actors are coming from very different worldviews and

ways of knowing, social bonds and norms can form the basis of effective conservation practices. This is important, as Agrawal and Gibson (1999: 632) note, because "...even well-funded coercive conservation generally fails."

Singleton and Taylor (1992) argue that community can bridge inequality and heterogeneity to the extent that members of the community are mutually vulnerable (see also Agrawal and Gibson 1999). Singleton and Taylor (1992) theorize that the different types of solutions that will result will depend on the degree of community: at one extreme are fully devolved, endogenous solutions that depend on high degrees of community; at the other, solutions heavily dependent on state enforcement because of low degrees of community, and governance hybrids such as co-management. Importantly for students of co-management, the strength of bonds and heterogeneity of preferences may also depend on the distribution of power and wealth within the group (McCay 2002). For instance, the transaction costs to collaboration in heterogeneous groups can be significant for members of minority or otherwise marginalized actors such as indigenous hunters (Kofinas 1998).

Bardhan and Dayton-Johnson (2002) make the point that heterogeneity may have a positive or negative affect on commons management depending on what the dependent variable is. The "Olsen effect," named for the work of Mancur Olsen posits that collective action can arise in an unequal situation. For instance, if a very wealthy landowner with many acres of forests agrees to cooperate in a regional fire management scheme, he could single-handedly influence the success of any institutional arrangement in controlling the spread of forest fires regardless of whether or not his poorer neighbors do. Similarly in Alaska, villages who harvest the most whales will have a broader impact on the success of the Alaska Eskimo Whaling Commission co-management regime than those villages that rarely harvest whales.

However, in a comparative review of large-n studies of common pool resource institutions, Bardhan and Dayton-Johnson (2002) found that heterogeneity most often has a negative affect on cooperation in commons. They analyzed six large-n studies for heterogeneity in the following factors: income, wealth, timing of appropriation (e.g., upstream or downstream for irrigation), alternatives to resource, ethnic or social, and rule choice. For my study, inequality in power relations and wealth among co-management partners is assumed, since marine mammal co-management institutions are dependent upon federal partners for funding, research permits, and recognition as a legitimate policy venue. Unlike co-management agreements that arise from

land claims or court settlements, marine mammal co-management institutions in Alaska are largely voluntary agreements based on memoranda of understanding. However, federal actors could not likely sustain a common-pool resource (CPR) institution alone with only the threat of force because they do not have enough resources (or sometimes knowledge of behavioral ecology of the species) to effectively monitor all users. The extent to which a government agency shares the power and burden of sanctioning is an interesting aspect of its organizational (agency) culture. The next section further explores concepts of organizational culture.

Organizational culture and its effect on institutions

The development of the literature

The study of organizational cultures is interdisciplinary. From anthropology to sociology to management studies, authors have sought to discover elements of culture in organizations, and examine how these qualities affect decision-making. Organizational sociologist Charles Perrow (1986) explains that the process of organizing requires the coordination of employee behavior. The coordination takes on the guise of control strategies to greater or lesser extent depending on the distance between employee beliefs and the demand of bosses as well as the importance of the task to the organization. Perrow distinguishes three types of control: (1) direct and obtrusive, such as orders, rules and surveillance; (2) structural and less obtrusive, such as division of labor and organizational form; and (3) indirect and physically unobtrusive, such as the acculturation of employees to norms and actions considered appropriate (p. 129).

Max Weber was one of the earliest scholars of organizational culture in that he described a bureaucracy in terms of not only its structure, but also the norms of "officialdom" that bureaucrats must strive for in order to maintain order. Weber argued that the most important norm was that officials be of higher social status than the public so that they maintain a level of authority associated with wealth, higher learning, and expertise. In addition, Weber discussed how bureaucracies reflect aspects of the larger culture they are embedded in. Weber (1978) posited that officials should be devoted to impersonal and functional purposes. However, he wrote:

> *These purposes, of course, frequently gain an ideological halo from cultural values, such as state, church, community, party or enterprise, which appear as surrogates for a this-worldly or other-worldly personal master and which are embodied by a given group* (p. 959).

Weber described the ideal type of bureaucracy as one based on formalized, compartmentalized offices with sharply defined labor rules, fixed jurisdictions, a clear chain of command and rules of professional conduct to ensure the consistent, objective application of rules to the governed (Weber 1978).

Weber's construction of bureaucracy is highly rational. In fact, Weber wrote that bureaucracy is the "...discharge of business according to *calculable rules* and 'without regard for persons'" (p. 975). Weber envisioned bureaucratic government as a smooth operating machine, enabling democracy to flourish as social and economic differences were leveled to create equality "before the law" (p. 976). Weber assumed that the goals to which bureaucrats were to attend to were also rational; however, he did seem concerned that once a bureaucracy was established, it would be nearly impossible to dismantle it.

Anthropologists (Nader 1972) and organizational sociologists (Perrow 1986) question the rationality of actual bureaucracies in practice and inspire others studying bureaucracy to conduct studies of bureaucracies using ethnographic methods, to capture what agencies actually do and compare actions to what they say they do in policy documents or public statements. Martin (1992) argues that organizations are rarely homogenous in culture and argues for a three-face approach, recognizing that organizations can consist of integrated parts, can be differentiated into various sub-cultures, and can be fragmented by ambiguity in goals and values. While much of the organizational studies literature has focused on corporate cultures, Smircich (1983) gives an excellent overview of organizational culture and administrative studies. She argues that analysts who see culture as systems of shared symbols and meanings take their cue from anthropologists such as Irving Hallowell (1955) and Clifford Geertz (1973) who treated societies as systems of shared symbols and meanings. When applied to organizational analysis, an organization is conceived as a "pattern of symbolic discourse" which must be deciphered by those seeking to join or understand the organization. Organizational psychologist Edgar Schein (1985) remains influential in studies of organizational culture that focus on basic underlying assumptions and how patterns of those assumptions affect behavior of the organization as a whole. Schein argues that culture is what a group learns over a period of time as that group solves its problems of survival in an external environment and its problems of internal integration. According to Schein, attitudes, espoused values and behavior all stem from a group's shared perceptions, language, and thought processes (Schein 1990).

Mahler (1997) examines how organizational culture affects group learning and adaptation. She utilizes a theory of organizational learning to examine several case studies in which institutions have been shaped by their culture. Mahler hypothesizes that the more ambiguous a problem is, the more important organizational culture is in shaping reaction to problems. Mahler supports her hypothesis with examples of how culture (beliefs, norms, practices) forms organizations resistant to change as well as adaptive organizations. In the management of marine mammals, population assessments come with a high degree of uncertainty because of the difficulties associated with counting animals underwater or otherwise obscured from view. An agency's philosophy towards uncertainty in population assessments affects the adoption of rules regarding subsistence harvesting. The United States Fish and Wildlife Service addresses uncertainty in polar bear population assessments through the recommendation of a precautionary approach to harvest levels. In contrast, in Canada, the Nunavut Wildlife Management Board has attempted to address uncertainty through risk assessment modeling in its quota allocation process for polar bear hunting (Taylor et al. 2006).

Peterson and Spencer (1991) and Rousseau (1990) discuss two schools of thought on organizational culture: as something an organization is, or something an organization has. In adopting the first school, Smircich (1983) describes culture as a root metaphor. In this view, organizations are particular forms of human expression, but do not have concrete status, like a machine or organism. Researchers following this school would be interested in learning how social processes shape social meanings. Unlike corporate organizations, however, bureaucracies are *required* to do certain things or achieve certain ends and do not often have the ability to change or shape their own understandings of problems. At the same time, they do have room to shape their response to problems, within the prevailing legal framework. Sharing the perspective that culture is something an organization has is applicable to studies of bureaucracies because unlike corporations or non-profits, they are expected to maintain a consistent system of rules over time.

Organizational culture in resource management studies

Many studies of organizational culture in the resource management literature use a government agency's reaction to external or internal processes in order to examine cultural understandings within the agency without empirically measuring cultural traits. Deal and Kennedy (1982) define culture as the social and normative glue that holds an organization

together. Kennedy has followed Schein in analyzing how organizational culture affects socialization of new recruits in the USFS (Kennedy 1986). Kennedy and Quigley (1998) further examined how USFS culture affects the agency's ability to adapt to an adopted ecosystem management paradigm. McBeath (2004) presents the reaction of the National Marine Fisheries Service to a series of scientific, legal, and judicial pressures and uses these reactions to explain the agency's cultural change towards Stellar Sea Lion management.

However, an agency is not destined to respond in a predictable manner across time. Bankes (2005) argues that legal hierarchies can be "flipped" so that an agency must integrate partners or issues that it previously considered within its discretion to address a particular way. For example, the *Boldt* decision in Washington State was a significant change to fisheries policy in that the court required Washington to include tribes with treaty rights in the decision-making process for fisheries allocation in addition to sharing in fifty percent of the harvest. In Alaska, the Marine Mammal Protection Act[7] (MMPA) was amended in 1994 to allow the agencies to partner with and fund Alaska Native organizations through cooperative agreements (Section 119). Though not as sweeping in its scope as the *Boldt* decision, institutions for essentially each Alaska marine mammal and its associated user groups were developed through Section 119 funding agreements and created new policy venues across the State through which the federal agencies and Alaska Native representatives now discuss marine mammal management.

Svyantek and DeShon (1993) liken organizational culture to the concept of an attractor in chaos theory, in which the attractor represents a stable overall behavior pattern for the organization. Disturbances will occur to move the culture towards different states, but the organization will return to its attracted state over time. These authors conceptualize culture as having both a self-sustaining component and an adaptive component. Interventions are most effective in changing the adaptive component, and likely ineffective in changing the cultural component because the cognitive frames an organization has affects how the organization defines its role and purpose in its domain (Svyantek and DeShon 1993). This aspect has important implications for designing policy interventions. Stern et al. (2002) also propose paying attention to policy interventions that are targeted to particular variables like mediators – those variables that are more adaptive to external influences. Policy interventions targeting organizational

[7] Pub. L. No. 92-522, 16 U.S.C.A. §§ 1361 et seq.

recruitment and systems of acculturation have shown moderate success in changing organizational culture (Kennedy and Quigley 1998).

Anthropology and organizational culture

Although the concept of culture was borrowed from anthropology, anthropological studies of bureaucracy focus on the organization as a site of the production of meaning and strategies for control over subjects' actions (Heyman 1995). Agencies' mobilizations of resources and policy fulfillment are biased to achieve (or fail to achieve) certain ends (Schattschneider 1960) so anthropological studies of bureaucracies focus on the gap between what agencies purport to do, and what they actually do. Organizational worldview fosters the subtle coherence of decisions over a wide variety of cases (Heyman 1995). Mahler (1997) argues that the more ambiguous a problem is, the more an organization's culture will shape its response.

Anthropological constructions of organizational culture remind us that "culture" can have dysfunctional and negative impacts on resource management. Alvesson (2002) argues that much scholarship in organizational studies is geared towards examining culture in terms of its instrumental or pragmatic value to corporate success. The idea that a firm can have a "good culture" relates to the "strong culture" hypothesis, characterized by norms beneficial to the company, customers, and society in general.

Alvesson (2002) argues:

> *It seems strange that the (major part of the) literature should generally disregard such values as bureaucratic-'meritocratic' hierarchy, unequal distribution of privileges and rewards, a mixture of individualism and conformity, male domination, emphasis on money, economic growth, consumerism, advanced technology, exploitation of nature, and the equation of economic criteria with rationality* (p. 42).

Alvesson further writes:

> *A bias towards the "positive" functions of culture and its close relation to issues such as harmony, consensus, clarity and meaningfulness is also implicit in many [organizational] studies...Symbols and cultural aspects are often seen as functional (or dysfunctional) for the organization in terms of goal attainment, meeting the emotional-expressive needs of members, reducing tension in communication, and so on...Culture is understood as (usually or potentially)*

> *useful – and those aspects of culture that are not easily or directly seen as useful remain out of sight, e.g. on gender and ethics* (p. 44).

Alvesson recommends researchers avoid sweeping generalizations about culture as a whole and instead look at specific "cultural manifestations" and study their consequences, which may or may not lead to measurable successful outcomes. Within a resource management context, a cultural manifestation could be the type of collaborative agreements an agency engages in, or its arguments in front of an administrative law judge.

Cultural manifestations are akin to the idea of emergent behaviors, actions arising from complex interactions between people in particular contexts. However, cultural manifestations are also physical *things* left behind – agency logos, press releases, and letters, etc. Schein (1985) referred to these things as *artifacts* of organizational culture, not the culture itself. Alvesson and other organizational theorists use these artifacts to infer values of an organization. In marine mammal resource management, agency rules around meat utilization[8] and "traditional" methods of harvesting are agency cultural manifestations that sometimes conflict with indigenous perspectives on those same concepts.

Weeden (2002), writing from political science, argues that an anthropological conceptualization of culture as "semiotic practices" adds value to political analyses and can be applied as a causal variable. Culture as semiotic practices refers to what language and symbols do (as opposed to Schein's view of language and symbols as artifacts of deeper cultural beliefs), how they are inscribed in concrete actions and finally, how they operate to produce observable political effects. Weeden argues for the use of semiotic practices as a lens because it offers a view of political phenomena by focusing attention on how and why actors invest them with meaning. In this way, Weeden draws on both anthropological understandings of culture as shared meanings, and sociologists such as Ann Swidler (1986) who understands culture as a repertoire or "tool kit" that influences "strategies of action" (p. 273).

If a bureaucracy is not purely a rational tool to objectively deliver policy, then, it must have an informal social, political dynamic by which policies are internally framed, debated, prioritized and advocated for before the policymakers engage with their constituents, bosses, and area of responsibility. It is this social, political dynamic and the dominant mental models that

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[8] For instance, what kind and percentage of meat must be used in order to meet agency guidelines for avoiding "wasteful" take. For an in-depth treatment of this topic, see Robards and Joly (2007-2008).

shape the range of policy choices that I am conceptualizing as an agency "culture." For instance, staff familiarity and perceptions of the usefulness of traditional ecological knowledge will likely affect their support for including it in management decision-making.

My approach to organizational culture is consistent with the resource management studies cited above as well as Weeden and Alvesson's approaches in that cultural manifestations are analyzed as causal variables with particular emphasis on how manifestations affect decision-making. Cultural manifestations are both dependent and independent variables, as they are shaped by interacting forces of history, structure and culture but also then affect subsequent decision-making.

Organizational culture and institutional performance

In the organizational studies literature, facets of culture have been qualitatively correlated with performance characteristics such as efficiency, teamwork, the development of shared definitions, internal or external focus, participatory nature, and persistence. Few studies have quantitatively linked aspects of organizational culture to indicators of performance. However, Petty et al. (1995) found that in one electrical utility company with multiple sub-organizations, corporate culture emphasizing teamwork was positively correlated with goal achievement. Given that the early organizational culture studies looked mostly at the instrumental rationality[9] of organizations, it is not surprising that many analyses of government performance have dealt with power, resource availability and political influence since they are the tools a bureaucracy uses to implement its goals (Clarke and McCool 1996). The performance of government agencies have also been measured against the hallmarks of "good government": efficiency, equity, and effectiveness. Recent studies have also looked at direct outcomes, such as the relationship of institutions to biophysical outcomes (e.g., number of whales, air quality, and global air temperature).

If we consider organizational culture to be "the way things are done around here" (Deal and Kennedy 1982), we can increase the number of studies addressing links between organizational culture and institutional performance. Provan and Milward (1995), in a landmark study of health policy networks, correlated patient outcomes such as mental health services and

[9] Instrumental rationality is generally perceived to be a specific form of rationality focusing on cost-effective means to achieve a certain end, whether or not that end is meaningful. In the case of federal bureaucracies, a focus on implementation of a blatantly flawed policy could be considered a case of instrumental rationality.

patient quality of life ratings with the way services were delivered through hierarchical or diffuse networks. Organizational culture has also been cited as a barrier to resource management strategies such as co-management (Pomeroy and Berkes 1997; Natcher et al. 2005), collaboration (Laninga 2003), ecosystem management (Kennedy and Quigley 1998), and adaptive management (Jacobson et al. 2006). Causal explanations of cultural impact have received less attention but have been addressed by institutional scholars using "social-practice models" of collective action (Young 2002a: 29). In these models (contrasted with more utilitarian collective action models), institutions give rise to social practices that structure behavior. Analysts using social-practice models assume that organizations make decisions based on what they consider to be appropriate behavior, versus calculations of utility (Young 2002a).

Analyses of institutional performance

Many of the common-pool resources and action arenas investigated under the IAD framework have been fairly simple, bounded, and small-scale. Performance in these cases is often fairly straightforward and focused on sustaining a particular resource – timber, clams, etc. For marine systems, characterized by their open and literally fluid boundaries, one must ask what other analytical tools have been used to analyze institutional performance for larger, migratory or more complex resource or environmental problems? Young et al. (1999) argue for a research program examining causal mechanisms of institutional performance. The authors outline several strategies including a focus on institutional drivers and their interaction with other drivers of ecosystem change. The institutional driver I am interested in is an agency's approach to policy-making. In order to analyze institutional effectiveness, Young et al. develop a diagnostic approach to institutional analysis that calls for an effort to identify critical features of specific problems followed by an effort to specify institutional arrangements best suited to deal with them. Institutional diagnostics, Young (2002a) argues, should address three sets of factors critical to performance: fit, interplay, and scale.

"Fit" is a metric focused on how well institutional characteristics match the socio-ecological system characteristics they seek to address (Young et al. 1999). Rapid ecological change in the North makes fit a particularly important factor for addressing the conservation of ice-dependent species as the Northern seas become warmer. Command-and-control approaches will inevitably have less influence over fast system dynamics (e.g., chaotic fish populations) that are variable and/or uncertain than slower system dynamics that are fairly stable over time (e.g.,

habitat structure). "Interplay" represents how institutions interact with other institutions, even unrelated ones, acting upon a problem or resource base. The effect of any new institution could be synergistic or complicating attempts to address environmental issues. Young (2002a) notes that interplay between national policies relating to consumptive use of federal lands and waters (e.g., the Outer Continental Shelf Lands Act) and local common pool resource institutions (e.g., Alaska Eskimo Whaling Commission Management Plan) regarding subsistence uses are amongst the most contentious issues in the North (p. 88).

Finally, the "problem of scale" focuses on the ability of institutions to function effectively at different levels of social and ecological organization (Young et al. 1999). Policy interventions based on analyses of local-level processes may not work when applied to national problems, and vice versa because of differing contexts, the heterogeneity of interests involved, and difficulties in enforcement. For instance, a devolved enforcement system like the one employed by the Alaska Eskimo Whaling Commission might not work at the national level for commercial fisheries because of the lack of social pressures to conform amongst crews and the individual profit-oriented nature of most commercial fisheries.

Feeny et al. (1990) offer multiple cases in which top-down changes have negatively affected resource sustainability, largely because new management laws often create open-access situations when they disrupt common property institutions. In contrast, Janssen et al. (2007) argue that preserving institutional diversity at local levels "...maintains a rich set of solutions of social systems adapting to ecological context" (pg. 308). Berkes (1999) defines these institutions as a component of local knowledge systems, especially in indigenous communities with a long history of interacting with their environments. For some migratory fish species, national or international regulations limiting who and how one can harvest can benefit local fishers through reducing competition outside of their social systems from foreign fleets. However, national or international laws relating to fisheries have tended to favor large, commercial users over subsistence or artisanal ones (Young 2002a). Berkes (2006) argues that systems are rarely situated at one scale, most likely affected by external processes or events at other scales so that all of these connections must be considered in diagnosing institutional performance.

The performance I am interested in relates to an institution's contributions toward resilience of social-ecological systems (SES). Institutions shape how people and governments interact with the ecosystem. In order to sustain any particular ecosystem service, at the very least,

institutions must prevent negative impacts from degrading the resource. In the most progressive SESs, institutions provide opportunities for learning and processing feedback to better understand system dynamics and enable responses to signals of change in the ecosystem or social system. As far as the institutional diagnostics of fit, interplay, and scale are predictive of institutional dysfunction, they can be helpful in understanding why some institutions are better than others are in fostering links between social and ecological components of an SES. The resilience of an SES lies upon the strength of these links, as well as the SES' ability to weather internal and external disturbances.

Social-ecological resilience in an institutional context

Resilience has been defined in two predominant ways in the ecological literature, reflecting two different aspects of stability: efficiency in maintaining a steady state and persistence in the face of disturbance. Holling (1973) argues that the perspectives hold different consequences for ecological systems. Holling and others define the first aspect engineering resilience, and the second ecosystem resilience (Holling 1996; Holling and Meffe 1996). Engineering resilience is measured by resistance to disturbance and the speed of return to the equilibrium. In contrast, ecosystem resilience is measured by the magnitude of disturbance that can be absorbed before the system changes its structure by changing the variables and processes that control behavior (Gunderson and Holling 2002).

Holling and Gunderson (2002) argue that sustainable relationships between people and nature require an emphasis on ecosystem resilience. The authors argue that concepts of engineering resilience have structured contemporary resource management practice. A shift to ecosystem resilience would change management and policy emphases from a micro command-and-control approach to one that sets overall conditions to allow adaptive strategies (Holling and Meffe 1996; Holling and Gunderson 2002).

Holling and Gunderson argue:

> *Exclusive emphasis on engineering resilience reinforces the dangerous myth that the variability of natural systems can be effectively controlled, that the consequences are predictable and that sustained maximum production is an attainable and sustainable goal* (p. 28).

Gunderson, Holling and Light (1995) link this reliance to the "pathology" or common problem of resource management. Resource management is pathological to the extent that it employs

strategies developed under the mental framework of steady-state dynamics and is not attuned to or allowing of natural variability of the problem at hand, relying on maintaining efficient control of ecosystem properties (Holling and Meffe 1996). Walker et al. (2004) note that systems under stress that have lost resilience may transform into altered or undesirable states. An obvious example of such a transformation would be any SES in which a keystone species declines to the point at which the system no longer maintains ecological services important for people or their ecosystem. Polar bears and bowhead whales have been managed under policies designed with equilibrium as a policy goal. A central aim of this dissertation is to investigate how well existing policies are working in an era of fundamental change in ecosystem characteristics.

Resilience as a management goal

Ecological surprises inevitably cause policy crises. In contrast, a management strategy based on the resilience framework is based on a conscious choice to put extra weight on "outliers" on the assumption that ecosystems are more prone to such behavior than are engineered systems with limited attraction basins, such as commodity prices (Walker et al. 2002). Walker et al. argue:

> *The goal of resilience management is to prevent an SES from moving into undesirable configurations. It depends on the system being able to cope with external shocks in the face of irreducible uncertainty* (2002:3).

Actors within an SES should aim to adopt policies that enhance a system's ability to reorganize and move within an acceptable state (Folke et al. 2002; Walker et al. 2002) (e.g., policies that maintain essential habitat features such as open migration corridors or important fish nurseries). Folke et al. (2002) argue that management with a resilience lens focuses on slowly changing variables such as soils, biological legacies and landscape processes that maintain "ecological memory." The authors note that resilience may be built through active management strategies that monitor, clarify, and redirect underlying, fundamental variables and thereby foster adaptive capacity.

The development of indicators for empirical resilience studies has lagged behind the theoretical work of conceptualizing social-ecological system dynamics (Carpenter et al. 2001). Recent work has focused on evaluating the ability of management structures to maintain the production and delivery of ecosystem services (Walker and Meyers 2004). Walker et al. (2006)

report on heuristics gleaned from case studies over the years. Of these propositions, the following bear upon resilience management:

- The "rule of hand." Critical changes in social-ecological systems are determined by a small set of variables

- Adaptability is primarily determined by (1) the absolute and relative amounts of all forms of capital: social, human, natural, manufactured and financial and (2) systems of governance

- Mental models drive change in social-ecological systems and adaptability is enhanced through partially overlapping mental models of system structure and function

- Learning is a key component of adaptability and is enhanced by careful experimentation in the form of active adaptive management

- Efforts to deliberately enhance adaptability can unintentionally lead to loss of resilience.

Anderies et al. (2004) writing from a social science perspective, suggest that instead of asking how we can better manage resources, we should ask ourselves what makes social-ecological systems (SESs) robust? Carpenter et al. (2001) note that ecosystem resilience can be difficult to apply to systems in which some components are consciously designed (such as management structures), which prescribe certain actions and deny others. Anderies et al. (2004) note that most resource management regimes consist of both engineered or designed elements (e.g., laws, agencies) and natural systems, so they propose a measure of "robustness" to indicate resource management strategies which maintain favored ecological services, such as fisheries, timber, or water quality.

Anderies et al. emphasize robustness because it emphasizes the cost-benefit trade-offs associated with systems designed to cope with uncertainty. One example of an approach to enhance the robustness of an SES would be to focus on governance that enhances the resilience of an ecosystem configuration that provides valued ecosystem services.

Governance is concerned with setting directions and coordinating policy rather than directly tackling management prescriptions. Milward and Provan (2000b) define the term governance as:

> *...concerned with creating the conditions for ordered rule and collective action, often including agents in the private and nonprofit sectors, as well as within the public sector* (p. 239).

Stoker (1998) argues that the essence of governance, as opposed to forms of government such as the legislative, executive and judiciary branches lies in its focus on governing mechanisms (e.g., grants, contracts, and memoranda of understanding) that do not rest solely on the authority and sanctions of government. Properties of governance exist in self-organizing systems as well as highly bureaucratic ones. Anderies et al. (2004) imagine SESs and engineered systems at opposite ends of a continuum of systems with both designed and self-organizing subcomponents and levels of uncertainty. In the former, the majority of components are self-organizing, very few are designed and uncertainty is high. In the latter, the majority of sub-systems are designed, very few of those self-organize, and uncertainty is low (figure 2.2).

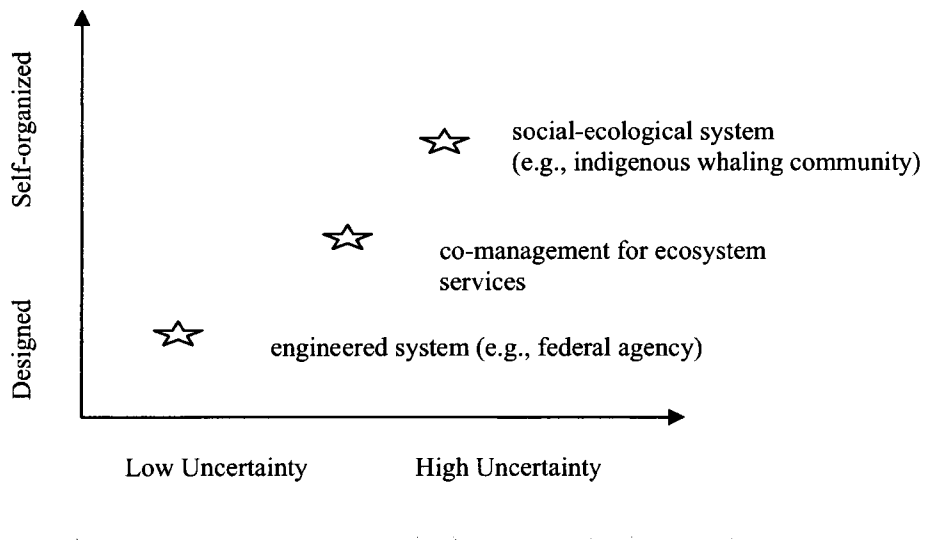

Figure 2.2 Continuum of systems Figure based on Anderies et al. (2004).

Anderies et al. (2004) focus on SESs that incorporate the resource, its governance system and associated governmental infrastructure as a coupled system. Particularly critical is the link between resource users and the public infrastructure (e.g., physical and social capital) providers. For instance, resource users who are actively involved in making rules are more likely to consider them legitimate as compared to those excluded from the process. This link can be strained by the introduction of an externally designed rule-set such as a federal law imposed on a local common-pool resource regime. Dietz et al. (2003) stress the importance of adaptive governance for SESs. Such governance incorporates actors across multiple levels of social organization, builds opportunity for institutional learning, and capitalizes on the self-organizing capacity of social networks. In times of crisis, a resilient SES that is governed adaptively may be able to transform itself into a more or equally desirable state (Folke et al. 2005).

Many resilience thinkers, such as Folke (2006), focus on those governance systems operating outside or tangential to formal government institutions, for instance emergent (i.e., of an ad-hoc nature or adhocratic) networks with little or no formal powers. To the extent to which co-management between Alaska Natives and federal agencies is built around deliberately constructed institutional responses and strategies (e.g., the Marine Mammal Protection Act or the Endangered Species Act), the governance infrastructure is more fixed than that of a problem-focused network as in the Kristianstad wetlands in Sweden[10] (Olsson et al. 2004a).

Folke et al. (1998a) focus on the match between ecological processes and management strategies. The tightly linked co-evolutionary nature of successful, small SESs make a strong case for including local knowledge (i.e., traditional ecological knowledge) into decision-making and the design of new institutions. Folke et al. (1998b) credit local knowledge as a key ingredient in the long-term management of resources. The next section touches on the unique potential of co-management to accommodate local knowledge in larger-scale management systems.

While appreciating the difference in root metaphors for robustness (engineering) and resilience (ecology), I use the resilience concept because co-management of marine mammals in Alaska has both fixed and emergent governance characteristics and operates under high levels of uncertainty. Fixed characteristics include co-management boards with bylaws, constituents,

[10] However, the complexity of managing for competing uses of the outer continental shelf using a multitude of controlling institutions has required problem-focused network activity and is becoming less and less like a conventional management process.

agency partners and linkages such as financial contracts. At the same time, policy networks connect co-managers to local governments, tribal councils, and advocacy groups playing some role in governance. A tension between formal institutions involved in co-management and informal strategies for resource management will undoubtedly increase as co-managers find themselves governing under new conditions with few formal institutional responses available at the ready.

Co-management as a strategy for resilience

Marine systems have been recognized as complex systems (Wilson et al. 1994; Walters 1997; Jentoft 2000); thus, management is subject to significant levels of uncertainty. Recent institutional theorists have recommended collaborative, adaptive approaches to resource management in order to build flexible management systems responsive to the task of ecosystem management under limited information, multiple drivers of system change, and limited budgets (Wilson et al. 1994; Ostrom 1998; Berkes 2002; Young 2002b).

Warming trends in the Arctic have the potential to significantly change animal distribution and essential habitat features that may not be detectable using traditional resource management techniques such as yearly population counts. Therefore, adaptive, cross-scale resource management strategies are becoming more prevalent in order to link different forms of knowledge to understand and address change. Co-management, the sharing of power for resource decision-making between the state and resource users (Pinkerton 1989; Berkes et al. 1991; Singleton 1998), has emerged as one promising technique to build resource management institutions that are equitable, efficient, and concerned with sustainability. Co-management strategies are also unique in their potential to link long-term local knowledge with scientific research based high-tech statistical models from government agencies. Both forms of knowledge together may provide a more accurate (close to the true state) and precise (repeatable under testing) understanding of the system than either alone.

Designing institutions that foster systemic resilience is a major project of the Resilience Alliance, a group of theorists investigating the ability of social and ecological systems to retain key functions in the face of change. Capacity for learning, adaptation, and self-organization are key concepts of resilience (Resilience Alliance 2005). Folke et al. (2003) assert that effective co-management fosters regional resilience and builds capacity for positive adaptation to ecosystem change. Berkes' (1989) analysis of co-management institutional success is particularly relevant to

resilience theory. The author describes a well-functioning co-management regime as one that is efficient, stable, resilient to surprise and shock, and equitable.

Olsson et al. (2004b) further argue that because of their multi-scaled approach, co-management institutions are uniquely situated to cope with surprise at local scales while maintaining key components of social-ecological systems as a whole. A key difference between co-management and other forms of resource management is its ability to bring information from multiple scales to bear on decision-making (Berkes 2002). Another unique quality is the potential of co-management actors to match rules-in-use to rules-in-force through enhanced local management authority (Anderies et al. 2004). Olsson et al. (2004b) report that sustained, cross-scale interactions inherent in co-management strengthen a network of actors for collective action. However, co-management is not necessarily adaptive by design.

Co-management institutions can be unresponsive and maladaptive just as easily as conventional management institutions. Recent resilience thinkers have stressed the importance of adaptation in management. Folke et al. (2002) define adaptive co-management as a process "...by which institutional arrangements and ecological knowledge are tested and revised in a dynamic, ongoing, self-organized process of learning by doing" (p. 20).

Co-management is not, however, a panacea (Caulfield 1997). Armitage (2006) reminds us that a model of adaptive governance or participatory co-management embodies a number of prescribed values: participation and collaboration, accountability, learning, trust, etc. However, Armitage writes:

> *...in most social-ecological systems, pre-existing or entrenched political and economic interests both driving and reacting to change suggest that calls for adaptive, multi-level governance may be overly optimistic. Issues of power and control, the social construction of problems, knowledge valuation and the positioning of different groups suggest that our understanding of what makes multi-level governance a possibility in specific places and at specific times may need to be carefully deconstructed* (Armitage 2006:18) .

Similar concerns have been raised by Kofinas (2005) and Nadasdy (2002). "Complete" co-management, as defined by Pinkerton (2003) refers to institutions that recognize proprietary rights of resource users and maintain equity in all facets of resource management, including research, allocation and distribution decisions. One task of this dissertation is to examine how co-

management succeeds in conserving resources and cultural uses of those resources within relatively weak legal authorities as compared to their Arctic Canadian counterparts.

Conclusion

This study builds upon the literatures described above, examining co-management as a conservation strategy at three scales: the local, the agency-hunter interface, and federal policy venues. Ultimately, I seek to understand social processes of policy formation, how institutions develop through time, and how well policy choices fit into the social environments they are designed to affect. The scholarship introduced in this literature review helps to frame the mechanics involved in creating good rules for environmental stewardship. Alternatively, the study could have been informed by theories of the bureaucratic process or an anthropological study of one of the federal agencies. However, neither approach would have satisfactorily explained the interactions across scales, from federal to indigenous communities, through networks of people and rooted in particular sets of relationships. The cross-scale nature of marine mammal management in Alaska, and differential levels of access to information, meetings, and key individuals required an interdisciplinary approach in order to capture and analyze relevant events. For instance, if I had conducted a place-based anthropological study of the Alaska Eskimo Whaling Commission, I would have had to travel to field sites in Barrow; Houston, Texas (the Executive Director's place of work in 2007); and Santiago, Chile (the site of a meeting of the International Whaling Commission). A comparative study of the two agencies focused on a place-based study of Barrow, Alaska would have been biased towards an analysis of the U.S. Fish & Wildlife Service as the National Marine Fisheries Service conducted the majority of its work through its networks instead of through site visits. A comparative analysis of co-management deliberation, practice and policy consequences across scales is thus aided by a triangulation of findings across methods and sources of evidence. Each chosen method and sources of evidence are presented in individual chapters.

A contemporary account of institutional performance is by definition bounded in a particular time and through particular sets of interactions. However, the performance of contemporary wildlife management policy is affected by prior relationships between communities and 1) resources, 2) other power structures at multiple spatial scales (e.g., colonial, federal, treaty, international), and 3) policy actors and specific institutions that act to shape behavior.

These factors are explored in the next chapter through a historical analysis of marine mammal management in Alaska.

Chapter 3. Marine mammals management in Alaska: a historical account of institutional origins and trajectories

Tutisic's house, like all the other log cabins there, reminded me strongly of some peculiar Russian ones I had seen much farther south. This was interesting. Hadn't they copied them from the Russians? I inquired, eagerly. Nobody knew. All they were sure of was that when people lived in the timber they always built houses like this. – Charles D. Brower, Fifty Years Below Zero (1997: 39)

Introduction

In the Institutional Analysis and Development framework presented in chapter two, Ostrom (1990) conceptualizes policy venues as dependent variables, arising from interactions between combinations of rules, attributes of the world, and communities of individuals. She also notes that these elements are combined in a configural, rather than additive manner in that outcomes are not determined by the presence or absence of factors but rather by the nature of their interactions (1990). For instance, similar policy venues at different points of time may differ significantly. Alternatively, important legacies of past policy venues may persist and confound modern policy reform. For these reasons, it is important to trace the history of human use of marine mammals, including nascent regulatory systems in order to understand their influence on the institutional structures and opportunities available to contemporary resource managers.

Co-management and cross-scale resource governance have been presented as institutional innovations, ways for governments and resource users to move from conflict to collaboration in addition to drawing on many levels of capacities and types of knowledge of a system. Scholars taking a historical view may argue that in indigenous communities with hundreds or thousands or years of land and sea occupancy and resource use, that co-management is only the latest of many attempts to re-order social relationships between a dominant sovereign state and the people living in that state. In Alaska, history and the peopling of the territory is bound together with the exploitation of marine mammals, arguable sustainable in some cases, but not in others. The United States purchased Russian interests in Alaska during the height of the fur and whaling trade; marine mammal management played a unique role in the negotiation and development of American sovereignty in the region (Nakajima 2007).

Most wildlife management regimes in Alaska follow the familiar pattern of colonial expansion of authority as in the rest of the country, albeit with a unique focus on subsistence. Marine mammals have been treated differently since the federal government preempted state law and established the Marine Mammal Protection Act (MMPA) to protect marine mammals as a class of wildlife. Alaska Natives were exempted from the MMPA general moratorium on take (§101(b)), as long as the species taken are not depleted and uses are not wasteful. In 1994, Congress amended the MMPA to, among other things, direct the Secretaries of Interior and Commerce, who share responsibility for marine mammal management, to enter into co-management agreements with Alaska Native Organizations (§119). Hailed as a break with the past history of top-down management, co-management has created some gains but has not proven to be a panacea[11] for agencies and communities working together.

A growing number of authors have explored marine mammal co-management institutions in Alaska (Freeman 1989; Huntington 1989; Langdon 1989; Huntington 1992; Adams et al. 1993; Hensel and Morrow 1998; Chambers 1999; Brower et al. 2002; Fernandez-Gimenez et al. 2006; Meek et al. 2008; Metcalf and Robards 2008; Robards 2008). Many of these accounts focus on contemporary dilemmas while placing the conflicts or cooperative success in context. However, none has taken a comprehensive look at institution-building for marine mammal management as an historical process of political development. Key questions explored in this analysis include: how might concepts from the 19th century regarding subsistence shape current policy choices, and what can hundreds of years of experimentation with marine mammal population tell us about sustainability and environmental change?

Following historical sociologist Jeffrey Haydu (1998) and policy researchers Howlett and Rayner (2006), this chapter establishes an historical narrative of marine mammal policy change. Through a comparison of four eras, I explore how evolving institutions and three particular forces have shaped marine mammal governance. These forces are sovereignty, dominant mode of production and value orientation. Despite very different social, political and economic contexts, actors in each era tried to solve persistent problems. The central problem I examine in this chapter is the classic dilemma for the management of subtractable living marine resources: how do actors organize the exploitation of a resource without exhausting it? Common property theorists have

[11] I thank Richard Caulfield for this language.

illustrated that no one form of governance (government control, privatization, or commons) is superior for all resources (Dietz et al. 2003). I begin this chapter with a literature review of methods for historical policy analysis. Using time periods as case studies, I next describe some of the dominant forces affecting human-marine mammal relations, and illustrate how the Russian and American Empires, the new State of Alaska, and Alaska Native Nations have solved the problem differently. In looking between time periods, when one regime becomes another, my research demonstrates that the combination of sovereignty, dominant mode of production (after Wolf 1982; Caulfield 1997), and value orientation shaped the adopted dominant mode of governance over human uses of marine mammals, resulting in relative measures of sustainability. I then trace these outcomes and institutional trajectories through subsequent time periods to understand change and transformation of governance.

Historical institutionalism as a method for policy analysis

Building on the work of Aminzade (1992), Griffin (1992) and Stinchcombe (1968), Howlett and Rayner (2006) explain that for a time, policy scholars operated under the implicit assumption that policy-making followed an ahistorical "general linear reality" (Abbott, 1988) in which the cause and success of policies could be measured empirically and, "*...a general set of social forces drove policy-making, with individual deviations from deterministic outcomes existing as 'noise' or random error*" (Howlett and Rayner 2006:1).

Theories of causation

Thelen (2003) explains that new institutionalists in multiple fields have approached the concept of institutional origins and change as the product of three main forces: functional - utilitarian design, power - distributional rewards, and cultural - social scripts. The functionalist - utilitarian view is that institutions are the conscious design of groups looking to achieve a collective action goal. According to this calculation, institutions are built for particular purposes and changes in the underlying goal should lead to a change in institutional form. A critique of this approach is laid out by Knight (1999) who finds that many historians point to institutional outcomes as the reason for the institutional design without examining rival causes.

A second causal hypothesis, the power - distributional argument, is built around ideas of political conflict and bargaining; institutions reflect asymmetries of power as those with more power design institutions favorable to themselves and potentially unfavorable to others. Thus,

institutional change reflects a change in power relations or a change in preferences of those in power. Thelen (2003) again points out how knowledge of institutional origins can muddy the analytical power of the argument in that institutions ultimately favorable to those not in power may arise from very different constituencies. For instance, Thelen notes that the U.S. Supreme Court now often protects the rights of women and minority groups even though it was developed in a very different context in which neither had civil rights.

New institutionalists working in sociology have developed a third hypothesis, describing institutions as embodying collectively defined cultural visions of how the world works. Scott and Meyer (1994) discuss how shared understandings create scripts which come to define the, "*... 'right' if not the only way to do things*" (p. 234). In this vein, cultural scripts define what is moral, legitimate, efficient, or right; a change in the larger script will usher in a change in the institutions of the time as well. Powell (1991) notes, however, that it often takes a change in power dynamics in order to open a space in which the script can be rewritten.

Policy narratives

Critics of the constant cause model in most social sciences increasingly argue that effects are determined by contingencies such as structural factors (e.g., historical timing) and the order in which relevant events happen, as well as actions by individuals (Howlett and Rayner 2006; Pierson 2000a; Abbott 1990). A turn towards narrative analysis in the social sciences has challenged the sufficiency of deductive, variable-based research. For instance, historical institutionalists trace institutional change as a legacy of concrete historical processes. In this view, institutions are not only binding forces but emerge from and interact with broader social and political contexts in which they are embedded (Thelen 1999).

Alternatives to mechanistic models include narrative and two narrative hybrid models: path dependency and process sequencing. Narrative analysis has been defined by historical sociologists as the organization of contemporaneous actions and happenings in a chronological, sequential order "*...that gives meaning to and explains each of its elements and is, at the same time, constituted by them*" (Griffin 1992: 1097). Tilly explains that historical analyses assume that the "*...time and place in which a structure or process appears make a difference to its character, that the sequence in which similar events occur has a substantial impact on their outcomes*" (Tilly 1985: 79). Gotham and Staples (1996) argue that the use of narrative as an analytical tool

does three things: it forces the analyst to examine causation through the use of factual and counterfactual questions about historical events and sequences; second, narratives can clarify antecedents to causal chains; and third, narrativists increasingly use temporal connections to allow the analysis of sequences of events that take agency, large-scale change, and long-term processes seriously to show how periodicity[12] affects the trajectory of events (Aminzade 1992; Gotham and Staples 1996).

Critiques to narrative analysis

However, narratives alone cannot explain policy outcomes. The use of narrative analysis has been critiqued as being too idiosyncratic to be useful in comparative analysis (Abbott 1990, Haydu 1998) and often ignores how sequences of various events and processes can explain outcomes, stasis or change in policy areas (Howlett and Rayner 2006). Narrativists, however, defend the method as being more empirically accurate (through inductive reasoning) than stochastic variable-driven analysis. The theory of path dependency solves some problems with narrative analysis in that it provides an explicit mechanism to explain how sequential events create outcomes. The theory of path dependency comes from the economic literature as an explanation for why inferior technologies persist in the marketplace despite shortcomings (Arthur 1988). In the path dependent model, a sub-optimal technology randomly (in the sense that it is not inevitable) becomes an industry standard based on its persistence through "locking-in" market shares and reinforcing mechanisms rather than utility (Arthur 1988). Haydu (1998) critiques this conception of path dependency because of its focus on deterministic processes, noting that Douglas North (1990) describes the decisions made at each turning point as largely exogenous rather than embedded in larger historical processes.

In political and other social sciences, Howlett and Rayner (2006) note, path dependency applies to the description of significant historical processes which observers have found to be, "*highly contingent in origin and inertial in nature*" (2006: 5). The authors further explain that the key difference between this model and others is that initial conditions occur by chance but have a significant effect over the irreversible course of events to follow. In a contingent sequence, each turning point makes the occurrence of the next more likely until the pattern of interactions between people are "locked-in" to a specific pattern, creating a type of steady state. General

[12] Periodicity is used by historical sociologists such as Ronald Aminzade to mean the quality of occurring at regular intervals as well as characteristics of that unit, such as duration, pace, trajectory and cycle (1992).

theories can then be used to explain the results of any particular policy outcomes at this particular time, as opposed to being able to apply one theory for all periods. For all of its usefulness in other fields, path dependency may be less useful in the policy sciences, because social feedback mechanisms are rarely so deterministic (Howlett and Rayner 2006).

Path dependency

Thelen argues that path-dependent approaches, especially ones that provide explanatory mechanisms for switch points, lock-ins, and institutional persistence have advantages over constant cause explanations (e.g., functional - utilitarian design, power - distributional rewards, and cultural - social scripts) even as they often draw on these theories of change. Path dependent theorists tend towards historist accounts (Stinchcombe 1968), in which institutions arise through a contingent event or agency and may be sustained by very different forces than those who developed the institution (Mahoney 2000, Stinchcombe 1968). Political scientists, Thelen writes, see path dependency in politics as involving some elements of chance in a beginning sequence, as a path is taken and once established, becomes a dominant institution as other alterative policies become less likely because relevant actors adjust their strategies in alignment with the dominant pattern (Thelen 2003 drawing on Levi 1997 and Pierson 2000b). Similar to the use of path dependence in economics, in this view, institutions persist because they provide increasing returns (North 1990). However, institutions do sometimes change, collapse, or transform into other institutions, necessitating a careful examination of mechanisms that may provoke change or transformation.

Process sequencing

The third competing method of historical policy analysis is known as process sequencing. It is similar to the theory of policy punctuated equilibrium developed by Baumgartner and Jones (2002) to explain periods of policy making in the U.S. Congress. This method stresses how outcomes are rooted in previous events and thinking. Initial conditions may be random (such as a major catastrophe or other unexpected event), but more often are often resulting from previous policy cycles. Instead of "locking in" a path, process sequencing highlights the continual processes of steering processes along these paths:

> *Choices in one period not only limit future options, they may also precipitate later crises, structure available options, and shape the choices made at those*

> *junctures shaping the switch points confronted by later generations, drawing the fault lines around which later crises will erupt and creating options for new solutions* (Haydu 1998: 353).

Haydu recommends building analytical power in narrative analysis by focusing on events, arranging them in temporal order, and examining how sequences are also causal chains (1998: 349). Haydu delineates periods by contrasting solutions for recurring problems instead of relying on particular causal variables or divergent outcomes. Reiterated problem solving also places social actors at "center stage" in the explanation of outcomes with earlier events and decisions leading to later dilemmas (Haydu 1998: 357). Howlett and Rayner (2006) argue that the process sequencing model is the most appropriate model for policy studies as it more accurately represents policy processes that are rarely random or irreversible, but result from embedded and cumulative social processes that change through time.

Beyond documenting institutional origins and change, Thelen argues for the use of several analytical tools to understand the mechanisms beneath institutional change and transformation. Building on the work of Schickler (2001), Thelen illustrates how institutions may change through a layering of new institutional features built on previous successful institutions. Schickler argues that new coalitions of actors may build upon existing institutions because they lack sufficient political support or may not want to dismantle the existing system. Campbell (1997) describes democratic political development in Eastern Europe after 1989 as institutional "bricolage" in which some new policies were developed by building upon the communist era policies already in place. Institutional conversion or transformation can happen when, "*...institutions designed with one set of goals in mind are redirected towards other ends*" (Thelen 2003: 228). Finally, Thelen argues for the analytical power of historical institutionalism in that institutional forms and functions can be more fully understood only when they are viewed in context of, "*...a larger temporal framework that includes the sequences of events and processes that shaped their development*" (2003: 231 based on Pierson and Skocpol 2004).

The analysis in this chapter follows Haydu's (1998) method for using time periods as case studies, and Howlett and Rayner (2006)'s focus on process sequencing. These methods structure cases and highlight transitions between eras as places where people as well as social, cultural and environmental events chart history's course.

Preview of the argument

Co-management of marine mammals in Alaska is best understood as a mode of governance stemming from a long trajectory of institutional change. Table 3.1 illustrates key elements of the analysis across eras, previewing a focus on institutional form, purpose and scale. In this chapter, I develop a narrative of institutional change from existing secondary texts written by agencies, academics and tribes. I complement these sources with primary texts to understand how actors of the time conceptualized their management strategies. In the analysis section, I analyze how three "constant causes" – strength of sovereignty, mode of production, and value orientations affected not only the change from one regime to the next, but also the mode of governance and relative sustainability of each regime.

For this analysis, I define sovereignty as a social force following Krasner (1988) in terms of defining and defending borders as well as the organization of public authority within the state. Wolf (1982) argues that one of the most destructive aspects of colonialism is its propensity to change colonized societies by changing the way society produces and distributes goods (i.e., mode of production, following Karl Marx), leading to a breakdown in relationships that sustain ways of life. Wolf elaborated on relationships built through trade amongst kin, tributary (i.e., taxation), and capitalist modes (1982). The third causal force shaping marine mammal governance in Alaska arises from distinct values governing the appropriate relationships between humans and animals. Each society defines what a logical and appropriate action is for particular situations and reinforces this logic through social reinforcement and sanctioning (March and Olsen 1984). As illustrated in this chapter, this logic is often reflected in institutions and may be contested through struggle, force, and the political process.

Outline of chapter

In the first section I trace the settling of Alaska by groups of migrants from Siberia, who eventually differentiate in Native Nations, develop complex societies using a plethora of resources, and build indigenous institutions guiding behavior. The continuity of indigenous institutions into modern times is discussed as a force shaping present-day management dilemmas and hybrid state-institutions such as co-management. In the second section, the rise of Russian and American colonial powers shifts the landscape of marine mammal governance from a complex social-ecological system to one that undergoes rapid and disruptive change, including an

Table 3.1 Defining features of four eras of marine mammal management in Alaska

Era	Institutional form	Purpose	Scale
Alaska Native Nations	Territorial boundaries	Establishing and defending access to resources	Regional
	Traditional rules for harvesting	Defining proper human-environmental relations	Tribal
Colonial	Trade and taxation rules	Establish extractive monopoly, area sovereignty	National – International
	Company rules for conservation and commercial quality	Sustain harvest, sustain economy	Regional and species-specific
	Define subsistence versus commercial	Maintain monopoly, food security	Regional and species-specific
Early statehood	Game rules	Regulate big game trophy hunting for conservation, sovereignty	Regional and species-specific
	Defining and limiting subsistence	Maintain monopoly, state sovereignty	State-wide, International
Post MMPA	Moratorium on hunting	Conservation, values shift	National, International
	Rules for reducing incidental take	Conservation, values shift	Tribal, State-wide, International
	Defining acceptable practices for subsistence	Defining subsistence through cultural and financial thresholds to limit trade for conservation and sovereignty	Tribal, Regional, State-wide, International
	Co-management agreements	Defining and building relationships, new management rules	Cross-scale, Tribal, Regional, State-wide, International

authoritarian capitalistic model with a goal of maximum productivity. This results in massive dislocations of communities and near collapse of many valued resources. The colonial powers begin to learn from the system and towards the end of their tenures have developed recognizable institutions of resource management. The Alaska territory and then new State of Alaska develops a short-lived regime for marine mammal management, collapsing under forces of competing sovereignty from tribes and against a wider backdrop of a clash in dominant values for the acceptable exploitation of marine mammals. Finally, the beginnings of the modern governance regime come into focus in the contemporary era as federal agencies build management programs using existing staff from the state and build relationships with communities.

The settling of Alaska, the rise of Alaska Native nations and marine mammal hunting: 9000 BP to 1848

Alaska has been home to indigenous peoples for at least 9000 years (West et al. 2007). As populations grew and migration continued across the Bering Strait, distinct and diverse Nations developed in Alaska, organized around particular places and ways of life. Archeological, oral historical evidence and the travel journals of maritime traders identify several drivers of human-marine mammal relationships. As discussed below, settlement was based on resource availability; indigenous institutions developed in relationship to resource use and other Native Nations. These inter-national relations and indigenous institutions remain important to the story of marine mammal management in several ways -- the first of which is the understanding of a shared destiny between people and animals. This understanding does not necessarily translate directly into a romantic notion of the "lay ecologist" (Caulfield 1997) but provides the basis for an enduring role for nations in the stewardship of animal species. Resources that people used to "make a living" in this era often established cultural identifiers and connections used in subsequent eras by colonial powers, Native Nations and their contemporary counterparts to delineate access to resources, recognize rights to harvest, and craft institutions regarding acceptable harvest practices[13]. Although many parts of coastal Alaska developed rich traditions

[13] For instance, aboriginal whaling is, in 2009, strictly regulated by the International Whaling Commission (IWC). The cultural continuity of whaling practices must be carefully documented and approved by the Commission in order for a community to engage in sanctioned whaling. The Village of Pt. Lay, Alaska was formally admitted as a whaling community at the IWC in 2007. Although whalers in Pt. Lay had whaled with crews from other villages and the town is littered with historic whaling bones as well as other evidence of the importance of whaling, 2008 was the first year they were legally allowed to launch boats from the shores of Pt. Lay. The anthropologist involved in documenting their relationship, Dr. Stephen

regarding the use of marine mammals, the following narrative section focuses on the Aleutians and the Arctic as notable examples of how early Alaskans built social-ecological systems.

Human and environmental relationships in the Aleutians

Climate and corresponding resource change in Alaska has affected migration, standards of living, and material cultures through time (Savinetsky et al. 2004; West et al. 2007; Murray 2008). The rich environment of the Eastern Aleutians, such as the islands of Unalaska and Umnak, has provided for communities and Unangan[14] culture subsisting on whales, seals, sea lions, sea otters, fish, sea birds and invertebrates for approximately 9000 years (West et. al. 2007). With abundant resources, larger Unangan settlements became possible and the need for conservation-minded institutions (rules and norms to control type and volume of use) would have been low[15]. People in the Aleutians would have had to adapt to changes in patterns of animal abundance, however. Savinetsky et al. (2004) hypothesizes that the size of mammal and bird populations in the Aleutians during the past 4000 years is negatively correlated with changes in summer temperature and positively correlated with changes in summer precipitation. Murray (2008) offers a complex view of both environmental change and human predation as drivers of presence/absence and changes in abundance of marine mammal remains found in Arctic settlements. For instance, on St. Lawrence Island, walrus bone consistently occurs in the record across time periods for the last 1000 years, which suggests a steady state of human uses relatively unlimited by ecological conditions. In the Aleutians, the presence of walrus appears to be driven by climatic changes and is used more periodically during colder eras. As a contrast to these Alaskan conditions, Murray suggests that in the Northeastern Nunavut (Canadian) settlement of Foxe Basin, change in the abundance of walrus bone was likely influenced by both climate and human action (2008).

Braund, was given a standing ovation at the 2008 AEWC Captains' Convention for his and his colleagues' work. In another example, Aleut leaders involved in co-management regimes sometimes describe the Aleut people as, "People of the Seal," emphasizing current as well as historic ties to and stewardship of Steller sea lions. This connection endures despite a decline in subsistence harvests over time.

[14] Unangan is a term for the people who speak the Unangan language and who have historically lived in the Aleutian Islands, the Pribilof Islands and the Alaska Peninsula west of Stepovak Bay (ANLC 2009). Russian explorers and traders called these people Aleuts, a term which I will use interchangeably with Unangan in accordance to common usage.

[15] Berkes et al. (2000) argues that adopting conservation institutions in times of abundance may even be considered mal-adaptive as it would waste time and energy. However, institutional scholars such as DiMaggio and Powell (1991) often point to cases in which institutions function more to signal legitimacy or status rather than act as functional guides to behavior.

The relative sustainability of this era is conjectured to be high because of a low level of harvesting for trade versus sustenance. That does not mean that all resources were harvested in an ecologically robust manner. For instance, the Steller sea cow (*Hydrodamalis gigas*) in the Aleutians is an example of human use as a cause of marine mammal extinction. Although many marine mammal populations are resilient to small-scale harvesting, biological traits combined with low or moderate amounts of hunting likely depressed the population of Steller sea cows in the North Pacific. Reportedly a slow-moving and easily caught species, sea cows lived in the Aleutians at least until 1000 years ago when they disappear from the archeological record[16]. The last refugia for sea cows were the Commander Islands, where Vitus Bering's crew came across the last remnant population; within 26 years, the Steller sea cow was extinct (West et al. 2007, Savinetsky et al. 2004). For the most part, most currently identified marine mammal populations in Alaska are thought to have been abundant prior to commercial exploitation in the 1700s (Pfister and DeMaster 2006).

As stated earlier, Unangan diets included a wide variety of animals in the region. They did not, however, intensively use all species they knew about. For instance, the Unangan people knew about the rich fur seal grounds of the Pribilof Islands (the Unangan word for these islands was Amiq), but did not harvest large amounts of fur seals until Russian commercial operations were established in the colonial era through the enslavement of the Unangan people (Torrey 1978). Many Unangan hunters were prolific traders and would trade sea otter fur skins to early explorers. Unangans would occasionally harvest whales, but would also scavenge dead whales that floated to their shores. The human population of the Aleutian Islands before the colonial era is estimated to have numbered approximately 10,000 (Black 2004) and represented a thriving people.

Human and environmental relationships in the Arctic

Settlement in Alaska north of the Bering Strait occurred more recently than in the Aleutians. Ackerman (1998) notes that the presence of harpoons, walrus, seal, and polar bear bones found by archeologists on Wrangel Island and a sealing harpoon found with bones at Cape Krusenstern are evidence for a, "*widespread sea mammal hunting complex in the Chukchi Sea*

[16] However, Lucien Turner, a weather observer on Attu island in the 1880s, reported that he often heard people talking about the presence of sea cows, and that they were so easy to capture in the intertidal zone and butcher nearby, they were considered a women's hunt (Turner 1886 as cited in West et al. 2007).

region at least by 3200 -2800 BP" (p. 255). The people of the later Choris[17] complex (3000 – 2500 BP) relied more heavily on terrestrial resources such as caribou. Beginning around 2500 BP, the people of the Norton culture, particularly south of the Seward Peninsula, subsisted on fish, caribou, walrus and seals. Whaling arose among peoples of the Okvik/Old Bering Sea cultures of the Bering Strait region, who also harvested walrus, seals, birds, and sometimes caribou. Whaling became more of a significant portion of diets in the Punuk-Birnirk-Thule cultural phases (Ackerman 1998). During this period, settlement sites along whale migration routes became more valuable, evidenced by archeological finds relating to conflict (Harritt 1995). This culture gave way to modern Eskimo cultures along the Chukchi, Bering and Beaufort Seas as well as Thule migrants who settled further east in present-day Canada and Greenland. One of the largest settlements in Northern Alaska is at Point Hope, where Tikigagmiut people lived in a large village by 1500 BP, even before beginning their whaling tradition (Ackerman 1998).

Arctic Iñupiat lived self-sufficient, nomadic lifestyles late into the 19th century organized on strong social bonds and in movement with bowhead whale migrations and other subsistence resources (Chance 1990). Chance describes the social organization of communities:

> *...for hundreds of years, the Iñupiat of Arctic Alaska lived in distinct territorially-based populations. Highly competent, they had an intimate knowledge of their environment. Their economic and social life was organized around interlocking bilateral kin ties, extending to other localities through co-marriage...Largely self-sufficient and politically autonomous, these kinship groups maintained active trading relations with other Iñupiat, Siberian and Alaskan Yup'ik, and Athabascan Indians* (Chance 1990: 29).

Access to resources and international peace was hard-won. Within intergenerational living memory, Alaska Natives have recalled[18] (Burch 1998) various early methods of exercising sovereignty over territory and resources including intense battles, truces, establishing trading partners, and cultural exchanges. By the time Russian, Spanish, English and American traders and colonists explored and "claimed" Alaskan lands and waters for their crowns or corporate

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[17] The Choris complex is an archeological site on the Choris Peninsula, Alaska.

[18] In his 2005 book, *Alliance and Conflict*, Burch sets the inception date of his study at 1800 because, "*...it is the earliest for which both the documentary evidence produced by Westerners and the oral accounts of Iñupiaq historians can be reasonably applied*" (p. 10).

interests, Alaska Native Nations inhabited, had moved through or were extensively using most areas of the state as most of the key resources were migratory in nature, or distributed across vast areas (Burch 1998).

Institutions in the Alaska Native nations era

Institutions in this era such as territorial boundaries and some ceremonies stemmed from functional needs such as ensuring regular access to food and reinforcing social norms. Appropriate human-animal relationships were taught through traditions, such as extensive pre-whaling rituals (Lantis 1938; Brower 1942), observing proper conduct during whaling season (Brower 1942), thanksgiving ceremonies such as the bladder ceremony in Yupik areas (Lantis 1947; Fienup-Riordan 1983), and foodsharing as well as thanksgiving through Nalukataq festivals in Iñupiaq areas. Some, though not all of these institutions, survived the coming colonial era, the beginning process of which spanned a hundred years (1741 – 1848)[19].

Institutional legacies of the era

These early institutions and the association of communities with particular species remain common threads in modern-day governance. For animals such as the bowhead whale, whose relationship with people continue to structure community life and cultural identity, stewardship is built upon wisdom about social-ecological dynamics often based on thousands of years of living, observing and depending on those animals. Even for species such as sea otters or fur seals whose exploitation has been tied to trade as long as people can remember, generations of living with these animals has produced local knowledge important in management decisions, successful exploitation, and relationships between people and those species. These relationships between people and animals as well as the technologies people used to harvest them are often considered baseline conditions for management decision-making; decisions in the present time usually reference these periods in law (e.g., the Marine Mammal Protection Act) or other rules[20]. For

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[19] Focused on the fur trade, the colonial era began at different times across Alaska's coastal areas. Russians first begin to colonize Alaska in 1741 in Unangan territory and in 1799 in Tlingit territory; colonialism did not reach north of the Bering Strait until the first Yankee whaler arrived in 1848 to devastating effect on whales, walrus and people (Bockstoce 1986). Parts of Alaska were also visited by and claimed by Spanish and British explorers.

[20] For instance, the Marine Mammal Protection Act restricts harvests to Alaska Natives who are either practicing subsistence (undefined for this section) or creating "*authentic native articles of handicrafts and clothing*" (emphasis mine, § 101(b)(2)). The Fur Seal Act requires Indians, Aleuts, and Eskimos to take fur seals for subsistence provided they are restricted to, "*...canoes not transported by or used in connection*

instance, as discussed in the fourth era, definitions, narratives and dominant cultural ideas around "customary and traditional" "wasteful practices," and "traditional handicrafts" draw from colonial visions of what life was like "before contact" and remain powerful threads and ongoing conflicts in marine mammal management institutions (Robards and Joly 2007-2008).

Of course, by the time many communities had actual encounters with colonial entities, they were already changing as a result of foreign trade goods, technologies, ideologies and disease (Black 2004). Before extensive contact with many remote villages, epidemics of new diseases that the population was largely unfamiliar with and lacked immunity from, began to circulate through Alaskan communities, linked by extensive trade routes (Fortuine 1989). Such traumatic changes likely began to undermine long-established cultural traditions well adapted to ecological conditions that arguably supported sustainable practices prior to colonization (Caulfield pers. comm.).

Colonial era: 1732 - 1958

The colonial era in Alaska stretches from early Russian exploration and trade ventures to the end of American federal administration of the Alaska territory. The era is characterized by Russian and, later, American policies geared at asserting sovereignty and defending monopolies of trade for fur seals, sea otters, and whales. Importantly, though, the Russians and later Americans begin to adopt conservation measures to support a sustained yield of animals. My narrative of this era particularly focuses on fur seal and bowhead whale management, as they are both key resources and their management history has had significant long-term social and ecological effects.

Russian Alaska

Russian historian Petr Aleksandrovich Tikhmenev notes that even before beginning exploration of Alaskan shores, Russian fur traders were aware of long-standing trading relationships between communities in present-day Chukotka and Alaska (1978). A fairly extensive market for fur products drove Russian expansion into Alaska beginning in the early 18th

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with other vessels, and propelled entirely by oars, paddles, or sails, and manned by not more than five persons each, in the way hitherto practiced and without the use of firearms" (emphasis added, 16 U.S.C. § 1153). Examples of the use of historic ecological and social conditions for walrus are examined in Robards and Joly (2007-2008).

century (Tikhmenev 1978). Although fur traders and explorers sailed numerous voyages to Alaska after 1732, colonization and Aleut resistance to it grew as Russian traders attempted to establish settlements. Captain Vitus Bering's second Northern Seas expedition in 1741 is generally credited with the first European cartography and documentation of Alaskan lands. Aleuts on Umnak Island reported a visit by the trader Glotov in 1759 and began a period of trade before Russians started to build settlements (Tikhmenev 1978). Early Russian colonial attempts were seldom peaceful, and not entirely successful. After a petition by the governor of Siberia to establish a military presence in Alaska and following numerous battles with Aleuts, on March 2, 1766, Empress Catherine II pronounced a decree on trade with native communities, directing the promyshlenniks (fur traders) to, "*...treat their new brothers, the inhabitants of these islands, kindly and without the slightest persecution or deceit...*" (Russian Empire, as cited in Tikhmenev 1978:451). This directive underscores what was then a growing "problem" between fur traders looking to establish trading territories and Alaska Native peoples defending their lands[21].

The battle for Russian sovereignty

Russians soon exerted their authority over Alaska Natives, lands, and resources. Markets for their furs included those in China, where sea otter pelts were highly prized. However, relations deteriorated at the same time that colonization began in earnest. After a series of failed attempts to colonize the Aleutian Islands, traders eventually enslaved Aleut hunters to exploit them to hunt fur seals and sea otters. Exploitation of both people and animals was intensive and extensive. So much so, that by the early 1780s, the fur trade was in decline. Petr Aleksandrovich Tikhmenev, an official historian for the fur trade monopoly, the Russian-American Company (RAC), chronicles how the decline in furbearing populations, the hostility of Alaskan peoples towards the Russians, and the violent conduct of the Russians influenced prominent trader Grigorii Ivanovich Shelikov to design a corporation capable of creating institutions, regulating trade, and surveying lands for Russian sovereigntist claims.

To further his own as well as Russian interests, Shelikov created a trading company with investors and launched three ships by 1783. Initial attempts to forge trade relations failed. After a period of battles, Shelikov enslaved Koniag people on Kodiak Island for the purposes of sea otter

[21] Further south in Tlingit territory, the Russians, the Tlingit clans, and Tsimshian clans (sometimes with help from American ships) periodically clashed over sea otters and sovereignty from 1805 to 1867 (Dean 1994).

hunting and took twenty of their children as hostages to, "...*ensure their loyalty*," writes Tikhmenev (1978:15). Tikhmenev describes several other occasions of hostage taking, trading hostages to other tribes, and enlisting Fox Islanders and Koniags to fight neighboring peoples in alliance with Shelikov.

Fur seal exploitation

Commercial fur seal exploitation on the Pribilof Islands began after 1786 as Russian fur trader Gavriil Prilbylov "discovered" the islands and later forcibly settled Unangan Aleut families on the island. The first year of organized exploitation (1786 or 1787), traders recorded 40,000 fur seal skins, 2,000 sea otter skins, and 14,400 pounds of walrus ivory. The Russian American Company was officially chartered by Emperor Paul I on July 8 1799 as a monopoly for resource extraction on the Northwest coast of America from latitude 55'N. Paul issued an imperial ukase (decree) to this effect on 27 December 1799 that apparently interested both the early United States government and Canadian trade interests because of the potential for expansion into their claimed territories (US Congress, Senate 1895 and House 1889, as cited in Scheffer et al. 1984).

Exploitation increased unabated, between 1804 and 1807 alone, furs worth 2.5 million rubles were taken from Alaska, including 15,000 sea otter pelts and almost 280,000 fur seals. Another 500,000 fur seal pelts were in storage in Russia and 800,000 skins were found in the Pribilof Island storehouses, of which 700,00 were ruined and discarded (McIntyre 1870 as cited in Scheffer et al. 1984). The excessive harvest of fur seals on the Pribilof Islands had diminished local marine mammal populations to the point at which company officers feared extirpation and ordered a temporary ban in 1804 on fur sealing. Tikhmenev reports local population declines in the Commander Islands, Copper Island and Unalaska as well. In 1806 to 1807, nearly all of the Unangan people were removed to Unalaska.

Early proclamations and rules were designed to secure a trade monopoly with Alaska Native hunters and increasingly were designed to assert Russian sovereignty to Alaskan resources and people. Over time, the Russian American Company and its government benefactors gradually adapted more policies aimed at sustaining the fur seal harvest. Area closures and limitations on the age class and sex of seals to be harvested were eventually instituted by the traders, beginning in 1808 (Tikhmenev 1978; Scheffer et al. 1984) with some success. For some time, the strength of these rules depended on which traders were doing the buying, as foreign captains were less

likely than Russians to observe company rules, especially when the governor at the time favored higher harvests (Tikhmenev 1978). By 1822, the following reforms were put in place: the "zapooska" (i.e., sparing young males), a quota, the development of a breeding reserve, and a moratorium on killing of silver pups other than those used for food and oil (Scheffer et al. 1984).

American trade challenges

By the early 1800s, American traders began to sail north to Alaska, and by 1804, American captains proposed permanent trade relations with Russia (Tikhmenev 1978). The Russian American Fur Company directors requested the Emperor of Russia to allow them to defend their trade monopoly by prohibiting foreign trade in the colony. In response, the emperor instructed Count Pahlen, the Russian Ambassador to the United States, to request that American citizens be prohibited from trade with the natives. Count Pahlen informed the Imperial Chancellor that in spite of repeated attempts to do so, the American government had neither the power nor the desire to regulate its citizens in their attempts at trade with Russian colonies because of domestic (American) politics (Tikhmenev 1978). American whaling companies and fur traders were at the time important patrons of the young government in the United States (Nakajima 2007). The Russian regime in Alaska began to weaken under challenges to its sovereignty, general difficulties in keeping settlements provisioned and British colonial expansion.

Russia responded to the growth of American and English trading companies entering Alaskan waters with another attempt to constrict trade in the new territory. Czar Alexander I issued an edict (the Imperial Ukaz of 1821) – which excluded foreign vessels from trade in Russian America and Eastern Siberia (Tikhmenev 1978). Both the United States and England pressed to have the edict reversed, as their fur trading companies demanded access to the resources of the Northwest. Subsequent treaties (the Russo-American Treaty of 1824 and the Anglo-Russian Treaty of 1825) established trading boundaries that have lasted to the present day and established principles of freedom of navigation and fishing in the North Pacific Ocean.

The treaty also established Russian territory as north of 54' 40" and allowed a period of open trade for no more than ten years. After the ten-year period, the United States reportedly informed its citizens that free trade in colonial waters of Alaska had been discontinued. Additionally, Article 2 of the convention prohibited American ships from stopping at places where there were Russian settlements, without permission of the managers of those settlements.

Tikhemenev notes that, "*...neither the announcement nor the prohibition brought any results*," (1978: 315) as the whaling industry was building in intensity. Illustrating the tide against Russian sovereignty was turning, up to 200 American and foreign whaling ships were expected to arrive in Northern waters by 1840. Due to wanton overharvests of many species and the sheer magnitude of the trade, fur exports fell through the 1800s. Whaling grew in trade until most species were significantly depleted by the mid 19th century (Table 3.2).

Table 3.2 Exports of trade goods from Alaska Source: Tikhmenev (1978: 153); Bockstoce and Botkin (1983).

Species	**1797 – 1821**	**1821 - 1842**	**1842 - 1862**
Sea otters	72,894	25,416	25,899
Fur seals	1,232,374	458,502	372,894
Sea lions	27	0	?
Walrus tusks	58,176 lbs.	234,036 lbs.	?
Whale baleen	42,228 lbs.	124,380 lbs.	7000-9000 bowhead whales[22]

Social legacies of Russian colonialism

Adding to the extreme shocks to Alaska Native communities from commercial competition for marine mammals, trading ships are thought to have brought the deadly smallpox epidemic of 1835-1840. Fortuine describes the resulting devastation:

> *From Prince of Wales Island to Norton Sound the disease devastated the population, leaving in its wake as many as one-third dead and many of the remainder scarred, blind, or otherwise disabled. Beyond the physical harm, however, smallpox left demoralizing losses of a different kind: the destruction of family groups, communities, religious faith, and in some areas even a way of life. The Alaska Natives were never the same after this catastrophe* (1989: 230).

[22] Russia could not and did not control the whaling trade in the Bering Sea and Bering Strait region, but the number is illustrative of the magnitude of the marine mammal harvest of the time.

Koniag families in sixty-five settlements on Kodiak Island that had survived Russian war, murder, slavery and the epidemic were consolidated by the Russians into seven new ones (Fortuine 1989). The Russian-American Company re-organized the Koniag way of life yet again by training survivors in farming and re-building communities on the Russian settlement model, disconnecting Koniag families from their relationship to the sea. Alaska Natives living in Russian America were vaccinated against smallpox, however, which many were grateful for. Fortuine (1989) argues that the successful vaccination and evidence of Russian immunity to smallpox further undermined traditional religious authorities such as shaman, leading to a widespread adoption of the Russian Orthodox faith. The Russian Orthodox Church remains an important element of Aleutian life today.

Modes of production in the Russian era

Exploitation of fur seals and sea otters through slavery was the dominant mode of production in the Russian colonial era. Throughout this brutal history, however, Unangans maintained many of their earlier institutions, including preferences for certain age-classes of seals for subsistence, and utilizing whale blubber and other materials for building boats (Tikhmenev 1978; Scheffer et al. 1984). Capitalist and subsistence modes operated simultaneously, even as the Russians attempted to control subsistence harvests somewhat. The high economic value placed on fur seal pelts made wealth production the dominant value for marine mammals.

The American territory

With pressure from American and British traders as well as their governments, Russia accepted an offer from the United States to buy the territory. Russia's sovereignty over Alaskan trade ended the way it had begun; its last act in Alaska was to complete the August harvest of fur seals, before effecting the Alaska purchase[23] in 1867 (Scheffer et al. 1984). American officials slowly built a presence in the region, establishing a program of taxation for the fur trade, and increasing military activities. In 1869 Captain James Seward remarked upon the value and the grand reach of the fur industry in Alaska during a speech given to the "citizens of Sitka":

> *The furs thus found here have been the chief element, for more than a hundred years, of the profitable commerce of the Hudson's Bay Company, whose mere possessory privileges seem, even at this late day, too costly to find a ready*

[23] Treaty of March 30, 1867, 15 Stat. 539.

> *purchaser. This fur-trade, together with the sea fur-trade within the Territory, were the sole basis alike of Russian commerce and empire on this continent. This commerce was so large and important as to induce the Governments of Russia and China to build and maintain a town for carrying on its exchanges in Tartary on the border of the two empires* (Seward 1869: 9).

Aleuts as well as other Native Nations were enraged upon learning that Russia's interests in Alaska had been sold to the United States without their consent or consultation (Torrey 1978). The Treaty included a provision for governing "uncivilized tribes" (Art. III Treaty 1967) as the United States Congress was accustomed to pass laws for aboriginal peoples. However, Unangans were considered civilized Russian subjects, and ostensibly could choose Russian or American citizenship through the Treaty. In practice, the United States did not recognize the civil rights of Unangans until 1966 (Torrey 1978). Extensive institutions and infrastructure for the fur trade passed into American, rather than Alaska Native, hands.

In terms of marine mammal management, the American purchase was initially more a change in the cast of characters rather than a new chapter in human-environmental relations. Exploitation of fur-bearing animals through monopolies remained a key characteristic of colonial life in Alaska. There were a few changes that met with some relief from the Aleuts, however. Peter Kostromitin, an Unangan elder from Unalaska, later noted subtle, yet significant differences in life under the Americans:

> *I am glad that I lived to see the Americans in the country...The Aleuts are better off now than they were under the Russians. The first Russians who came here killed our men and took away our women and all our possessions; and afterward, when the Russian-American Company came, they made all the Aleuts like slaves, and sent them to hunt far away, where many were drowned and many killed by savage natives, and others stopped in strange places and never came back. The old Company gave us fish for nothing, but we could have got plenty of it for ourselves if we had been allowed to stay at home and provide for our families. Often they would not sell us flour or tea even if we had skins to pay for it. Now we must pay for everything, but we can buy what we like. God will not give me many days to live, but I am satisfied* (Veniaminov cited in Torrey 1978:33).

Institutional legacies

Although conditions improved somewhat, it would be over another hundred years before Pribilof islanders gained control over their island from the American federal government (Torrey 1978). Similar to the Russian regime, fur sealing in the Pribilofs under American rule got off to an unruly start with uncontrolled corporate exploitation. During 1868, and before the U.S. Congress acted to close the harvest, at least four private San Francisco companies established sealing operations on the Pribilofs and took several hundred thousand seals within a year (Roppel 1984). Early American officials recommended to Congress to adopt the Russian conservation rules including area closures and limiting the harvest to males. The Russian rules were developed through Unangan traditional practices of protecting females and further experimentation by the Company (Scheffer et al. 1984).

Captain W.A. Howard, captain of the first American revenue steamer in Alaska, the Lincoln, reported on his 1867 trip while testifying to Congress in support of a law limiting fur sealing:

> *I would very respectfully call the attention of the department to the magnificent trade opened up by this transfer, and consequently lost to Russia and Great Britain, but which, if unprotected by this legislation, will in a few years be entirely lost to us. The Russian American Fur Company protects in a most careful manner the "fur-bearing animals," killing only the males of a certain age, never exceeding the number necessary for the supply of the market* (Howard as cited in Black 2004: 274).

That same year, the Customs Act established federal jurisdiction over the Alaskan fur trade (except for fur seals, which were the purview of Congress) within the Treasury Department. A moratorium was placed on fur seal harvesting until government control could be established through military occupation (Scheffer et al. 1984). Following the moratorium, Congress continued the Russian organizational form and awarded a monopoly fur sealing contract to the Alaska Commercial Company for a 20-year term. The lease included provisions such as a quota of 75,000 annual harvest on St. Paul and a 25,000 quota limit on St. George (Roppel 1984) as well as an age limit (males over 1 year old) and seasonal closures. Responsibility for fur seals passed from the Secretary of the Interior to the Secretary of the Treasury, which established the "fur-seal service" in 1893. This service remained under the Treasury until 1903, when it became

an independent agency under the Secretary of Commerce and Labor (Scheffer et al. 1984). By 1891, pelagic sealing (sealing in open water) combined with liberal harvests on the rookeries had significantly reduced the herd and harvests were weak. The United States and Great Britain agreed to a modus vivendi (i.e., temporary arrangement) to close the Bering Sea to pelagic sealing and reduce the harvest to subsistence-only (Scheffer et al. 1984). This original agreement grew into the Paris Tribunal of 1893 and new regulations were drafted. These new rules instituted a 60-mile sanctuary around the Pribilofs, a seasonal closure and a ban on firearms in the Bering Sea. These rules did not have their intended effect, as Japanese pelagic sealing increased in intensity.

Nationalization of fur seal enterprise

The Alaska Commercial Company lease expired in 1910 and with reports of a declining herd, illegal harvests of females and pups as well as other mismanagement, Congress nationalized fur seal management. The conservation group, the Camp Fire Club, publicized its concern over reports of dwindling herds and demanded that members of the Fur Seal Board with ties to the Alaska Commercial Company be fired (Anonymous 1910). Eventually St. Paul and St. George were declared by a joint resolution of Congress a special reservation for Government purposes and unauthorized persons could no longer land on the islands (Scheffer et al. 1984). Meanwhile, another epidemic of influenza combined with measles, smallpox and potentially other diseases swept along the Aleutian chain and along the Northern Alaska coast as far as Point Hope, delaying the fur seal harvest on St. Paul as the entire island reportedly suffered from influenza (Fortuine 1989). Congress began oversight hearings on the fur seal operations in 1911 and several officials associated with the fur seal service were investigated for corruption.

The internationalization of fur seal management

On July 7, 1911 the United States, Great Britain, Russia and Japan signed the "Convention for the preservation and protection of the fur seals and sea otter which frequent the waters of the North Pacific Ocean," which declared a moratorium on pelagic sealing and the importation of skins caught through such means. This agreement was successful in ending the practice and beginning a turn around phase for the Pribilof Island fur seal population (Scheffer et al. 1984). However, the convention also created an enduring institution, the creation of special rules to prevent indigenous hunters from adopting modern equipment in order to hunt more efficiently. Technology that existed during the time of colonization was now considered

"traditional" for legal purposes and subsistence was considered the use of traditional hunting technology for food. In propagating rules, the signatories to the convention decreed:

> *It is further agreed that the provisions of this Convention shall not apply to Indians, Ainos, Aleuts, or other aborigines dwelling on the coast of the waters mentioned in Article I, who carry on pelagic sealing in canoes not transported by or used in connection with other vessels, and propelled entirely by oars, paddles, or sails, and manned by not more than five persons each, in the way hitherto practiced and without the use of firearms; provided that such aborigines are not in the employment of other persons or under contract to deliver the skins to any person* (Convention Article IV 1911).

This restriction of gear type and separation of the subsistence and cash economy is a persistent conceptualization of native harvests as being at the same time, within the same class of activity to require regulation but different enough to provide for an exemption from most rules. Coming at the time, these restrictions were geared towards reducing catch and thus prohibiting commercial competition from Aleuts. Considering that the fur seal harvest was the basis of the Unangan economy for over 100 years by then, it is likely that hunters would have joined commercial enterprises if they could have. Unangans were considered wards of the government, though, so it was unlikely that the government would have considered granting a contract to the communities themselves. The treaty language created enduring, sticky concepts that show up in other contexts as what sociologists DiMaggio and Powell (1991) call "institutional isomorphism," the replication of institutions for similar purposes without regard to unique circumstance. I will discuss these two ideas later in the chapter, in regards to other species and regulatory environments.

In 1912, Congress declared a five-year moratorium on fur seal harvests excepting seals taken for subsistence, whose skins were also allowed to be sold. Articles of the time illuminate a debate stoked by passionate conservationists over fur seal management methods. A Fur Seal Service adviser argued in the New York Times that a moratorium could be detrimental to the herd because "superfluous males" would depress populations by fighting and killing other seals (Lucas 1913). Writing in *Science*, former Secretary to the American Fur Seal Commission and Bureau of Fisheries agent George A. Clark argued that the government should not introduce another

moratorium on fur sealing, as a moratorium would essentially translate into an extensive native harvest, "*When left without restraint, it is well known that the natives are unable to resist the temptation to kill pup seals for food*" (Clark 1913). Clark's comment is interesting for a few reasons, not the least of which is an assertion that native harvests would be unsustainable if not controlled by the federal government. It is clear that the federal government was at the time unable to control its own Treasury agents, several of whom were investigated for corruption in overharvesting seals to sell without authorization.

The United States managed the fur seal harvest together with Russia, Japan, and Great Britain (for Canada) for most of the 20th century for sealskin products, until populations became depressed and conservation organizations mounted significant pressure to halt the trade. This enterprise in various institutional forms persisted for nearly 100 years but fell apart after the U.S. discontinued its factory for processing fur seals on the island in the mid-1980s[24]. The exploitative social conditions on the Pribilof Islands persisted from 1786 until 1962 when Aleut hunters began to receive pay for their work after a successful lawsuit against the government. The islands also remained closed to others until the permit system was ended in 1964 (Roppel 1984). As an example of how intertwined marine mammals management is with Alaskan history, Aleut people were granted free movement, a basic civil right, not through the Civil Rights Act of 1964, but through the Fur Seal Act of 1966[25].

The growth of the whaling fleet; the decline of the whales

Fur seals were one of the first, but not the only valuable marine resource in Alaska. Commercial whaling made a dramatic entrance in the 1840s when right whale summering grounds in the Gulf of Alaska and off the Kamchatka Peninsula were found by Yankee whalers looking for baleen, bones and oil for industrial applications. Exploitation rapidly intensified, evidenced by the growth of American whaling ships in Alaskan waters growing by order of magnitude (a few in 1840 to 300-400 by 1851) over a decade (Gilmore 1978; Scarff 1991). Commercial bowhead whaling elicited a similar pattern, from one ship in 1848 to fifty in 1849 and two hundred-twenty in 1852 (Bockstoce and Botkin 1983). A third of the total pelagic catch was taken by 1852, and half by 1865 as the population crashed from an estimated 18,000 before

[24] In 1983, St. Paul islanders, although economically devastated, rallied their neighbors and declared St. Paul Independence Day (Feidt 2008).
[25] Fur Seal Act of 1966, 16 U.S.C.A. §§ 1151 et seq.

the commercial era to 3,000 by the end of the century (Woodby and Botkin 1993). Whalers in the Eastern North Pacific next turned to humpback whales, killing an estimated 4-5000 whales in Alaska and British Columbia between 1905 and 1910 (Rice 1978). Alaska Native communities living off pelagic marine mammals felt the intense brunt of this exploitation as they saw their livelihoods destroyed. For instance, ninety percent of people on St. Lawrence Island died in a famine between 1878 and 1880, when there were not enough walrus to feed the community after pelagic whalers had taken up to 140,000 walruses with the whaling fleets over the period of 1867 to 1883 (Bockstoce 1982). The Russian traders were even disgusted by the lawlessness and ruthlessness of the exploitation, as Tikhemenev explains their difficulty in keeping American whalers at bay:

> *Continuous complaints from the year 1843 up to 1850 prove that the temerity of the whalers became extreme. Landing on the island of the Aleutian and Kurile groups, they cut wood where they pleased and rendered oil on the beach...moreover, in their rowdiness they have often demolished native huts and small company posts, answering with threats or derision when reminded of the existing regulations and of the prohibition against whaling near the shore* (Tikhmenev 1978: 317).

Ecological and social legacies of whaling

Because whaling was conducted from off-shore vessels in the most intensive period of exploitation, there were no effective rules preventing open-access overharvesting, in accordance to earlier Anglo-Russian treaties establishing freedom of navigation. The exploitation of large whales has had several legacy effects on Alaska social-ecological systems. Because they reproduce slowly, large marine mammals have been slow to recover. A whale census in 1980 in the northern Gulf of Alaska concluded that all species of great whales were severely depleted. In an area that historically supported thousands of whales, the census found only 159 fin whales, 363 humpback whales, and 36 sperm whales (Rice and Wolman 1982). *Ecological* legacy effects include the change in bowhead whale summering grounds away from Kamchatka and other refuge areas (Springer et al. 2006) and a potential restructuring of the marine ecosystem due to the loss of food for predators and nutrients from dead animals (Kareiva et al. 2006). Authors such as Myers and Worm (2003) have hypothesized a shift towards pelagic fisheries and bottom-up

ecological dynamics[26] as the great whales were no longer feeding on plankton to the same extent, removing food limitations for other species (Essington 2006; Kareiva et al. 2006).

Social legacies of this era include expanded patterns of trade for Iñupiat and other whalers working from shore-based whaling stations (Brower 1942; Bockstoce 1986) before the collapse of whale stocks. More ominous legacies include the starvation of St. Lawrence Islanders and social structures in St. Lawrence communities due to the overharvest of walrus by whalers (Mudar and Speaker 2003), a population collapse of Aleut peoples in the Aleutians (Black 2004) and widespread foreign diseases to which Alaska Natives had no immunity and few remedies (Fortuine 1989). Communities battered by war, disease and famine were in many cases forced to relocate or otherwise re-organized through missionary expansion and the development of territorial health and education systems. Despite all of this unimaginable change, many communities continued recognizable indigenous patterns of subsistence production, sharing and trade. That is not to say that the social-ecological system dynamics prior to colonization remained unchanged, but that even through ecological and social collapse, the memory of the system in many parts of Alaska was strong enough in individuals, families, in communities, their languages and practices that the subsistence lifeworld continued despite these shocks to the system.

Management of marine mammals in the Territory of Alaska

In 1902, Congress passed the Alaska Game Law, assigning protection of Alaskan mammals to the U.S. Bureau of Biological Survey (later merged with the U.S. Bureau of Fisheries to become the U.S. Fish and Wildlife Service). An exemption allowed Alaska Natives to hunt game animals and birds for fur and clothing, but restricted them from shipping or selling any part other than the hides. The law was amended in 1903 to clarify that parts and skins of animals killed for meat cannot later be sold for commerce. Captain C.R.E. Radclyffe, an English big game sportsman writing at the time, condemned what he considered to be widespread killing of brown bears and other big game for the skin trade by Alaska Natives acting under the exemption (Radclyffe 1904: 29). This tension between regulated "sportsmen" and seemingly unregulated subsistence take would

[26] In studies of marine trophic systems, both food limitation (bottom-up drivers) and levels of predation (top-down drivers) limit population growth of secondary consumers like whales and seals; one or the other drivers may be dominant in any ecosystem for a variety of reasons (see Essington 2006).

remain a fault line in Alaskan wildlife politics through to the present time. To its credit, Congress recognized on the one hand, the importance of food security in Alaska for Alaska Natives and others living out in the country, and on the other hand, its low likelihood of enforcing stronger restrictions. The game law passed by Congress in 1908 reaffirmed the exemption.

Federal control of resources

As the Alaskan territory grew in (non-Native) population, Congress authorized more homerule functions. In 1912, the second Organic Act created a new civil government for Alaska, but left federal control of resources intact. Fishing and mining interests (i.e., the Alaska Lobby) succeeded in putting in a clause that expressly forbade the legislature, "*...to alter, amend, modify and repeal measures relating to fish and game*" (Naske and Slotnick 1987: 95). In *de facto* fashion, most fish and game rules profited commercial interests entrenched in Alaska, especially the Seattle-based fisheries industry. Budding statehood advocates had reason to believe that federal agencies were biased towards these large industrial partners. Naske and Slotnick (1987) note that when the Bureau of Fisheries (pre-cursor to the National Marine Fisheries Service) established a Pacific branch in Seattle, it conveniently located its offices in a building where twenty of the major salmon companies were located. At the time, both the Bureau and its parent Department of Commerce resisted any suggestions that Alaskans be given any role in the management of salmon.

In 1925, Congress passed another game law for Alaska. It created the Alaska Game Commission to establish hunting seasons, register guides, and set limits on the number of animals that can be killed. Natives who had not "adopted a civilized mode of living" did not need a hunting license. They were allowed to take game during closed seasons when "in absolute need of food and other food is not available."

Subsistence whaling defined

Around the globe, but very much of local concern, the first Convention for the Regulation of Whaling[27], signed in Geneva in 1931 and entered into force in 1935, exempted "aborigines" from the restrictions of the treaty, provided that they used non-industrial technology to capture

[27] Convention for the Regulation of Whaling 1931, 49 Stat. 3079; T.S. 880.

whales and did not sell whale parts to third persons. The text borrows content and reflects the intent from the 1911 fur seal treaty. Article three of the convention states:

> *The present Convention does not apply to aborigines dwelling on the coasts of the territories of the High Contracting Parties provided that:*
>
> *(1) They only use canoes, pirogues or other exclusively native craft propelled by oars or sails;*
>
> *(2) They do not carry firearms;*
>
> *(3) They are not in the employment of persons other than aborigines;*
>
> *(4) They are not under contract to deliver the products of their whaling to any third person.*

Here the international community is defining subsistence whaling as that which fixes aboriginal technology to pre-industrial time periods and separates the cash economy from the subsistence economy. Both of these ideas continue to provide an undercurrent to Alaskan resource politics. The revised International Convention for the Regulation of Whaling[28] in 1946 only mentions aboriginal fisheries in exempting them from a moratorium on harvesting grey or right whales. The exemption was later deleted, subjecting local whaling patterns to global regulation.

Ecological and social legacies of the American colonial era

Ecological legacies of this era include population declines of fur seals, sea otters, whales and walrus. Both the Russian and later the American government began to design rules relating to conservation of the species, although most early rules existed to promote the exclusivity and profitability of the fur sealing enterprise. Novel Russian and Unangan policies such as area closures and protection of females were adopted by the new American government, which gradually developed a successful fur seal fishery. Settlements begun by Russian colonists endured, including St. George and St. Paul. The paternalistic government overseers and corporate foundations for the towns also endured until "abandonment" of the Pribilof Aleuts by the U.S. government in the 1970s (Jones 1980) once the demand for furs in Europe had declined and a

[28] International Convention for the Regulation of Whaling with Schedule of Whaling Regulations 1946, 62 Stat. 1716; T.I.A.S. 1849.

burgeoning environmental movement in Europe and the contiguous United States gained momentum.

Social legacies of this era include sweeping social change through epidemics, slavery, the expansion and transfer of empire, and significant change in many communities in human-environmental relations through subsistence species declines from commercial overharvest. Such traumatic changes must have undermined generations-old cultural traditions that arguably supported sustainable ecological practices prior to colonization. In the Iñupiaq community of Wales, for instance, after the Spanish flu of 1918 decimated one-third of the prosperous town, visiting priests assembled surviving men and women and forcibly married them to new spouses in order to create families for the surviving children who had lost parents (Griest undated). Many of the town's most prominent whalers died in the epidemic, which would have also affected the social organization of the town due to the influence whalers have in the social life of a whaling village, and as the providers of the largest source of food for the village. The town which once numbered near 600 (Griest undated) is now home to 136 people (ACDCIS 2009).

Alaska Natives also experienced subtle changes that nevertheless had important impacts on the way people lived their lives. Women in many communities were actively involved in the trade of fish and game prior to and with Russian colonies (Frink 2007). Frink (2007) argues that mercantile influences on the way subsistence foods were stored, processed and distributed the Yukon-Kuskokwim delta drove changes in the way men and women participated in trade, with women gaining status from trade in game under the Russians but losing it with the American colonial focus on the fur trade[29].

The colonial era stretches through an increasingly internationalized resource management regime. From early trade taxes to the declaration of Russian sovereignty over Alaska to the Alaska purchase, interactions between colonial powers drove three major changes in coastal Alaskan communities: tragic loss of thousands of Alaska Natives including whole communities through murder, war, disease and deprivation; depletion of fur seals, otters, whales and walrus; and an imposed system of human-environmental relations built on commercial trade. In order to

[29] Frink (2007) argues that a change in the site of food storage, from beneath the house in the early colonial era to outside the house in the late colonial era illustrates the wane in women's influence over the production of subsistence foods. Animal processing for fur sales in Yukon-Kuskokwim Delta region required less expertise from women, whereas animal processing for trade in meat was the province of women.

rationally harvest fur seals, the Russian American Company (RAC) eventually adopted several policies: it was granted a monopoly over the American fur trade, successfully bounding the system from other would-be traders for a time; on the advice of Unangan hunters, the RAC adopted conservation measures such as the protection of females; and the RAC structured its purchases to reward certain age-classes of fur seal pelts. Several of these beginning conservation measures were adopted by the incoming Americans, who largely ran the commercial enterprise the same way.

Many of the social impacts of the system are still in evidence in the Pribilof Islands as St. Paul and St. George were essentially company towns, built around the fur seal rookeries. The story of pelagic whaling is largely one of uncontrolled harvest until depletion in the North Pacific. Neither Russia nor America would significantly intervene in the harvests until the early 20th century. These legacies of colonial administration and the removal of large quantities of animals from the waters surrounding Alaska remain in the system, from genetic bottlenecks in the bowhead whale population to a re-ordering of the Unangan-fur seal relationship in modern times and the continuity of Yankee whaling equipment in the modern Alaska Native bowhead whale fishery.

Advent of Alaskan statehood: 1958 - 1972

The American colonial period saw a small but growing population of non-Native people (many associated with mining, fishing, and the military) establishing towns and building a system of governance for Alaska, largely without Native influence. The coastal populations and visitors began to compete directly for marine mammals as sources of material for commerce, food and sport around the state. Prior to Alaskan statehood, marine mammals were treated in American law much like terrestrial animals, with the nature of regulations designed depending on their perceived utility and threat from overharvesting. Under the International Convention for the Regulation of Whaling, and the Fur Seal and Sea Otter Treaty, the use of marine mammals was increasingly governed at the international level. The Territory of Alaska, and later the State, shared authority with Washington D.C. for day-to-day management of most marine mammal species.

Under Alaska's second Organic Act of 1912, federal wildlife managers managed wildlife assisted by the Alaska Game Commission, an advisory board. With the passage of the Alaska

Statehood Act in 1960, the federal government prepared to transfer its powers of wildlife management to the state except for fur seals and sea otters, which remained federally managed[30]. The transfer of power at the time was standard for federal-state relationships, as states are considered the "owners" of wildlife (not covered through existing treaties) through the State Ownership Doctrine established by the 1896 *Geer v. Connecticut* Supreme Court decision[31] (Bean and Rowland 1997). However, the Territorial Governor at the time, Hugh Wade, reported to Washington, D.C. that no provisions for Alaska Native use of fish and game had been protected in the new State's wildlife management statute and the transfer became contingent upon the State developing protections for subsistence use of resources (Norris 2002).

The development of Alaskan bureaucracies

By 1960, Alaska passed a revised statute (Title 16) in which subsistence harvests were regulated in a way similar to sport fisheries in that hunters were expected to become licensed and follow state-administered rules; additionally, all residents could participate in subsistence fishing as long as they used allowable technology. No distinction between subsistence and sport game hunting was recognized. Although the State promised to expand citizen collaboration in wildlife management through regional advisory councils, most of the active councils were located in urban, largely non-Native population centers, reducing any influence rural residents might have had (Norris 2002). In the 1950s, there were few Alaska Native organizations involved in formal systems of wildlife management, with the potential exception of the Alaska Indian Brotherhood in the Southeast region and the Tanana Chiefs Conference in the Interior, both formed in 1912 (Norris 2002) but neither were actively involved in the development of a state regime.

At the same time, most Alaska Native communities were using local institutions and other forms of governance with respect to wildlife, save for the occasional visit by a federal game warden. One priority of the incoming wildlife regime, former state officials say, was to create legal seasons to reflect local practices so that people would be law-abiding. Oliver "Bud" Burris,

[30] These two species were subject to existing international management schemes, although the federal government did allow for revenue sharing from both resources through Section 6 of the Alaska Statehood Act.
[31] 161 U.S. 519 (1896).

a former manager with the Alaska Department of Fish & Game notes:

> *One of my first assignments in the winter of 1961-1962 was traveling the Yukon, Kobuk and Noatak rivers to find out what people were doing as far as game was concerned...What we found out was people were necessarily hunting out of season. The federal seasons were so restrictive they couldn't get the meat they needed...We began a process of liberalizing seasons on moose to fit what the local people needed and what the population could sustain...*(Mowry 2009).

Moose and caribou were largely managed to promote food security for all Alaskans through promoting harvests in abundant populations and restricting harvests in depressed ones based on the philosophy of game management. Many marine mammals, however, were to be managed by the state for sport-hunting or other uses, which created some worry in rural communities that subsistence would not be considered a priority for the new state. After all, the new State constitution described Alaska's vast resources as commons, meant to be shared by all and regulated by the State. Social movements among Alaska Native villages and leaders were mobilized in response to the growth of resource development and increasingly bureaucratized systems of wildlife management that eventually clashed with subsistence resource use patterns. The 1961 arrest of State Representative John Nusunginya for hunting ducks out of season lead to the renowned Barrow Duck-In of 1961, as hundreds of Barrow residents demanded to be arrested in solidarity with their ducks in hand, protesting the enforcement of the Migratory Bird Treaty (Langdon 1984; Huntington 1992; Sepez-Aradanas 2002; Burwell 2005).

Land transfers and social movements

Statehood brought a boost to resource development, including state lands transfers and oil development. Under provisions of the Statehood Act, the new State of Alaska applied to the Bureau of Land Management for transfer of title to lands and began a leasing program for oil and gas development (Rogers 1969). In response, by mid 1966, Alaska Native regional associations had claimed title to two hundred ninety million acres of land and financial compensation through the Bureau of Indian Affairs for lands already transferred to the Alaskan state (Rogers 1969). Eventually, the Secretary of the Interior[32] announced that lands selections would be frozen until

[32] Both Bureaus of Land Management and Indian Affairs are located within the Department of the Interior and have had overlapping jurisdiction for land transfers.

resolution of Alaska Native aboriginal land claims (Rogers 1969), giving some time for political organizing. Regional organizations developed from the North Slope to Southeast and eventually came together to form the Alaska Federation of Natives in 1966 (Rogers 1969).

The ecological status of marine mammal populations

Prior to the 1972 Marine Mammal Protection Act, marine mammals in Alaskan waters were managed in disparate programs based on either international treaties (fur seals, sea otters, and whales) or consumptive-use management goals such as sport hunting (polar bear and walrus) and predator-control programs (whiskered seals and belugas). In gaining control over wildlife management, the new Alaska Department of Fish & Game set about researching the status and uses of the State's wildlife. By the late 1950s, all of the great whales were depleted from Alaskan waters due to Russian, European, and American whaling (Springer et al. 2006), and the walrus population remained depressed from the devastating exploitation of the colonial era (Fay 1957). Fur seals in the Pribilofs, however, had largely recovered by the early 1950s but as the population appeared to be near carrying capacity the government initiated a controversial program[33] to cull females in 1953 (Scheffer et al. 1984).

After World War II, polar bears became a prominent trophy game animal on the Alaskan coasts; prior to statehood, harvests by sport hunters were tracked to greater or lesser extent through the export of skins (Lentfer 1970). The State of Alaska classified polar bears as "big game" in its 1960 game laws, which limited hunting through bag limits. By 1961 hunters were required to present the skins to the State for monitoring harvests (BSFW and Alaska 1965). Early on, Alaska Native guides had been successful guides for sport-hunters but their businesses suffered under the growth of aerial bear hunting, which was faster and more efficient but largely populated by non-Native guides. In addition, subsistence hunters were prohibited from using aircraft to hunt bears. The state did still allow a trade in skins, however.

By 1965, aerial hunting of polar bears was thought to have seriously affected populations around the Arctic and the International Union for the Conservation of Nature (IUCN) convened a meeting of polar bear experts in Fairbanks, Alaska to discuss developing a pan-Arctic polar bear conservation strategy. Alaskan bear biologists had relied on bear sightings by pilots in their assessment of the robustness of populations in remote regions such as the Chukchi Sea coast, but

[33] Unangan sealers and some naturalists protested this program, as they felt it would be disastrous to the herd (Torrey 1978).

the increasing likelihood of a shut-down of the sport hunt affected the working relationship of biologists and guides and the state began to doubt the validity of the positive population data from the pilots (Lentfer 1972). Russia had earlier declared their Chukchi polar bear population (shared with Alaska) depleted and had banned hunting in 1954, although Alaskan biologists disputed the evidence of declines or the ability of the international community to manage polar bears more successfully (Lentfer 1970). By 1970, the American representative to the IUCN group reported that restrictions in harvest would likely be necessary to counter increased aerial hunting (Lentfer 1970). In 1973, the parties agreed[34] to an end to commercial hunting, protection of polar bear habitat, and scientific studies through a multilateral treaty[35] (Fikkan et al. 1993; Baur 1995).

Federal pre-emption and institutional legacies

The State of Alaska held management authority for marine mammals from 1960 until 1972, when authority for management was pre-empted by the federal Marine Mammal Protection Act and management functions subsumed by the U.S. Fish &Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS). The early statehood era was a brief period for marine mammal management, in which the state began to build its competence in wildlife management and a regulatory system. The introduction of this wildlife management regime was premised on the idea that a small department of biologists and enforcement officers could achieve the following: effectively survey remote animal populations to assess trends in population dynamics, effectively manage human interactions across the same vast spaces, and do so in a collaborative fashion with equal consideration for subsistence and sport interests[36]. Certain marine mammals (e.g., walrus, polar bears, Steller sea lions) had been managed as game animals since colonial times for visiting sport hunters who would report their catch to Territorial officials as they attempted to export it (Radclyffe 1904). Marine mammals, to the extent they were not already managed by the federal government, were included in the new state wildlife management system

[34] Agreement on the Conservation of Polar Bears, TIAS No. 8409, 27 UST 3918 (November 15, 1973)[hereinafter Polar Bear Agreement].

[35] Interestingly, the United States has been out of compliance to the Agreement since 1972, as it never set aside comparable amounts of habitat in accordance to Article II (Baur 1995). In 2005, the United States representative to the Polar Bear Specialist's Group (PBSG) suggested that the United States was interested in re-opening the treaty in order to delete habitat provisions, rather than conform to its obligations (Aars et al. 2006). After listing polar bears as a threatened species under the Endangered Species Act in February 2008, however, the U.S. Fish & Wildlife Service eventually agreed to designate critical habitat protections in exchange for settling a lawsuit with environmental groups.

[36] The State continues to struggle with the second two of these tasks in relationship to wildlife they manage.

based on utility with the management goal of maximum sustained yield. A key legacy of this era was the refusal on the part of the state to distinguish between subsistence and sports hunters in the management of wildlife other than fisheries. Another legacy important to the history of marine mammal management was the mobilization of Alaska Native organizations defending their aboriginal rights to lands and resources and demanding an official role in governing Alaska resource management.

Period of multiple sovereigns: 1972 - present

The decades of the 1960s and 1970s were a period of environmental awakening in the United States. Many of the Nation's key environmental policies including the National Environmental Policy Act (1970), the Endangered Species Act (1973) and the Marine Mammal Protection Act (1972) were passed into law during this time. The Marine Mammal Protection Act (MMPA) was the culmination of a campaign lead by many voices within conservation, scientific and commercial circles who believed in a unified approach to marine mammal conservation. Bean and Rowland describe three different advocacy coalitions involved in the MMPA: a sustainable use group made up of commercial interests, some scientists and conservationists in the Gifford Pinchot tradition; ecologically-minded scientists and conservationists interested in marine mammals' role in marine ecosystems; and animal welfare-oriented preservationists arguing for protection based on individual animal rights and the superior intellect of marine mammals (1997: 110). The diversity of opinions resulted in a compromise bill that Bean and Rowland describe as, "*...neither purely protectionist nor purely exploitive but almost always complex*" (1997: 111). One artifact of the compromises made was the maintenance of split jurisdiction over marine mammal management between two separate federal bureaucracies (Bean and Rowland 1997). The Department of Interior's U.S. Fish & Wildlife Service (USFWS) oversees resource management relating to the take of polar bears, walrus, sea otters and manatees. The Department of Commerce's National Marine Fisheries Service (NMFS) manages a similar program for whales and seals (excepting walrus). Both programs involve management functions such as research, enforcement, incidental take by fisheries and harassment by other industries, and regulating subsistence hunting of "depleted" species by Alaska Natives. Wherever the range of USFWS and NMFS managed species overlap, communities harvesting marine mammals are also subject to two different approaches to management led by each agency.

The burgeoning environmental movement in the 1960s and 1970s overlapped with another movement towards tribal sovereignty and recognition of aboriginal rights across Indian Country[37]. New Alaska Native Organizations mobilized to stop indiscriminate land transfers to the State without a land claim agreement and prior to expanded oil and gas development, that had already displaced people, cabins, and gravesites. Their extraordinary efforts combined with oil and gas company pressures to clear title to land culminated in the Alaska Native Claims Settlement Act of 1971[38] (Mitchell 2001; Hensley 2008), which exchanged aboriginal lands and hunting rights for the surface rights of up to forty-four million acres of land, the establishment of regional corporations to manage lands, and a cash settlement. Human access to terrestrial wildlife populations was to be managed by the State; however, Congress intended that subsistence uses for Alaska Natives would be a priority in times of shortage[39]. Marine mammals were not yet considered a special category of wildlife for management purposes. Fur seal harvests and research was governed under the Fur Seal Treaty Act, polar bears were managed as large game by the State, and whiskered seals were managed as pests.

The politics of defining subsistence in the MMPA

Growing national environmental consciousness and conservation movements propelled the Congress to develop a categorical way of managing human interactions with marine mammals. Congress debated two major bills that informed the final Marine Mammal Protection Act of 1972. Rhetorical flourishes in the accompanying Congressional report give some insight into the political considerations and value orientations of both the House and Senate committees (and personalities on the committees) hearing the bills at the time. The Congressional report on House bill (H.R. 10420) begins a section on legislative background this way:

> *Recent history indicates that man's impact upon marine mammals has ranged from what might be termed malign neglect to virtual genocide. These animals...have only rarely benefitted from our interest: they have been shot, blown up, clubbed to death, run down by boats, poisoned, and exposed to a*

[37] "Indian Country" is a commonly used name to describe lands owned by indigenous peoples in the United States, but also indigenous communities generally.
[38] The Alaska Native Claims Settlement Act, 1971, 43 U.S.C.A. §§ 1601 et seq.
[39] In 1980, Congress passed provisions protecting subsistence under Title VIII of the Alaska National Interest Lands Conservation Act. Urban hunters challenged this requirement as unconstitutional under the Alaskan constitution and won in the Alaska Supreme Court. Since 1991 dual management systems exist across the state for state and federal lands.

> *multitude of other indignities, all in the interests of profit or recreation* (U.S. House 1971: 11-12).

The same section in the 1972 Senate bill describes the policy problem this way:

> *The committee has learned that man's dealings with marine mammals have in many areas resulted in over-utilization of this precious natural resource* (U.S. Senate 1972: 1-2).

In both bills, Senator Ted Stevens was able to ensure an Alaska Native exemption from the Marine Mammal Protection Act's moratorium on take, provided that populations were not depleted. When the Congressional bill H.R. 10420 and accompanying report was released from committee for a vote on the floors of the House and Senate, Alaska Natives and the Alaska Congressional delegation were alarmed at the bill's moratorium on the production of crafts and foodstuffs for sale from marine mammals (Morgan 1972).

Senator Ted Stevens, through his friend, Commerce Committee Chairman Senator Magnuson, was able to secure a Congressional field hearing in Nome during the month of May 1972 where hunters, producers and their families flocked to give testimony on the bill (Morgan 1972). Several remarked that the bill's key supporters knew little, if anything, about the Alaska subsistence life. A reporter from the Washington Post noted that those testifying struggled to find analogies of the importance of subsistence that Americans from the rest of the country might relate to:

> *"It's like telling a coal miner you can only dig enough to heat your house but you can't sell any," one said. "Learning to hunt and carve are equivalent to a Masters in college," maintained Paul Tuilana, a walrus hunter with 35 years experience from King Island. "Now this bill has taken away my diploma." The status of hunters is like that of football players. In many villages the young people look up to them and sometimes they are village leaders, reported Jerome Trigg, president of the Bering Strait Native Association* (Morgan 1972).

The next year's Senate version of the bill (S. 2871) included a provision allowing for handicraft production as long as it was "authentic" and not highly commercialized. Food derived from marine mammal subsistence hunting could continue to be sold, as long as it were either sold in a

native village or town or sold for consumption by Alaska Natives residing elsewhere. The Conference Committee to create a compromise bill adopted the Senate language. The Committee also adopted the Senate bill's allowance for subsistence take of endangered species, provided it was overseen by the Secretary of Interior or Commerce (U.S. House 1972).

The main goals of the MMPA are to "maintain the health and stability of the marine ecosystem," and, wherever consistent with this first goal, sustain optimum populations of marine mammals within the carrying capacity of their environment (§ 2(6)). These goals were to be met through a general moratorium on the taking of marine mammals subject to limited exceptions, and the protection of important habitat features. The focus on ecosystem functioning and a recognition of animal populations as important units to be conserved within a species were unique contributions to wildlife law[40]. Although the law preempted state laws relating to marine mammals, the MMPA (Section 109) allows for a process by which a state may apply to regain management authority through a waiver of the moratorium, and the State of Alaska prepared itself to apply for management authority over nine species of marine mammals in 1973. Under the proposed Alaskan management scheme, non-depleted marine mammal species would potentially be available for hunting by all, regardless of their prior rights or historical dependence for subsistence. The management paradigm was also distinctly different than the Congressional intent, based on a maximum sustained yield approach instead of the more progressive focus on ecosystems. The State went even further, though, to promise to manage for abundance of game animals and intensive predator (e.g., whiskered seals, belugas) control in order to maintain high populations of valued animals, while eliminating perceived competition from officially unvalued ones.

The State of Alaska bids to manage marine mammals

In 1976, after a review of the application and a series of field hearings, a federal administrative judge ruled that the Secretaries of Commerce and Interior should transfer authority for marine mammals to the state (Interagency Task Group 1978). This conclusion was also supported by submitted comment letters from the University of Alaska, the Alaska Professional Hunters Association, Inc., the Safari Club; and, curiously, the National Wildlife Federation as

[40] Unfortunately, as the years have gone by, neither agency has been able to manage on an ecosystem basis, partially due to statutory requirements for a minimum amount of information about "strategic" stocks – depleted populations or those likely to be subject to fisheries bycatch (Robards 2008).

well as the Wildlife Society. Both the National Wildlife Federation and The Wildlife Society testified that since population levels of the nine species appeared to be stable, and given that "...*Congress never intended that the moratorium on the taking of marine mammals be invoked any longer than necessary to insure the adequate safeguarding of each species*..." (Interagency Task Group 1978: Section IX), the organizations supported the transfer of management authority.

Value orientations of policy actors

The Environmental Defense Fund and Monitor, Inc. submitted a joint letter opposing the transfer based on an inadequate review of the environmental consequences of the transfer, and a questioning of its data and conclusions. Among other points, they argued that the MMPA does not allow a management focus on maximum sustained yield, and that the Draft Environmental Impact Statement did not review other kinds of take of marine mammals in Alaska, such as harassment by industry and animals that are taken but not retrieved (i.e., struck and lost). The Society for Animal Protective Legislation argued against the use of firearms, and killing of animals generally for commercial or sport-related uses. In an attached letter to NMFS, the Society argued that prior to the Act's passage, the State of Alaska had opposed it, and sought to have itself exempted from the Act entirely through a proposal that was defeated on the floor of the Senate. The Society also argued that the transfer would essentially allow Alaska to manage marine mammals in the same way as before the Act was passed with a set of policy goals opposed to the substance of the Act – the protection of all marine mammals. For instance, the Society noted that many individuals came forward in Kodiak for hearings on the MMPA who were claiming an economic hardship exemption from the Act. Among them were non-Native hunters whose sole livelihoods were based on marine mammal products, fishermen taking sea lions, and a full-time IRS agent who hunted marine mammals in his spare time. Alaska's proposed regulations would have created a legal avenue for the fishermen and IRS agent to continue their current practices, which the Society was opposed to[41].

[41] In its argument against entrusting Alaska with the management of marine mammals, the Society quotes Mr. Vania, the Director of the Alaska Department of Fish & Game, who credited predator control policies for conserving valued resources, saying, "...otherwise we'd be overrun with killer whales or mice or what have you" (Interagency Task Group 1978: Section IX).

Alaska Native organizations protest the transfer

Newly energized Alaska Native organizations also testified against state management of marine mammals. Perhaps in preparation for being accused of not protecting subsistence rights in its proposal, the drafters of the assessment wrote:

> *Native subsistence dependency has decreased since the white man began to colonize Alaska. The granting of 40 million acres in fee title land and nearly $1 billion to the Natives under provisions of the Alaska Native Claims Settlement Act (ANCSA) should accelerate this trend. It has been said that ANCSA will have as great an impact upon the Alaska Native's traditional way of life as did their early encounter with white man's culture* (Interagency Task Group 1978: Section IX).

The Bering Straits Native Corporation (BSNC) writing from Nome took offense to the characterization, writing:

> *The impact of ANCSA on village life style has been very little...The following are the individual resident stockholder share from the ANCSA distribution checks: 1973- $182.00, 1974 - 92.23, 1975-78.41. We don't foresee any major change in the lifestyle and subsistence dependence of the Alaskan Native Village Residents on marine mammals in the near future* (Interagency Task Group 1978: Section IX).

The Corporation summed up its opposition to the proposal this way:

> *We strongly oppose the proposed state regulations as currently written...as they are too restrictive; they do not make special reference to taking of seals for food...We realize that the moratorium and game management is primarily designed for the conservation of marine mammals and for balanced ecosystem* [sic]. *We do, however, feel strongly that the Alaska Native Needs* [sic] *were not emphasized enough, particularly in the proposed federal regulations and the state regulations. If all taking was terminated on any species of seals or walrus, the effect would be to bring to point of starvation to these small Alaskan Native Villages that depend primarily on sea mammals for food. We ask that other forms of taking of marine mammals be terminated first before you force the Alaska*

> *Natives to the point of breaking the law* (Interagency Task Group 1978: Section IX).

Nunam Kitlutsisti, the environmental advisor to the Association of Village Council Presidents in the lower Yukon-Kuskokwim region of Alaska, provided data on the amount of subsistence food harvested per village per year based on household calendars to track consumption patterns. They estimated that the region consumed 12.8 million pounds of wild foods in 1974.

> Nunam Kitlutsisti also cites two core reasons why it opposes state management:
>
> *...that the State has failed to meet its obligation to manage its resources in regard to beneficial users, and has failed to adequately provide the funds for support of subsistence communities dependent upon renewable resources; and...the State of Alaska has little regard for the future consequences of massive Federal development plans in the Bering Sea that will make all assumptions concerning existing ecological conditions in the Bering Sea null...* (Interagency Task Group 1978: Section IX).

Both the Bering Straits Native Corporation and Nunam Kitlutsisti emphasize fears that the State would manage primarily for sport hunts, neglect research in predominantly rural areas, and place primary value on resource development over marine mammals. Consistent with the Alaska constitution and wildlife management policy at the time, Alaska proposed a management regime with equal access to subsistence species by all residents. In creating its management regime, the state did not provide an exemption for Alaska Native subsistence as required by MMPA Section 101(b), which a US District Court subsequently ruled unlawful given the Federal Government's unique, trust relationship to Alaska Natives (*People of Togiak v. United States*). Following the *People of Togiak* ruling, the Federal Government amended the MMPA to design a process states would have to go through in order to return authority over marine mammals. Alaska would have to abide by the *People of Togiak* ruling and by 1980, the newly passed Alaska National Interest Lands Conservation Act Title VIII[42] protection for rural subsistence.

Again, in 1982, the state of Alaska considered submitting an application for resuming management over 10 species it had previously managed. This effort eventually led to a revised

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[42] Act of December 2, 1980, Pub. L. No. 96-487, Title VIII, 94 Stat. 2371, 2422, 16 U.S.C.A. §§ 3111 et seq.

plan by 1986, this time targeting only those species with commercial value –walrus, polar bear, and sea otters. The Alaska Department of Fish & Game (ADFG) held public hearings in over 40 villages from 1984 to 1985, and finding widespread resistance to the proposal, eventually abandoned its pursuit (Langdon 1984). Mistrust of State priorities and practices was widely felt across rural Alaska and in Alaska Native political centers. This feeling was not unanimous, however, as groups such as the Eskimo Walrus Commission had worked extensively with the State in coming up with potential management plans and declined to take a position on the transfer (Langdon 1984).

Regulation of marine mammals in Alaska has followed a similar trajectory to other wildlife management politics in that federal and state agencies have held differing positions on and reception to protection of rural subsistence uses as the highest management priority, largely prohibiting a unified regime for the state's wildlife on federal and state lands. Alaska has long maintained, and its Supreme Court upheld in the 1989 *McDowell v. State of Alaska*[43] decision, that it cannot discriminate against urban residents in its prioritization of subsistence hunting due to its equal protection clause in the state constitution (Article 1 § 1). In comparison, under federal rules for subsistence hunting on federal lands, rural residents with a "customary and traditional use" of a specified resource have the first priority for hunting in the event of scarcity.

Federal management and Alaska Natives

Life for Alaska Native communities under federal management has also had its challenges. Tensions between Alaska Native hunters and the federal agencies grew throughout the post-MMPA[44] period as decisions by federal powers negatively impacted subsistence hunters throughout rural Alaska. The first such decision was made by the federal government in its role as delegate to the International Whaling Commission (IWC) in 1977. After submitting harvest records to the IWC in 1976 that indicated a significant number of whales struck and lost in Alaska during the whaling season, the IWC voted to enact a complete moratorium on bowhead whaling at its 1977 meeting (Dept. of Commerce 1977). The U.S. government did not challenge the decision. Despite prior warnings to the U.S. delegation on the potential adverse impact to Alaska Native whaling communities (Dept. of Commerce 1977), the U.S. delegation did not

[43] 785 P.2d 1 (Alaska 1989).
[44] In the case of bowhead whales, listed as endangered under the Endangered Species Act (ESA), the whales and industrial impacts to them are managed under both the ESA and the MMPA.

inform Alaskan whalers of the international movement towards a ban. The movement was burgeoned by an anti-whaling and sealing environment movement growing in Europe and the U.S.; IWC delegates undertook a precautionary stance on the hunt, given a lack of data indicating a sustainable population level (Freeman 1989).

Whalers politically mobilized in Alaska to fight the ban and uphold their aboriginal rights, forming the Alaska Eskimo Whaling Commission in 1977. Whalers pursued their claim in the courts on the basis that the IWC lacked jurisdiction over aboriginal whaling and the U.S. government did not honor its trust relationship to Alaska Natives. The whalers even visited with Vice President Mondale (Langdon 1984). Whalers reacted to the moratorium by imposing their own quota system while initiating negotiations with NMFS and Alaska's Congressional delegation. They were assisted in their efforts by a new, politically well-informed group of young Iñupiaq leaders including Marie Adams and the AEWC Chairman Eugene Brower and as well as a sympathetic environmental group, Friends of the Earth (Huntington 1989). In response to the whalers' intention to resume whaling under their own quota system, the federal administration convened a grand jury and subpoenaed five prominent whalers, charging Mr. Brower and an AEWC staff member with contempt when the whalers refused to testify (Langdon, 1984).

Resource conflicts and the rise of co-management

With whalers and their wives declaring their intentions to go to jail rather than follow what they considered to be an unreasonable federal quota for whales, the federal government eventually invited AEWC officers to Washington D.C. to discuss a cooperative agreement to regulate whaling and the grand jury investigation was dropped[45]. The 1977 IWC action was the first attempt to regulate the Alaska Iñupiaq and Yup'ik whale harvest, and as the United States did not object to the rule change, the IWC has been involved in monitoring and prescribing catch figures for subsistence bowhead whaling in Alaska ever since. While the co-management agreement is considered to be successful in regulating harvests, the particular politics of the International Whaling Commission require the whalers to mount a defense of their management program, subsistence rights and lifeworld every time the multi-year quota comes up for renewal.

[45] Detailed analyses of the crisis and the eventual agreement between the AEWC and NMFS to co-manage whaling is documented by Huntington (1989), Freeman (1989) and Langdon (1984).

A second crisis and subsequent mobilization emerged in the 1980s surrounding new rules proposed by the USFWS to restrict the nature of "traditional handicrafts" allowed as a subsistence activity under the MMPA. The USFWS undertook two high profile enforcement actions: in 1974 the Service seized clothing made by Marina Katelnikoff, an Aleut sea otter skin sewer; in 1991, the FWS prosecuted the "Teddy Bear Case" against Boyd Didrickson, a Sitka-based Tlingit man making teddy bear toys out of sea otter furs. The Service charged Didrickson with violating rules regulating what the service considered "traditional" handicrafts (*Didrickson v. Dept. of the Interior*)[46]. The District Court ruled that the FWS did not have the authority under the MMPA to regulate the harvest of sea otters for handicraft production absent a finding of depletion of the stock and found the Service's definition of "traditional" to be arbitrarily set between 1910 and 1972. Consequently, in the late 1990s and early 2000s, the Service and co-management groups such as The Alaskan Sea Otter and Steller Sea Lion Commission and the Eskimo Walrus Commission have worked to develop guidelines for handicraft production that would not be arbitrary. These efforts have produced mixed results (Robards and Joly 2007-2008).

There were also positive motions towards home-rule in other parts of the state. In the Arctic, policy entrepreneurs such as Ben Nageak, Marie Adams Carroll, Kathy Frost, and Lloyd Lowry brokered co-management relationships with Inuvialuit (Canadian) hunters in the late 1980s to develop interlocal management arrangements such as the Inuvialuit – Iñupiaq Agreement on Beluga Whales and Polar Bears (Adams et al. 1993; Brower et al. 2002; Lovecraft 2007). In general, this period saw a movement towards more contextualized management, with significant local and Alaska Native involvement in state management systems.

Co-management is enshrined in the MMPA

The Marine Mammal Protection Act requires re-authorization every five years, but has not made it to the floor of the House or Senate since 1994. That year rumors were circulating in Alaska that some of the environmental groups opposed to marine mammal hunting would seek to delete the Section 101(b) exemption for Alaska Natives (Anonymous 2006a). The exemption is important because it enshrined in law the unique relationship between coastal Alaska Natives and marine mammals and aimed to provide unobtrusive management frameworks by only allowing the development of hard policies such as quotas if species were found to be depleted. In practice,

[46] 982 F.2d 1332 (9th Cir. 1992).

the exemption has been a mixed blessing. Because the agencies have not been able to manage before populations are found to be depleted, the harvests of some species (e.g., Cook Inlet beluga) were not actively managed until the population began to crash. Governments such as the Sitka Tribe have encouraged voluntary management plans in order to reduce the harvest of harbor seals bound for the sealskin market.

Sovereignty and co-management

Recognition of tribal authority for pre-emptive management at the village or co-management level has been actively opposed by the State of Alaska, fearing the recognition of Alaska Native sovereignty over resource uses and police powers. Alaska's predominantly non-native political leadership, including Senator Ted Stevens[47] and others, strongly opposed such recognition. This view is reflected in the writing of historian and lobbyist Donald Mitchell[48], who argued to Congress that tribes do not exist in Alaska and therefore cannot manage resources. In the run up to the 1994 amendments, a coalition of Alaska Native marine mammal advocates, the Indigenous Peoples' Council for Marine Mammals (IPCOMM), began working within the Alaska Native Federation for not only maintaining the exemption, but to increase the power of Alaska Native Organizations working with the federal agencies through the development of co-management arrangements.

In 1994, Congress amended the Marine Mammal Protection Act and directed the National Marine Fisheries Service and the US Fish & Wildlife Service to enter into co-management agreements with Alaska Native organizations (Section 119) in order to make government decision-making about marine mammal conservation and subsistence hunting more responsive to Alaska Native concerns. Although not a major agenda item, the Alaska Native community was able to gain Congressional support for this amendment, and change the structure of the relationships of agencies to community groups from one of uneasy conflict to one of collaboration. The boards to be established would be eligible for Congressional appropriations, directed to flow through NMFS and USFWS.

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[47] Senator Stevens reportedly supported a limited amendment of the MMPA that would have allowed federal agencies to adopt local tribal conservation ordinances which would then be enforceable. This amendment has not yet become law as the MMPA has not been reauthorized since 1994.

[48] Notably, Mitchell represented the Alaska Federation of Natives until a falling out with the organization.

Although some boards such as the Alaska Eskimo Whaling Commission predate the 1994 amendments, many others were able to form following the policy change without having to weather crises or other mobilizing events that often precipitate the formation of community groups. One demand many Alaska Natives had was for managers to acknowledge traditional ecological knowledge, defined as the body of collected knowledge held by an indigenous community and developed through long-term, intimate interaction between the people and their environment.

The growing recognition of indigenous rights

These demands followed an international movement towards indigenous rights, including the exercise of co-management institutions in Canada, homerule functions in Greenland, and similar developments elsewhere. In the United States, federal-aboriginal relationships gained positive boosts from the Clinton Administration through an executive order affirming the government-to-government relationship between federal agencies and tribes, acknowledgement of Alaskan villages as tribes, and a new program to evaluate federally permitted activities for their disproportionate adverse impact on minority or poor communities.

Funding for co-management and related activities grew throughout the 1990s, aided by Congressional earmarks and driven by new MMPA mandates for assessing subsistence harvests in 1994 (see chapter five). New co-management bodies developed at various spatial or social scales (e.g., a village or a statewide organization), and existing tribal bodies began to work with IPCOMM to further co-management. Many of the earlier IPCOMM leaders were also involved with broader international movements towards aboriginal rights to resources through organizations such as the Inuit Circumpolar Conference. Around the world, communities, organizations and government bodies such as the UN were debating recognition of aboriginal rights to resources.

In 1997, the responsive federal agencies executed a memorandum of agreement with IPCOMM, detailing the goals, methods, and means for negotiating Section 119 agreements with tribes or tribally authorized Alaska Native organizations (ANOs). The MOA outlines core management functions of the co-management agreements: 1) collecting and analyzing population data, 2) institution-building, 3) enforcement, 4) regulating harvests, 5) planning, 6) research, and 7) training (Dept. of Commerce et al. 1997). By the year 2000, after a tumultuous period

following the passage of the MMPA, marine mammal management in Alaska was in a relatively steady state. The post-MMPA period saw a shift in the locus of rule-making from the federal agencies to the state, and then back again to the agencies, before being challenged by growing policy venues developed by Alaska Native organizations, such as the Alaska Eskimo Whaling Commission and the Eskimo Walrus Commission.

As most species recovered from the colonial era, marine mammals management in Alaska focused on research and tracking the subsistence harvest together with Alaska Native organizations. The State, meanwhile, unable to actively manage marine mammals due to its endemic inability to recognize Alaska Native harvests as legally unique, began to specialize in research, collaborating with the agencies and communities. This decade has also witnessed new challenges such as the inability of some populations to recover (e.g., the Western Stock of Steller sea lions) and the negative impact of sea ice loss on walrus and polar bear populations largely recovered from earlier periods of intensive harvesting.

One recent challenge has been the development of stable funding streams for marine mammal co-management. The relationship between funding and co-management activities is complex. The ability of funding has catalyzed the development of some co-management groups, such as the Ice Seals Committee while drastic reductions in federal funding, such as occurred in 2006 and 2007 stalled most programs. Additionally, many co-management boards that were accustomed to seeking funding through Congressional earmarks have had to scale down as Congress changed hands to Democratic control in 2006. The lack of stable funding also challenges collective action.

Time periods as cases: marine mammal management dilemmas

History has a long arc in the story of marine mammal management in Alaska. Drivers of institutional development have included technological progress (e.g., the development of sea mammal hunting) and intense competition for resources in the Native Nations era, quests for sovereignty and high commercial yields in the Colonial era ending in nascent conservation institutions, "public use" and sovereignty in the early Statehood era, growing demands for aboriginal rights to resources and conservation and self-government in the post-MMPA era (table 3.1). Uses and diversity of values towards marine mammals have also changed through time for both non-Native as well as Native peoples. In this final section, I argue that the combination of

sovereignty, mode of production, and value orientation shaped the adopted dominant mode of governance over human uses of marine mammals, resulting in relative measures of ecological sustainability.

In the Native Nations era, Alaska was dominated by multiple sovereigns, with often carefully defended territories and particular histories of resource use. Trading agreements between Nations and protocols for accessing resources were mainstays in constructing and maintaining human-environmental relations. Modes of production and value orientation in this era can best be described in terms of relationships as well. Early communities lived largely within their regional ecological budget, but also involved in extensive trade networks, and towards the colonial period, involved in wage labor as well as subsistence labor generalizing about the dominant mode of production difficult. Although trade between nations in Alaska existed, there is not much evidence to suggest that any species were primarily harvested for trade or that if they were, there was an extensive market for goods that could affect relative abundances of animals. In addition, some resources were more valued than others regardless of their potential for trade (e.g., fish in Aleut communities). Local institutions and power relations would probably have resulted in *de facto* open access regimes for migratory species, but harvests for most animals probably were limited and sustainable, as evidenced by abundance for most species during the early days of the Russian colony. It is likely that climate, density of settlements, harvests largely based on subsistence and the resilience of various species to harvest all aided in achieving sustainability.

Russian traders began to gradually, and later violently, re-define these relationships for many Aleut Nations, including those enslaved and sent to the Pribilofs. Colonial control over productive Aleutian and later Central and Southeast Alaskan regions were designed to foster commercial production of goods. However, Russians could not muster the strength of force to conquer Tlingit and Tsimshian communities and so had less power in the Southeast. Because of the value of the furs (i.e., the sole basis of empire in the Region) and the lack of centralized authority in any but a few settlement regions, this period of privatized resource management was unsustainable, save for nascent rules developed in the latter stages of Russian occupation.

These rules such as the zapooska, developed by Russians and Unangans, eventually became the framework for American control and management as well. Whaling and walrus hunting in the North Pacific and Arctic Oceans during the mid-colonial era was uncontrolled and

obviously unsustainable due to the lack of a strong sovereign in the region with authority over pelagic whaling. The Americans began their marine mammal commercial enterprise in Alaska through privatization, and eventually moved to government control, with poor results in the first fur seal lease period, but eventually adopted international institutions and bureaucratic reforms that lead to a recovery of the fur seals. Bowhead whales were also largely recovered over the next century due to the loss of commercial markets, an international moratorium on whaling, a small Alaska Native harvest and effective collective action.

The early statehood era lasted long enough for the state to develop a management plan based on Euro-American models of resource management for those species not already managed by federal agencies. The short duration of this period makes generalizations difficult. Efforts in marine mammal management were not appreciably different than for other species in the state, focused around regulating commercial take such as walrus sport hunts and eliminating predators, such as beluga. Management was accordingly most active for the most heavily harvested species, resulting in ecological sustainability for desired species. The desires of the State of Alaska and indigenous hunters conflicted for several species, each with their own acceptable modes of production. The irreconcilability of indigenous subsistence with the state management regime eventually collapsed state authority for marine mammals. The mode of governance differed for different parts of the state. Large game animals such as walrus were managed by the state through bag limits and sport guiding licensing agreements. In parts of the state in which subsistence food harvesting was the primary "management goal," however, communities largely followed local norms even as the State tried to enforce new rules. Many hunters did take part, however, in the Sate's bounty program for marine mammals that were thought to compete with fisheries for food.

Changing American values towards marine mammals culminated in a new institution in 1972, the Marine Mammal Protection Act, designed to protect marine mammals from industry and to re-orient relationships between humans and marine mammals based on ecological productivity rather than commercial or other utilitarian uses. Federal control for species other than fur seals, sea otters, and bowhead whales was not immediately realized as differences between federal responsibilities and the values of prominent state officials turned into conflicts. Federal authorities and Alaska Native leaders initially clashed over what an allowable use of marine mammals should be, especially in light of the Section 101(b) exemption for the take of non-depleted animals. In many cases, federal officials looked back to pre-colonial indigenous

institutions in order to define an allowable use, such as the ban on teddy bears made from sea otters. The officials look back to these institutions with particular understandings and ends in mind, however, as they had not actively sought to recreate indigenous rules as well as technologies or modes of use that would limit harvests. The current era has seen management hybrids, such as co-management, grow as the sovereign strength of Alaska Native Nations has resurged. In the current age in which squabbles over the definition of the word *authentic* have been at the root of many high profile conflicts (Robards and Joly 2007-2008), potential losses from climate change and ecological regime changes have begun to take on more urgency, necessitating a collective action response in order to redefine and manage for sustainability in context.

This historical analysis demonstrates the highly dynamic nature of marine mammal co-management in Alaska and the conditions that gave rise to current co-management arrangements. The evidence shows that mounting a collective action response to conservation problems depends on a whole host of factors including the values and strategic goals partners bring to the table. Securing stable funding is a persistent challenge. Additionally, the strength of partnerships can be influenced by a number of social processes as well as the power of institutions designed to conserve animal populations. How those social processes create particular action arenas and situations is next explored in a comparative analysis of contemporary marine mammal management under the leadership of two federal agencies, the U.S. Fish & Wildlife Service and the National Marine Fisheries Service.

Chapter 4: The influence of agency culture, history, and structure on policy choices

Gestalt: *A structure, configuration, or pattern of physical, biological, or psychological phenomena so integrated as to constitute a functional unit with properties not derivable by summation of its parts.* – (Merriam-Webster Dictionary 2009)

Introduction

After two hundred years of conventional top-down resource management, the 1972 Marine Mammal Protection Act[49] created a window of opportunity for self-regulation through its exemption for Alaska Native use of marine mammals. Although agencies could not restrict the level of harvest under the law unless there was a conservation concern, the agencies were authorized to regulate and monitor the nature of use. With the vast, rural nature of the state, the costs of conventional resource management, the growth of Alaska Native organizations and changing attitudes towards collaboration, the stage was set for building more collaborative wildlife management policies in Alaska.

The literature on resource management is riddled with references to collaboration, mostly examining successes and failures in sustaining collaborative resource management venues. In the past few decades, American federal agencies in particular have come under pressure to build relationships with key constituencies such as non-governmental organizations, resource users, and local communities (Koontz 2007). This democratization of resource management can be seen as a dismantling of modernist or rationalized governance (Ansell and Gash 2008), as reformists have targeted agencies perceived to be captured by their regulated entities through the creation of iron triangles between administrative agencies, business communities, and Congress[50]. A movement towards more collaborative types of management programs has made multi-sectoral groups more commonplace (Ansell and Gash 2008). Where the stakeholders have unique rights to the resources, as tribal entities do, co-management arrangements between the managers of the resources and the users of the resources have developed (see chapter two and three).

At the same time, scholars have begun to examine the negative or challenging aspects of participation in collaborative or co-management agreements, such as cooptation (Hensel and

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[49] Act of October 21, 1972, 86 Stat. 1027, P.L. 92-522, 16 U.S.C.A. §§ 1361 et seq.

[50] (O'Toole 1997) and others have disproven the ubiquity of the "iron triangle" concept, focusing on the importance of policy communities – networks of people interested in the subject matter and able to insert themselves into policy-making venues.

Morrow 1998; Nadasdy 2003a), transaction costs (Kofinas 2005), management of relationships (Natcher et al. 2005) and, at worst, manipulation by decision-makers (Cooke and Kothari 2001). Agency leaders and academics have also questioned the "hollowing out" of agencies to various ends (Milward and Provan 2000a). In Alaska, common-place agency constraints like funding and enforcement capacity combined with a shift towards community-based program delivery has resulted in a proliferation of participatory governance strategies in Alaska ranging from advisory councils to full co-management boards for wildlife management (Huntington 1992; Spaeder 2005). Resource management agencies follow other trends in federal governance, such as the use of state, regional and tribal governments as well as non-profit agents and networks (O'Toole 1997; Milward and Provan 2000b) to deliver public policies and programs.

Comparative public policy scholars have long noted that some federal agencies collaborate more often, or more effectively than others (Pomeroy and Berkes 1997; Branch and Bradbury 2006). Organizational culture has been identified as one of the driving forces of government agency performance (McCurdy 1992; Mahler 1997; Brewer and Selden 2000; McBeath 2004; Butler and Koontz 2005; Branch and Bradbury 2006). Fewer scholars have successfully explained how organizational culture acts as a causal force to shape policy implementation (Druckman et al. 1997) but see (McCurdy 1992; Howard-Grenville 2006). One would think that two federal agencies with similar mandates (wildlife conservation), managing marine mammals in the same town using similar policy tools would operate more or less the same, with similar levels of effectiveness. However, fieldwork reveals this assumption to be unfounded. Why are these two policy strategies different? Moreover, do these differences matter in terms of effectiveness or equitable outcomes? Through case studies of marine mammal co-management between communities and two separate federal agencies, I illustrate how organizational culture, history and structure affect policy approaches and success.

Section one explores the concept of organizational culture, especially in relationship to organizational performance. Following Alvesson (Alvesson 2002), I focus on cultural manifestations as a key unit of analysis and develop a typology of co-management cultural manifestations as a basis for comparison between the two cases. By manifestations, I mean an agency's approach to policy problems. This can include the type and strength of policies agencies tend to pursue in collaborative management. My typology is informed by literature on co-management and through field experience in an Alaskan context. In the second section, I develop

a framework to facilitate analysis of co-management performance through amalgamating elements of Easton's theory (Easton 1965) of policy performance, Alvesson's concept of cultural manifestations (Alvesson 2002), Ostrom et al.'s institutional analysis and development framework (Ostrom et al. 1994), and Young's concept of policy fit (Young 2002a). In section three, I build cultural profiles of the agencies through a literature review and survey data. I then compare institutions for subsistence harvest assessment drawing on field observations, policy documents and interviews to illuminate the influence of culture on the implementation of harvest assessment policies. I chose to analyze harvest assessment policies because they result in high-profile interactions between agencies and the communities and have been the focus of many conflicts in Alaskan wildlife management. Then, in section four, I classify the harvest assessment policies using the co-management typology and discuss how these differences affect policy outcomes. In conclusion, I discuss the implications and limitations of this research project and offer some suggestions for future research directions.

Theories of organizational culture

As reviewed in chapter two, organizational culture refers to basic underlying assumptions, shared perceptions, language and thought processes among a cohesive group of people (Schein 1990). The Competing Values Model (CVM, figure 4.1) posits that organizations differ in two key dimensions: organizational focus (internal versus external) and the rigidity of organization (flexibility versus control) (Cameron and Quinn 1999). This model, operationalized through the Organizational Culture Assessment Inventory, has been validated across more than a thousand case studies (Cameron and Quinn 1999), including seventy-five government agencies. Not surprisingly, most government agencies were found to have a hierarchical culture, which fits with the classic bureaucratic form of organization (Cameron and Quinn 1999). The CVM dimensions complement much of the scholarship on co-management as a governance strategy. The extent to which agencies engage with communities (external orientation) and share power (flexibility) has been consistently linked to success in co-management tasks that require significant community buy-in, such as harvest assessment (Berkes et al. 1991; Pinkerton 2003).

Scholars of adaptive co-management also emphasize adaptive capacity and flexibility as being critical components of managing for resilience (Westley 1995; Danter et al. 2000; Folke et al. 2005; Imperial and Yandle 2005; Hahn et al. 2008). Authors such as Danter et al. (2000), Imperial and Yandle (2005); Hahn et al. (2008) explain how problem-focused or adhocratic

organizations (Mintzberg 1979) can be more successful than traditional bureaucracies in building new approaches and coalitions to achieve ecosystem management objectives hindered by traditional command and control structures that reward stasis and consistency (Grumbine 1994; Knight and Meffe 1997). Armitage (2008) reminds us, however, that contextual forces such as power differentials, knowledge valuation, and dominant policy narratives can make institutions and organizations resilient to the sort of cultural change that is prescribed above for governing complex, adaptive systems.

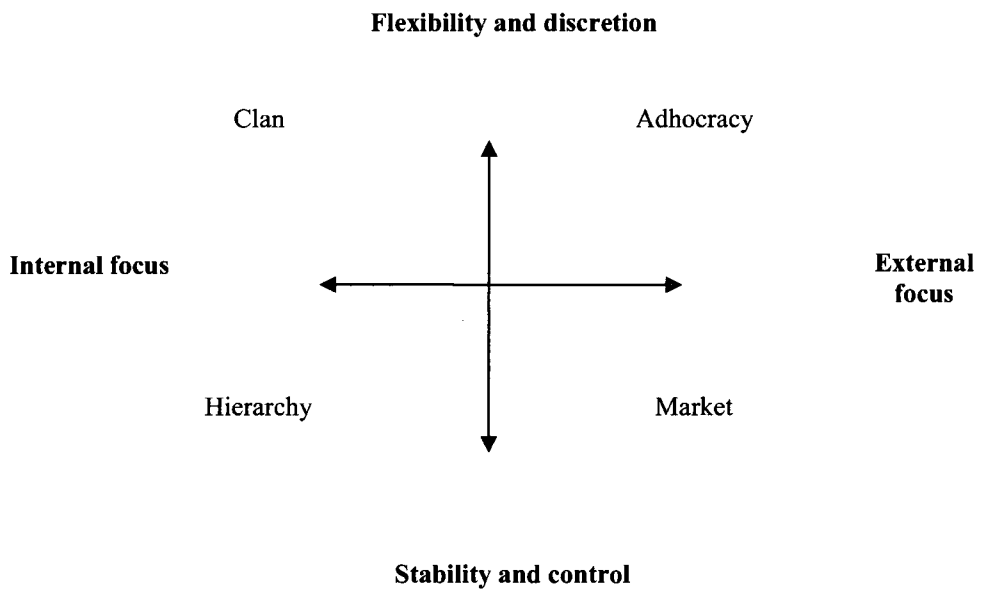

Figure 4.1 The Competing Values Model (Cameron and Quinn 1999).

Alvesson (2002) recommends researchers avoid sweeping generalizations about culture as a whole and instead look at specific "cultural manifestations" and study their consequences, which may or may not lead to measurable successful outcomes. Within a resource management context, a cultural manifestation could be the type of collaborative agreements an agency engages in, or its arguments in front of an administrative law judge. Cultural manifestations are akin to the

idea of emergent behaviors, actions arising from complex interactions between people in particular contexts. However, cultural manifestations are also physical *things* left behind – agency logos, press releases, and letters, etc. Anthropologists call these things "material culture." Schein (1990) refers to these things as *artifacts* of organizational culture, not the culture itself. Alvesson and other organizational theorists use these artifacts to infer values of an organization.

Cultural manifestations in Alaskan marine mammal co-management include the dominant types of projects the agency supports as part of the co-management process, and the extent to which responsibility and authority for programs is devolved to local leaders. These manifestations are important in that they represent how policy is implemented on the ground, and so are key in evaluating the performance of co-management as a strategy for resource management. Although agencies make discrete policy choices, I argue that the choices are shaped by their cultures as part of a causal chain that structures those choices at multiple points in time. Through case studies of harvest assessment, I explore the proposition that externally oriented and flexible cultural types are more likely to devolve responsibilities to community partners than are internally oriented and/or rigid organizations.

Typology of co-management relationships

Co-management agreements have been categorized as falling along a continuum of power-sharing (Pinkerton 1989; Berkes et al. 1991; Pinkerton 2003). Carlsson and Berkes (2005), however, argue that co-management may have many facets that involve different actors with differing levels of authority at different points in time. In Alaska, as elsewhere, co-management has many definitions. Donoghue and Thompson (2003) characterize types of federal-tribal resource management agreements based on an evaluation of key components of collaboration. Their analysis is sensitive to the methods in which American federal agencies formalize relationships with stakeholders.

Out of a dataset of ten relationships across the United States, the authors identify five distinct types: co-management, contracts, cooperation, working relationships, and conservation easements. The types differ on the decision-making authority, transfer of money, level of mutual dependency, transfer of knowledge, and implementation (Donoghue and Thompson 2003).

In Alaska, the situation is complicated by vague statutory language as well as the ways in which actors contest and define their own participation. While most Alaska Native organizations describe their activities as co-management, their funding is packaged into cooperative

agreements, contracts or grants. Both agencies tout "cooperative conservation" as often if not more than "co-management." In the recent past, the National Marine Fisheries Service preferred to enter into cooperative agreements outlining shared expectations of both co-management partners and then offer funding through a separate agreement while the U.S. Fish & Wildlife Service has tied funding to contracts outlining particular tasks. Both agencies have increasingly specified activities to be funded as a method of program accountability.

In light of the complexity of co-management rhetoric and practice, I propose a typology of co-management manifestations below (table 4.1). The manifestations[51] (i.e., policy approaches) are particular activities outlined by these contracts and agreements as well as the extent to which the agency devolves authority for the task in principle, and the actual power-sharing situation that emerges. For instance, even though a regime may allow for joint constitutional-level decision-making, participation in the regime must still be funded and prioritized. Partners without much devolved power may nevertheless take the lead in research programs that are perceived as a form of strong co-management. Devolution is not the only, or best, method of policy implementation. However, local management efforts can be significantly enhanced by the ability to innovate or adapt to changing conditions (chapter six). These efforts are supported by greater local management power.

Organizational culture and institutional performance

In the organizational studies literature, facets of culture have been qualitatively correlated with performance characteristics such as efficiency, teamwork, the development of shared definitions, internal or external focus, participatory nature, and persistence. Given that the early organizational culture studies looked mostly at the instrumental rationality[52] of organizations, it is not surprising that many analyses of government performance have dealt with power, resource availability and political influence since they are the tools a bureaucracy uses to implement its goals (Clarke and McCool 1996). The performance of government agencies have also been measured against the hallmarks of "good government": efficiency, equity, and effectiveness

[51] I will refer to manifestations as policy approaches for the remainder of the chapter.

[52] Instrumental rationality is generally perceived to be a specific form of rationality focusing on cost-effective means to achieve a certain end, whether or not that end is meaningful. In the case of federal bureaucracies, a focus on implementation of a blatantly flawed policy would be considered a case of instrumental rationality.

Table 4.1 Co-management policy approaches Approaches are a configuration of all three columns.

Examples of activities	Degree of power-sharing in principle	Power-sharing result
Regulatory activities	Joint constitutional-level decision-making	Strong to weak, as perceived by co-management partners
Research projects	Devolved policy implementation through grants	
Information-sharing	Compacts	
	Contracts or joint projects	
	Consultation	

(Lynn et al. 2001). Recent studies have also looked at have also looked at direct outcomes of institutional forms on the success of conserving resources (e.g., how does a rule affect animal population growth?) (Underdal and Young 2004; Young et al. 2008).

Organizational culture has been cited as a barrier to resource management strategies such as co-management (Pomeroy and Berkes 1997; Natcher et al. 2005), collaboration (Laninga 2003), ecosystem management (Kennedy and Quigley 1998), and adaptive management (Jacobson et al. 2006). Causal explanations of cultural impact have received less attention (but see Watt 2001) but have been addressed by institutional scholars using social-practice models of collective action. In these models (contrasted with more utilitarian collective action models), institutions give rise to social practices that structure behavior. Analysts using social-practice models assume that organizations make decisions based on what they consider appropriate behavior, versus calculations of utility (Young 2002a).

In order to understand cultural influences on co-management relations, I define agency culture as the norms governing behavior (using focus and rigidity as measures of these) of agency employees, especially as manifested in external relations with communities in rural Alaska and co-management boards. Culture in this sense is intrinsically related to bureaucratic structure and agency history because the breadth and diversity of an agency's mission affects the extent to

which co-management is prioritized. Historical relationships between agency staff and Alaska Native communities also influence the likelihood that any federal rules will be effective, producing a form of path dependency. Together, these factors produce cultural manifestations in the form of co-management policy approaches.

Development of a conceptual model

Agency culture is an institutional driver that has not been adequately addressed in the literature of resource regimes. The Institutional Analysis and Development framework developed by (Ostrom et al. 1994, also see figure 2.1) helps one to map and understand how users of common-property resources build resource management regimes that enhance shared understandings of the resource and create incentives for compliance to rules limiting use of scarce resources. Agency culture can be conceptualized as a key factor affecting actors' motivations to collaborate and therefore, a driver shaping the policy arena – in this case, marine mammals management in Alaska. In the IAD model, the patterns of interaction produced by the policy arena affect the outcome and institutional performance.

In order to analyze institutional effectiveness, Young (2002b) and others developed a diagnostic approach to institutional analysis which calls for an effort to identify critical features of specific problems followed by an effort to specify institutional arrangements best suited to deal with them. One of these approaches, the "fit" of a policy to a policy problem, is an examination into how well institutions match the ecological and social drivers and conditions of a resource. Building upon this work and others focused on the social context of resource management policy implementation (e.g., Long 1989; McCay 2002; Agrawal 2005), this chapter considers how well policies fit social contexts.

Following the early work of (Easton 1965) as well as recent institutional theorists (Underdal and Young 2004), I evaluate performance of co-management regimes for outputs (policies), outcomes (changes in behavior) and impacts on the resource of interest. My research builds upon institutional theory by investigating agency culture as a key driver shaping outcomes. Below, I present a conceptual model of linkages between organizational culture and performance (figure 4.2), based on the above literature and field observations.

Outputs and outcomes are particularly important to understand the potential effectiveness of any particular policy on the ground in Northern Alaska. Outputs include such things as agency guidelines, rules, and local harvest management plans. An analytic focus on agency culture

examines how cultural manifestations affect the design or enforcement of agency, co-management board, and local policies. In marine mammal co-management common pool resource regimes, feedback between outputs and outcomes relating to social processes such as harvest monitoring are observable through co-management board meetings and at local research sites. An analysis of outcomes examines to which the above polices change any behaviors, either in co-management arrangements or at the local level. Additional methods of conceptualizing and examining outcomes are presented in chapters five and six.

Organizational culture is of course only one variable amongst a suite of variables affecting resource management policy success including leadership, capacity, resource

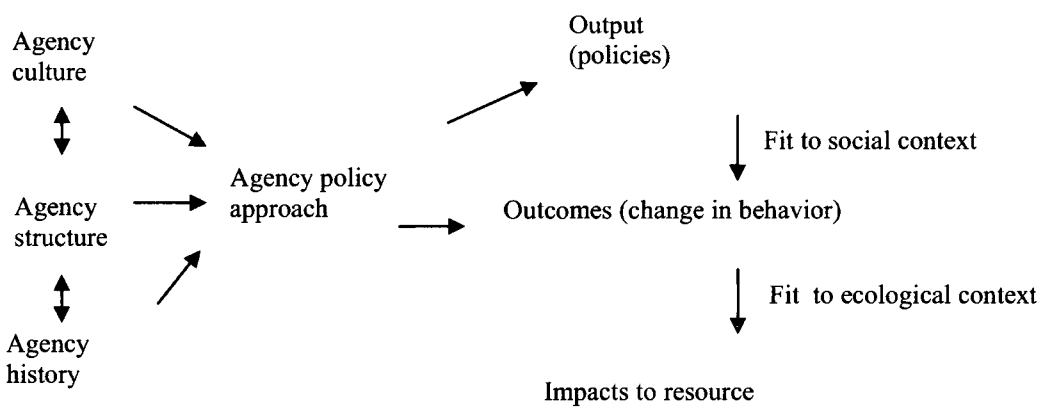

Figure 4.2 Conceptual model of the influence of agency culture, structure and history on policy performance

provisioning, Congressional support, and others. However, the existence of two federal agencies, the U.S. Fish & Wildlife Service and the National Marine Fisheries Service, each developing their own interpretations of federal policy in Alaska and the resulting policy approaches lends a

unique opportunity to build upon theories of institutional performance through a case study of organizational culture as a driver of policy outcomes[53].

Methods

Government processes and agencies are notoriously difficult to study because of problems with gaining access to the "field" where key decisions take place. Recognizing these constraints, anthropologists have suggested engaging with bureaucracies as constituents (Nader 1972) or by conducting multi-sited ethnographies (Marcus 1995; Caulfield 1997) that take into account the multiple loci of influence and decision-making from the individual actor to the world stage. Sociologist Norman Long (1989) argues for studying organizations at the interface – where bureaucrats and the public meet to implement public policy. Following Long, I employed multiple methods in order to understand the agencies and their relationship to co-management partners: observation at public and co-management board meetings, content analysis of policy and historical documents, semi-structured key informant interviews, informal interviews, and an organizational culture survey designed by psychologists (Cameron and Quinn 1999). Each of these methods relate to one or more particular scales of management activity – the federal agency involved, cross-scale co-management board meetings, and two villages with active hunting populations. I elaborate on each method below.

Document analysis and literature review

In order to build agency cultural profiles, I first compiled a literature review chronicling the agencies and their relationships to stakeholders. I collected and analyzed historical and contemporary policy documents and used the method of process tracing (George and McKeown 1985; King et al. 1994) to examine how each agency's policy choices affect their relationships with their co-management partners and resource management outcomes.

Participant observation

Another key source of data stems from a four-year period of observation of meetings (2004 – 2008) relating to marine mammal conservation. The meetings involved co-management

[53] One critique of many small-N studies is that investigators often start from the dependent variable – in this case, policy success, and then try to explain that success, rather than adopt a more quasi-experimental approach, in which the policy outcomes are unknown and the differences between outcomes can be attributed more convincingly to independent variables. Of course, as examined in chapter three, historical institutionalists would argue with this approach if it were used to examine success over a long period of time, as it seemingly discounts human agency, contingencies, and the importance of process.

relations, Endangered Species Act deliberations, and oil and gas development in Northern Alaska. Each meeting was an agency-stakeholder interface, in which both federal wildlife managers, whalers, polar bear hunters, and other concerned constituents come together in various constellations for a variety of purposes – some informative, some deliberative. Observation included meetings of the Alaska Eskimo Whaling Commission (2005 – 2008), the Nanuuq Commission (2006), the Indigenous Peoples' Council for Marine Mammals (2004 – 2008), and others.

During the meetings, I took notes and digitally recorded selected portions of the meeting open to the public. Notes were qualitatively analyzed for themes relating to the degree of collaboration, evidence of conflict, and agency cultural manifestations such as policy announcements or approaches, and emergent themes. Recordings were consulted for additional details.

Interviews

I conducted formal and informal interviews with wildlife managers with marine mammal management sections of the U.S. Fish & Wildlife Service and the National Marine Fisheries Service. Formal, semi-structured interviews were conducted with two FWS management biologists and three NMFS management biologists focused on co-management activities, conservation challenges, and success. The interviews ranged in length from twenty minutes to an hour and a half. Informal[54] interviews and discussions were conducted with three additional FWS management biologists and three NMFS management biologists as part of my period of participant observation. Taken together, I spoke with five out of eight present and past FWS managers and six out of seven present and past NMFS managers responsible for bowhead whales, beluga whales, harbor seals, ice seals, polar bears, walrus, and sea otters.

I also interviewed co-management directors, chairmen and local officials involved with USFWS regimes (two formal interviews and two informal interviews) and NMFS (three formal and two informal) to ask about their relationship with the agencies, their definitions of co-management, and their opinion of management challenges and successes. These interviews ranged from half an hour to two hours. Interviews were transcribed and analyzed for themes

[54] Informal discussions were initiated at the request of two biologists who did not want to speak on the record. Two other biologists consented to a formal interview but subsequent attempts to schedule the interviews failed. I spoke at length to two other biologists in the course of public meetings.

relating to agency culture, co-management, and effectiveness of the policies in question. Formal interviews were not a particularly rich source of data for analyzing agency culture so they were predominantly used to supplement policy histories and the perspectives of actors involved in the regimes.

Internet survey

The third method of data collection included a survey of Alaska-region FWS and NMFS staff by email. The survey was designed to measure employees' perceptions of their agency culture following the Organizational Culture Assessment Inventory (OCAI) methodology (Cameron and Quinn 1999). Each question offered respondents four choices representing how closely their organization resembled four organizational archetypes: clan, adhocracy, market and hierarchy. Respondents were asked to divide one hundred points among the types based on their experience working within USFWS or NMFS. Mean scores were plotted on satellite graphs to determine the predominant culture. The scoring method does not lend itself to statistical analysis; in keeping with Cameron and Quinn (1999), differences in scores over ten points were viewed as significant discrepancies.

In addition to the six standard OCAI questions about characteristics, leadership, management style, social glue, organizational emphasis, and definitions of success, I included three additional questions relating to dealing with uncertainty, seeking information, and working with stakeholders. These additional questions are especially relevant to managing wildlife in Alaska because of challenges associated with climate change, the challenges of federal agencies in managing resources in rural, predominantly indigenous areas with thousands of years of self-regulation or no regulation, and a lack of baseline information on the status of many resources. I also asked survey respondents to evaluate outcomes of collaborative activities they were involved in.

The survey was conducted via QuestionPro software on the internet. The survey was pre-tested for face validity (whether the questions appear valid to the target audience) by six resource managers from a different agency and revised based on their feedback. The rate of survey response was lower than expected (n=12, N=127 for NMFS, n=57, N=508 for USFWS), likely biased by the survey mode (Sheehan 2006), agency directives to forward the survey to a private email account, and the targeting of too broad a population that did not find the survey salient. However, the survey results did correspond to other internet surveys in the literature in that

although survey responses were low, respondents were more candid with their open-ended responses than they were in personal interviews (Joinson 2001; Grandcola et al. 2003). In addition, 75% of survey respondents reported being actively involved in collaborative management and this figure included many senior managers.

Case study evaluations using the conceptual model

In this section, I begin by giving an overview of each agency with a focus on co-management relationships. I then build a cultural profile drawing on prior studies of each agency and present the results of the organizational culture survey. Next, I explain the roles of culture, history and the development of stakeholder relationships in the development of harvest assessment policies. The policies and the success of each are compared.

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) is the chief federal agency regulating both commercial and subsistence-harvested marine animals. This agency has conflicting missions: the development of a sustainable fishery industry and the protection of cetaceans and seals, many of whom depend on the same fisheries for food. Moreover, NMFS's mission in fisheries development and management brings it into close association with the fishing industry, which critics argue has "captured" the agency (see McBeath 2004).

Management responsibilities for marine mammals began within the Bureau of Commercial Fisheries, as marine mammals were exploited for various commercial goods but were shifted to the Office of Protected Resources after the passage of the Marine Mammal Protection Act, largely designed to prevent fisheries bycatch of marine mammals (Bean and Rowland 1997). Key management duties relating to marine mammals are shared between four offices: the Alaska Regional Protected Species offices in Anchorage and Juneau, the Protected Resources headquarters office in Washington, DC, and the Alaska Fisheries Science Center in Seattle. The director of the National Oceanic and Atmospheric Administration typically is appointed one of the American Commissioners to the International Whaling Commission, supported by an interagency team from the Departments of State, Commerce, and Interior (Peterson 1992). The majority of staff working with bowhead whale management within NMFS are wildlife biologists. Even though NMFS is responsible for most marine mammals in Alaska and maintains co-management agreements with eight partners, several respondents familiar with

both agencies report that NMFS has a low prioritization for co-management activities as compared to the U.S. Fish & Wildlife Service (USFWS) and point towards its tendency to fund research through the State of Alaska's marine mammal division.

Contemporary co-management agreements with Alaska Native organizations set out co-management goals and activities for blocks of time. The amount of time covered depends on the program goal. For instance, the Cook Inlet beluga whale co-management agreement is re-negotiated approximately every year whereas the Alaska Eskimo Whaling Commission cooperative agreement typically spans the same amount of years as the quota authorized by the International Whaling Commission (e.g., 2008-2012). Funding packages are developed separately through cooperative agreements or grants. During the period of study (2004-2008), several boards spent significant time lobbying Congress to receive base funding through budgetary earmarks. Co-management agreements have been developed at multiple scales: through NOAA headquarters for internationally relevant regimes like the Alaska Eskimo Whaling Commission, the NMFS regional office, and through the Alaska Fisheries Science Center for research-oriented agreements.

NMFS culture

The culture of the National Marine Fisheries Service (NMFS) in 1998 was described by McBeath (2004) as one which was politically risk-averse (e.g., when restricting fisheries) but scientifically risk-tolerant when weighing the value of the fisheries to the value of the recovery of the Steller sea lion populations under the Endangered Species Act[55] (ESA). During a hearing on agency management of fisheries in Steller sea lion habitat, a federal judge chided NMFS for ignoring relevant factors (such as the impact of allowable fisheries catches that may nutritionally stress sea lions) and admittedly failing to analyze them in biological opinions required under the ESA. After a series of legal challenges, fisheries were effectively managed by the federal court until NMFS could meet the challenges of managing Steller sea lions in a commercially valuable area. By 2003, McBeath notes, and in reaction to losses in the court, NMFS underwent a cultural change and became more transparent in its process, gained more staff dedicated to environmental assessment, and worked more effectively across programs for fisheries and protected resources (e.g., marine mammals) in order to avoid political surprises to powerful fisheries interests and the agency itself.

[55] Act of December 28, 1973, 87 Stat. 885, Pub. L. No. 93-205, 16 U.S.C.A. §§ 1531 et seq.

A panel convened by the National Academy of Public Administration (Gade et al. 2002) found that the federal fisheries management system is in crisis, as ten times as many decisions were being challenged in the courts in 2002 as compared to the early 1990s. The panel writes:

> *The councils and NMFS often find it difficult to impose austere measures, and they are reluctant to act in the face of strong opposition and political clout that can be brought to bear on fishery management issues* (p. x).

Part of the problem, the panel notes, is a proliferation of mandates, coupled with a lack of prioritization by Congress:

> *Existing statutory mandates convey multiple and often conflicting responsibilities, giving a sense that each is a priority, and reconciling these laws falls to the Assistant Administrator. NMFS' ability to reconcile these varied mandates—to conserve fisheries, preserve protected species, protect the environment, promote U.S. economic interests, encourage recreational fishing, and address socio-economic issues—would be enhanced if Congress were to clarify their relative priority. Doing so would improve the prospects for meeting critical objectives* (p. xiii).

The Magnusson Fishery Conservation and Management Act of 1976[56] created an unusual, highly participatory system of fisheries councils. Gade et al. (2002) notes that members of the councils were primarily the states, commercial and recreational fishermen. NMFS' original duties towards research and information collection went towards "industry self-management" (Gade et al. 2002: 3), which became the foundation for the council system. This sort of iron triangle was eventually breached by the addition of environmental groups. The highly participatory nature of fisheries management may make NMFS biologists more familiar with collaborative management processes than other agencies, even if they may feel that too much collaboration can subvert management decisions based on science (see UCS and PEER 2005).

NMFS' program for marine mammal management in Alaska has several different institutional histories (see chapter three) that may differentiate cultures within the marine mammal program in the Protected Resources division from the Sustainable Fisheries division. NMFS' fur seal program in the Pribilofs began as a very top-down program (chapter three), in which fur seal agents dictated residents' personal lives as well as their harvesting activities. On

[56] Pub. L. 94-265, U.S.C.A. 16 § 1801-1882.

St. George, this program is now experienced as a shared observation and management strategy, supported by strong federal-tribal relationships. When asked about anachronistic Fur Seal Act[57] rules relating to how seals must be taken, a respondent noted that the partners talk about it, but changing the rule seems like a difficult prospect, so mostly both sides ignore it (Anonymous pers. comm.). For the agency biologists' part, some have expressed their dissatisfaction at the consistency or perceived accuracy of harvest assessments conducted by their various partners. However, the dissatisfaction is often framed as a problem to be resolved, rather than something the agency plans to take on itself.

Adams et al. (1993) describe the early years of the Alaska Inuvialuit Beluga Whale Committee (now known as the Alaska Beluga Whale Committee). Key activities included developing enough baseline information in order to defend hunters against a potential move by the International Whaling Commission to bring small whales under its jurisdiction. The early program involved harvest assessment as well as biological information-gathering, based on partnerships between hunting communities, ADF&G and NMFS, all full members of the committee. Adams was one of the early directors of the AEWC, so her shrewdness in regards to working with agencies and the IWC helped shape the committee's pro-scientific collegial nature. In a 2006 article, Fernandez-Gimenez et al. (2006) describe the ABWC's efforts as focused primarily on research about beluga stocks and harvest levels. Information from these activities has fed directly into NMFS analyses. Significantly, issues over management control have not been especially salient topics at the ABWC:

> *In the ABWC, the struggle for sovereignty has been played out at a fairly low level of intensity, both in assertions of and negotiations over knowledge, and in early negotiations over the structure of the organization. Although native ABWC members openly discussed the use of science as a tool of state control generally, they were supportive of ABWC's research programme and perceived benefits to belugas and beluga hunters from the knowledge it has generated* (Fernandez-Gimenez et al. 2006: 312).

[57] Pub. L. No. 89-702, 80 Stat. 1091, 16 U.S.C.A. §§ 1151 et seq.

The authors credit the ABWC's organizational culture for creating space for joint production of knowledge:

> *The ABWC appears to be a strong example of the way in which a co-management organization can provide opportunities for relationship-building and joint action, particularly joint inquiry about beluga populations. These joint research activities in turn have reinforced communication and trust among participants leading to increased commitment to and involvement in research by hunters, and increased appreciation for and use of TEK by scientists and managers* (Fernandez-Gimenez et al. 2006: 313).

Positive relationships developed through research and joint work have not necessarily translated into the devolution of local management authority, in the way envisioned by agencies and founding members of the ABWC. Fernandez-Gimenez et al. (2008) credit this disparity to the cognitive dissonance beluga whale hunters and others have when they support the development of locally developed, but public and potentially federally enforceable, *de jure* rules but continue to operate by norm-based *de facto* rules.

It would be erroneous to assume that NMFS' external orientation is a sufficient cause in creating more harmonious co-management relationships. One need only look at the Cook Inlet beluga whale battles between various factions to realize the fallacy of that argument (Moore and DeMaster 2000). However, all of the NMFS-associated boards, with slight exception to the Cook Inlet Marine Mammal Commission and the Alaska Native Harbor Seal Commission, appear to have less contentious relationships with their agency partners than do USFWS boards.

The 2002 Gade et al. report noted that mandates and data deficiencies around stock assessment reporting demanded a large proportion of NMFS' scientific expertise, precluding many staff from working on other projects. The panel recommended that NMFS prioritize budgeting to expand its scientific expertise to cover other critical information needs, such as habitat requirements, food web dynamics, and the health and reproductive status of populations. In addition, the panel recommended that the agency contract out work where it could not hire additional staff. McBeath notes that by 2004, the Alaska Regional office had accomplished several of these and other goals in relation to its Steller sea lion responsibilities under the Endangered Species Act. Notably, creating a co-management regime was not one of these priorities, as the subsistence harvest was considered an insignificant driver of species decline.

Alaska Native organizations, including the Alaska Native Sea Otter and Steller Sea Lion Commission, were involved in the recovery plan process.

Finally, in response to the National Academy report, in line with Administration goals across resource management sectors, NMFS also adopted the Bush Administration's cooperative conservation program. By 2008, NMFS had created a Partnerships and Communication Division to streamline this approach.

NMFS agency culture survey results

Agency cultures change through time, so any one-time survey of organizational culture is by definition a snapshot. However, the Competing Values Model focuses on general tendencies and can be a good source of information to use in predicting general aspects of future performance, barring significant changes to the agency's culture, legal authorities and structure. NMFS staff were surveyed during the summer of 2008 (n=12, N=127). The majority of staff surveyed perceived the agency to have a market culture (figure 4.3) overall with a mean score of 29.34, followed by clan (25.35), hierarchy (23.79), and adhocracy (20.40). This result means that the staff considered the agency to be externally oriented but also a controlled place. Respondents recognized many different cultural characteristics across the nine questions, so the market culture result is not appreciably stronger than other cultural types. NMFS' existing fisheries programs, co-management priorities, and history of contracting work is consistent with the Competing Values Model market archetype.

Figures 4.4 to 4.6 represent staff perceptions regarding working with stakeholders, dealing with uncertainty, and seeking information. The strength of the market response in Figure 4.4 (35.00) represents agreement with the following statement, "When working with stakeholders, [NMFS] builds support from stakeholder partners who we work with to implement and monitor our preferred solutions to resource management issues." Concerning dealing with uncertainty (Figure 4.5), respondents ranked NMFS as an adhocracy (32.50), meaning that the organization is flexible, innovative and looks to external sources for inspiration. When seeking information (figure 4.6), respondents ranked NMFS as a clan (32.08), followed closely by

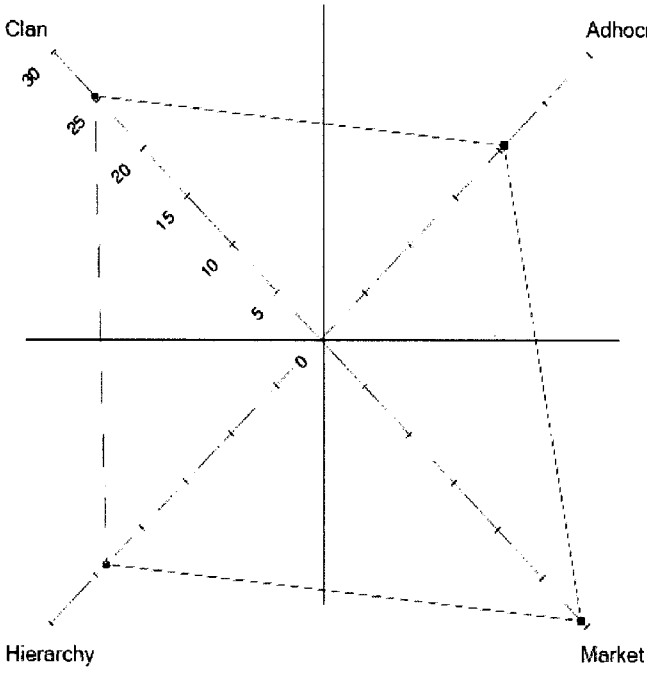

Figure 4.3 NMFS organizational culture The mean response (n=12) is "market."

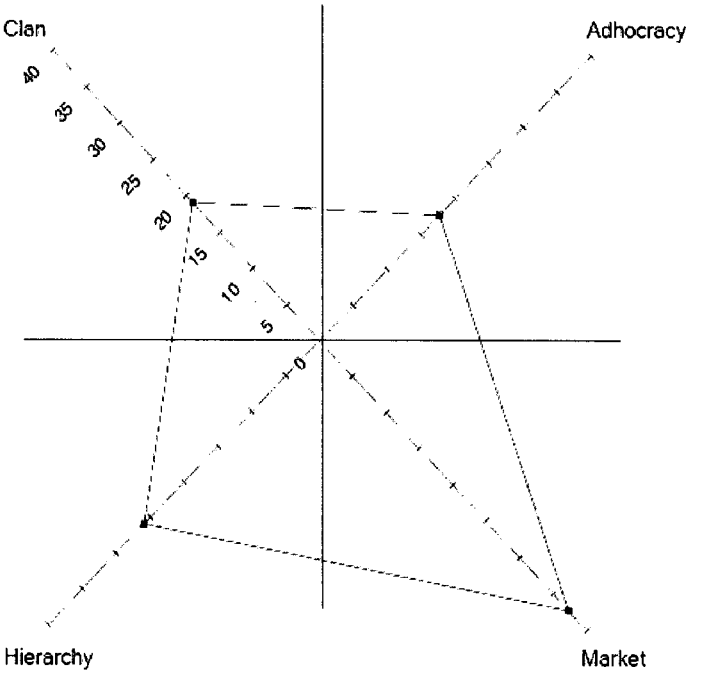

Figure 4.4 NMFS stakeholder relations The mean response (n=12) is "market."

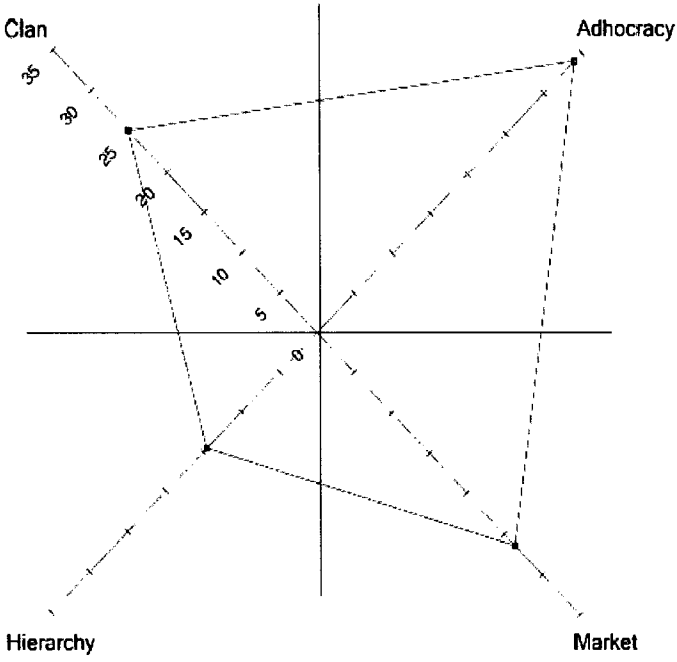

Figure 4.5 NMFS dealing with uncertainty The mean response (n=12) is "adhocracy."

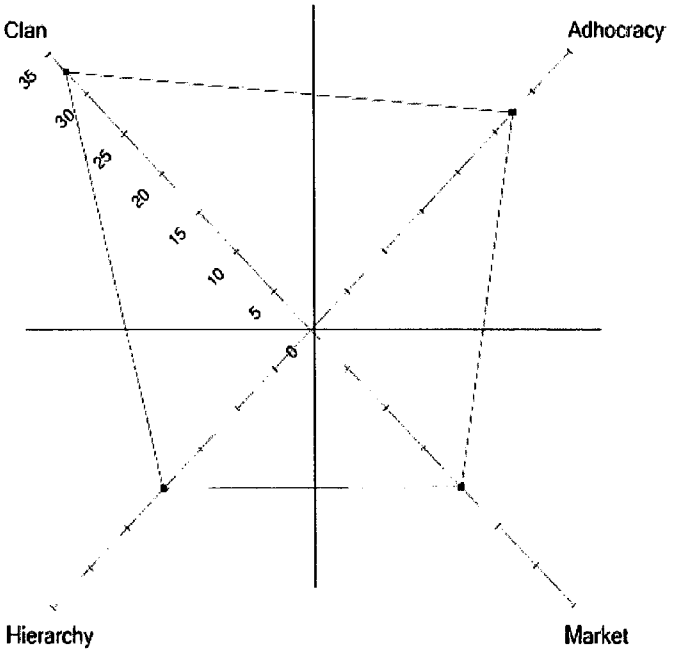

Figure 4.6 NMFS seeking information The mean response (n=12) is "clan."

adhocratic (27.03), emphasizing the agency's flexibility and use of a variety of resources to achieve its mission.

History of bowhead whale harvest assessment policy

The first co-management arrangement that NMFS negotiated significantly affected later relationships with Alaska Native hunters, and the agency approach to subsistence harvest assessment. The late 1970s was a period of conflict between the National Marine Fisheries Service and the Alaska Eskimo whalers, culminating in civil disobedience of the IWC moratorium (and NMFS' enforcement of it) and a subsequent indictment of the leaders of the Barrow Whaling Captains' Association (Langdon 1984; Freeman 1989; Huntington 1992) by a federal grand jury in Anchorage. Law enforcement officers were often seen up in Barrow, intending to enforce an internationally recognized quota on the aboriginal bowhead hunt. It was noted that there were improvements to be made in the efficiency of the hunt, but the command-and-control resource management strategy was not felt to be an optimal solution by Barrow whalers. Eventually, NMFS realized that it was unlikely to receive the sort of information it needed to effect the international treaty by force alone, as the officers relied on whalers to report their catch and communications were strained between NMFS and the whalers. A respondent knowledgeable of the history of the AEWC describes the chain of events that brought NMFS to the table:

> *And then finally...through the work of the lawyers in Washington, D.C., NOAA folks agreed to come and talk to us in Seattle. So the agreement was... because...the Federal Government was having trouble managing Natives! To them we were a big liability at the IWC* (Anonymous 2006b).

The eventually adopted management plan for the bowhead hunt relied on a devolved enforcement regime made up of whalers, the Alaska Eskimo Whaling Commission, and tribunals for any violations. The Alaska Eskimo Whaling Commission was the first co-management institution in the United States in which management of a subsistence resource was devolved to the subsistence users, and it has endured as a policy monopoly over bowhead whale subsistence management since its inception with no credible challenges to its authority.

The former member credits the reporting and enforcement authorities for building legitimacy in the agreement:

> *There were some hairy situations back then...the NMFS people who were trying to observe what was going on out on the ice, it, just even having a gun. That was a scary situation. I said...they're going to misinterpret that. You're an enforcement officer, even if that gun was used for bear protection, the interpretation would be, you're an enforcement officer, you know, get out of here. And it was testy. So...* [NMFS] *agreed to them, that all the reporting goes through the Whaling Commission. So...we wanted those things and...we also...sort of parallel to this agreement with the federal government, we were also working ways to have a clear lines...of communication and representation in...the community, local community to establish AEWC as a...real organization that represented the whalers* (Anonymous 2006b).

NMFS' early conflict and conflict resolution with the AEWC led to the adoption of a devolved harvest assessment program. When the IWC deleted its exemption for aboriginal whaling in 1977, NMFS lacked a management plan for bowhead whales (Freeman 1989). This gap allowed the whalers a window of opportunity to design a policy they could accept without having to fight an existing institution. The quote above illustrates not only how NMFS initially handled conflict and harvest assessment (e.g., on-site law enforcement officers), but also NMFS' willingness to adapt to the AEWC proposal. The whalers developed their own plan, which NMFS agreed to in 1982. Other influential factors include the resolution of conflict, brokered by Senator Ted Stevens, and evidence of the whalers' powers of collective action (e.g., civil disobedience towards the ban on whaling).

Structure of relationship with stakeholders

NMFS' tendency to contract out aspects of its work affects its policy choices in working with co-management groups. Although NMFS is responsible for protecting *all* whales, dolphins, porpoises, seals, and sea lions under the MMPA (and where relevant, the ESA), bowhead whales remain one of their largest cross-scale management programs, with a significant commitment to regional management, research and international diplomacy. The eventual success of the AEWC management plan led several other co-management groups to adopt their own strategies for managing harvests before federal rules were in place. At a 1991 (prior to the founding of

IPCOMM) conference on marine mammals in Alaska, NMFS representative Steve Zimmerman noted NMFS' responsibility for thirty species of marine mammals in Alaska. He said that in order to determine the removal rate for fisheries, NMFS needed to have good subsistence harvest numbers to work with. According to a report from the conference, Zimmerman planned to contract out this work (RuralCap 1991).

In 1994, the MMPA was amended to require harvest assessment programs for subsistence species. In most cases, NMFS outsourced harvest assessment programs to the State, and later, to co-management bodies. Many NMFS-related co-management bodies developed after 1994 were organized as a way for hunters and indigenous leaders to gain influence and control over how management functions such as harvest assessment would be implemented.

Because NMFS often contracts out harvest assessment work, the organizations submitting proposals have some freedom to experiment with harvest assessment methodologies and co-management processes. The Alaska Beluga Whale Committee, for instance, developed management plans and harvest assessment methods based on a strong working relationship with the Alaska Department of Fish & Game (ADF&G). Marie Adams Carroll, an early director of the AEWC, worked with marine mammalogist Kathy Frost of ADF&G to develop the organization into the successful co-management body it is today (Adams et al. 1993). The group came together with the primary goal of learning more about beluga whales and establishing a research plan that everyone could agree upon before a crisis required draconian methods (Huntington 1992; Adams et al. 1993; Anonymous 2006b). The Alaska Native Harbor Seal Commission also adopted a working relationship with the ADF&G division of subsistence to develop its harvest assessment methodology.

The State of Alaska has limited jurisdiction over marine mammal – human interaction, the most involved example of this relates to walrus haul-outs and subsistence hunting on Round Island, which they cooperative manage with the Eskimo Walrus Commission (EWC), the Quayassuq Walrus Commission[58], and the USFWS. However, the State has significant research capacity and aids many of the co-management boards or scientific staff in their collection of data and research. In the case of successful operational collaboration, this question of whether or not

[58] This Commission was developed around the Round Island sanctuary, and is funded through a sub-agreement to the USFWS-EWC agreement.

the state has a legitimate interest in marine mammal management is usually not an ongoing topic[59].

Another co-management body, the Cook Inlet Marine Mammal Council, assessed its own beluga whale harvests from 1995 until the species was declared depleted in 1999; an extremely limited hunt was allowed afterwards. NMFS had originally awarded ADF&G a contract to assess Cook Inlet beluga harvests; Cook Inlet hunters demanded a hearing with the NMFS Regional Director and they eventually secured a contract to assess their own harvests. Their effort dramatically improved NMFS' reporting reliability, especially in the estimation of the number of animals that were struck and lost (Anonymous 2007a). This late collaboration was too late to reverse the decline of the beluga population, which has stagnated in recent years. New co-management agreements such as that with the Aleut Marine Mammal Commission include harvest assessment along with a suite of other observations shared with NMFS's research arm, the Alaska Fisheries Science Center. These observations are part of an effort to build joint knowledge.

The U.S. Fish & Wildlife Service

The U.S. Fish & Wildlife Service (USFWS) is the premier agency in the United States regulating activities that may impact wildlife on federal lands, and protected species on other lands. The USFWS is predominantly a terrestrial agency as part of the Department of the Interior, but also has jurisdiction over walrus, polar bears and sea otters in Alaska (as well as manatees in Florida). It has a strong presence in Alaska as federal wildlife refuge managers and have a substantial staff of social scientists within their terrestrial division, as required for work implementing federal land acts such as the Alaska National Interest Lands Conservation Act of 1980[60] (ANILCA PL 96-487) which requires an analysis of a development's impact on subsistence if federal permits or funds are involved. Its marine mammal division has its own office in Anchorage but also works with the marine mammal research specialists at the U.S. Geological Survey's (USGS) office in Anchorage. The Biological Resource Discipline (BRD) at the USGS is a science agency for all of the Department of Interior agencies and operates a client-driven approach to science. Its staff has not entered into any co-management agreements.

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[59] This topic does come up frequently at policy-oriented venues such as IPCOMM meetings.
[60] Pub. L. No. 95-487, 16 U.S.C.A. §§ 3101 et seq.

The USFWS and co-management partners generally develop MOUs for general statements of co-management goals. However, at the moment, only one of the three co-management bodies has an MOU. The Nanuuq Commission does not have one and the Alaska Sea Otter and Steller Sea Lion Commission (TASSC) no longer has a co-management relationship with USFWS, as sea otter hunting communities have been re-organizing that board[61]. Co-management tasks are outlined in cooperative agreements that are contracts for services. The three key co-management bodies are budgeted within USFWS' annual appropriation from Congress, thus tying the co-management boards to their partner agency more fully than most boards working with NMFS.

USFWS also has international projects with Russian counterparts and other countries involved in international treaties protecting animals with special conservation needs. The department enforces the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In addition to export/import permits, under the MMPA, the department maintains its own program for collecting information from harvested marine mammals called the Marking, Tagging and Reporting program and has a large enforcement team to fight trafficking of endangered or threatened species. The enforcement division has a separate chain of command, and reports to the Service's headquarters office in Washington, DC. This separation gives the division independence from the management staff, but also causes some tension with co-managers who may not have control over how the enforcement staff will use information it shares.

USFWS agency culture

The internal orientation of the U.S. Fish & Wildlife Service influences the way the agency approaches and conceptualizes co-management. A U.S. Fish & Wildlife Service (USFWS)-sponsored program evaluation for the implementation of an ecosystem management approach in 1998 (Mullins et al. 1998) contains several findings that support the proposition that the agency is internally oriented and tends towards hierarchical decision-making. When discussing how the agency has approached partnerships for implementing ecosystem management programs, the authors noted that interviewees and survey respondents did not readily discuss partnerships as part of their daily work.

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[61] One respondent characterized sea otter co-management as a "loveless arranged marriage."

A theme also emerged:

> *...that suggested partnerships are being pursued with stakeholders that essentially agree with Service opinions. There was a strong cry that the Service put more effort into reaching out to stakeholders who have not traditionally been their friends...It was obvious from the data that the Service is still struggling to be flexible in creating and participating in worthwhile partnerships with a wide variety of stakeholders* (Mullins et al. 1998: 5).

Since the evaluation was published, the Service has engaged it what it calls "Cooperative Conservation." Bush Administration DOI Secretary Gail Norton defined[62] this term as a partnership-based approach to stewardship through a process, "*...called the 4C's - conservation through cooperation, communication, and consultation.*" The Bush Administration also passed guidelines requiring federal natural resource and environmental agencies to include cooperative conservation principles in mechanisms for hiring, training and rewarding employees.

The running joke in Alaska co-management circles is that this approach translates to, "You cooperate, and we manage." In many programs in Alaska, the cooperative conservation model appears to emphasize the communication and consultation elements, resulting in programs predominantly managed by the Service. Importantly, cooperative agreements are also federally recognized mechanisms for transferring funds to external groups.

Ohlson et al. (2008) examined the cooperative agreement between USFWS and the Nez Perce Tribe in central Idaho and found the agency cautious in sharing authority, but willing to devolve operational tasks. The Tribe assumed operational management of the recovery plan; both the Tribe and the agency found the collaboration to be a success. Where they disagreed was on the institutional authorities that would underlie a cooperative versus a co-management agreement. The Secretary has authority under the Endangered Species Act (ESA) to manage listed species and so defined the relationship as a cooperative agreement. The Nez Perce have treaty rights to local resources and so saw their authority as vested in their treaty relationship to the federal government; consequently, the Tribe considered the agreement to be one of co-management. In an interview, Ohlson et al. (2008) found that one of the USFWS' concerns with calling the relationship a co-management agreement was that it may signal to non-cooperating partners (e.g., the State of Idaho, which refused to participate) that the federal government is ceding

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[62] This approach is outlined at www.fws.gov/partnerships/ and was accessed on March 22, 2009.

sovereignty. Additionally, the agreement allowed the Tribe to take over operational management of the program, but not have an equal seat in higher-level policy decision-making.

The authors note that despite the Service's Native American Policy (USFWS 1994), ostensibly explaining the Service's authority to co-manage[63], the word and its implications proved to be a disconnect between both partners' goals for the program. This relationship is similar to most co-management arrangements in North America, in which the federal sovereign maintains a veto over decisions made by a co-management group. In this case, the Service was responsive to external partners, innovative and adaptive, although it did not go as far towards shared decision-making as the Nez Perce Tribe felt was warranted under their treaty. Thompson (2006) described the same relationship as a cooperative one, rather than a co-management one due to that difference.

Three studies in Alaska (Chambers 1999; Watson 2007; Robards 2008) characterize relationships between Alaska Natives and the Service's Alaska Regional Office. Chambers (1999) documented the evolution of the Eskimo Walrus Commission and its relationship with the USFWS. Even though the EWC developed its own management plan in 1984, modeled on the AEWC plan adopted by NMFS, it was never operationalized. The 1984 plan, though, did lead to a 1987 MOU that built the foundations of the relationship between the agency and hunter representatives, focusing on communications and statements of joint values. The Executive Director at the time, Caleb Pungowiyi, conceded that the EWC did a lot of cooperating, and not much managing at this point, but did successfully begin to build a relationship with USFWS. This spirit of cooperation turned sour in 1990[64], when the Service initiated Operation Whiteout, a law enforcement raid on several walrus hunting villages, hunters, and ivory buyers (Chambers 1999). The investigation was initially supported by some Alaska Native leaders concerned about

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[63] The policy states, "The Service recognizes that as a result of treaties, statutes, and judicial decrees, certain Native American governments, along with State governments, may have shared responsibilities to co-manage fish and wildlife resources. In such cases, the Service will cooperate with Native American governments and affected resources management agencies to help meet objectives of all parties" (USFWS 1994: 4). The policy also declares that the Service will retain primary authority to manage resources on Service lands.

[64] Around the same time (1993), the Service was in tense discussions with Central Yup'ik Eskimo communities in the Yukon Delta National Wildlife Refuge about developing a brown bear co-management agreement (Spaeder 2005) after the Regional Director approved a brown bear study against significant local opposition. Although leadership is not treated separately to organizational culture in this study, conflict resolution obviously requires agency buy-in at high levels in order to succeed (see Pomeroy and Berkes 1997).

growing alcohol and drug abuse tied to ivory sales, but the media sensationalism of the "head-hunters" investigated caused much anger in the Native community. Pungoyiwi (1997) notes:

> *Things worked well until 1991 when USFWS conducted Operation Whiteout and did not inform EWC until they had issued a press release on the operation...An angry meeting was held in November of '91 with Native leaders charging USFWS of not living up to the cooperative agreement. The relationship remained tenuous between 1991 and 1993 until a new* [USFWS] *Regional Director was appointed* (Pungowiyi 1997 as cited in Chambers 1999:49).

By 1999, Chambers reported the EWC involvement in multiple management programs and projects, some directed by the EWC, some involving joint work, and many directed by the agency. In USFWS projects, he notes, "*...the role of the EWC is to facilitate greater Native participation in USFWS projects by encouraging Native hunters to cooperate.*" EWC is expected to help USFWS assess harvests, remind hunters of wasteful take guidelines, and engage in cooperative enforcement efforts. Both the EWC and the USFWS encouraged the development of local ordinances and local management capacity, but by 1999, only one village ordinance had advanced. The agency in 1999 seemed open to the possibility of devolved management authority, with the agency taking a back-up role in the case of egregious violations or involving other crimes. The Whiteout Operation set back the aspirations of both communities and managers.

By the mid-2000s, Robards (2008) found the situation essentially unchanged from 1999, but with flagging local interest in management activities[65]. The MMPA has not been reauthorized since 1994, so no additional funding or authorities have been available to effect an AEWC-style management plan. In addition, conservative factions within the State of Alaska government have bitterly fought tribal sovereignty over the actions of their own members, including lobbying Congress against new management authorities proposed for the Marine Mammal Protection Act reauthorization process.

Robards (2008) describes the relationship between the Eskimo Walrus Commission and the USFWS as one in which Alaska Native hunters lack a meaningful role in problem definition and decision-making. He describes a regime more focused on the "authentic" uses of walrus according to MMPA regulations than the ultimate scale of the harvest (Robards 2008), which the

[65] But see Fernandez-Gimenez et al. (2008) for a discussion about social and cultural barriers to formalizing local management plans in beluga whale hunting communities.

federal courts limited purview of in *People of Togiak v. United States*[66] absent a finding of depletion of the resource. Robards (2008) also describes walrus co-management decision-making as being situated primarily at the collective-choice level, whereas conflict between hunters (manifested at the day-to-day operational level) and the agency are generated by vaguely defined constitutional-level rules that hunters do not have deliberative purview over. Furthermore, the focus on authenticity alienates the practical realities of the hunters from the constitutional level rules, constraining meaningful dialogue with hunters. Three other current and former executive directors of the EWC have also described the relationship as predominantly top-down (Pungowiyi 1997; Anonymous 2006c; Anonymous 2006d).

Watson (2007) followed the interactions between Koyukon elders and the Service's Migratory Bird Program. She notes that during her fieldwork, a regional refuge manager had a friendly, collegial working relationship in producing knowledge about avian ecology with locals and elders. However, local villages experience the regulatory program for migratory birds[67] as well as other subsistence resources such as moose as top-down processes. In her study, regional subsistence advisory councils are predominantly platforms for the exchange or reception of information, and not typically a deliberative space. Research methods and findings may be debated or clarified, but policy-level discussions are not typically engaged. A 2007 multi-agency "listening tour" is an example of this approach.

USFWS agency culture survey results

Staff members of the Alaska Regional Office of USFWS were surveyed during the summer of 2008 in order to further examine agency tendencies towards policy approaches. The majority of respondents ranked USFWS as a hierarchy culture overall (figure 4.7) with a mean score of 33.76, followed by clan (25.76), market (22.23), and adhocracy (16.17). This result indicates that the agency is perceived to be internally oriented and with moderate levels of flexibility as compared to other organizational types. The cooperative conservation model adopted by the Service is culturally consistent with the hierarchy and clan archetypes, as they both emphasize an internal orientation. USFWS respondents considering how the agency works with stakeholders (figure 4.8) were split between two archetypes, hierarchy (27.87) and clan

[66] 470 F. Supp. supra at 428.
[67] The subsistence harvest of migratory birds in Alaska are co-managed between the Service and regional government representatives through the Alaska Migratory Bird Co-management Council.

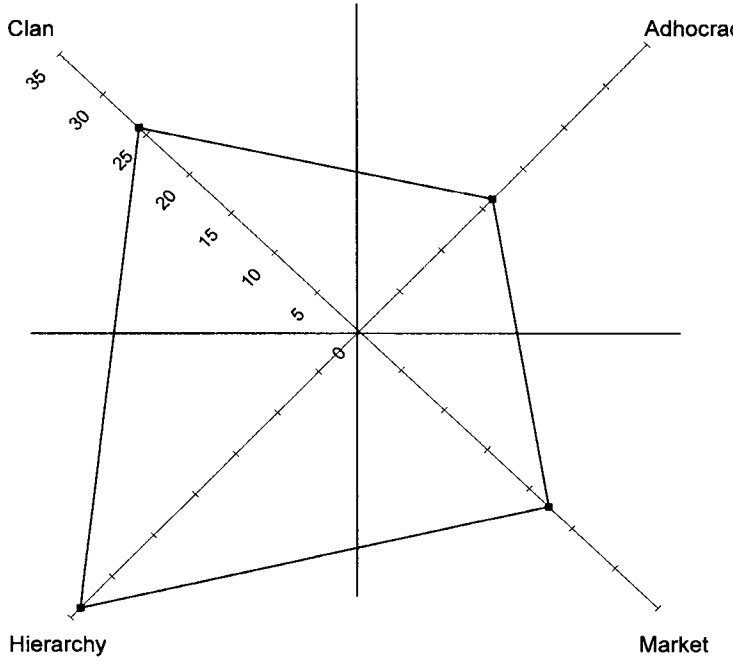

Figure 4.7 USFWS organizational culture The mean response (n=57) is "hierarchy."

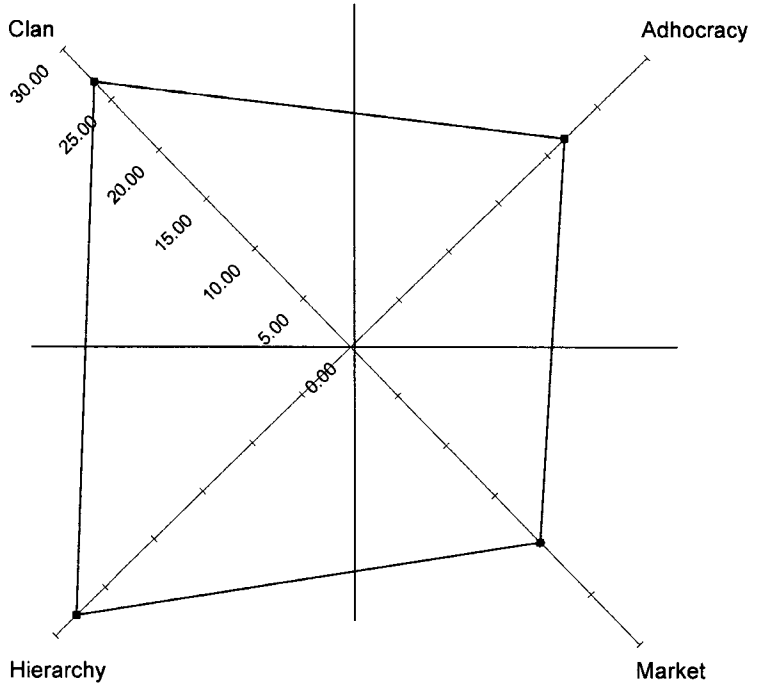

Figure 4.8 USFWS stakeholder relations The mean response (n=57) is "hierarchy."

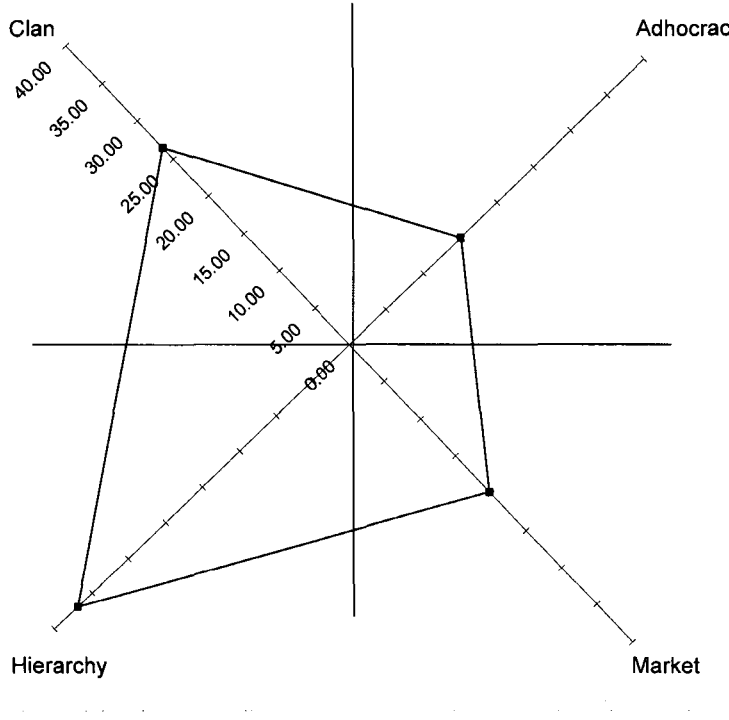

Figure 4.9 USFWS uncertainty The mean response (n=57) is "hierarchy."

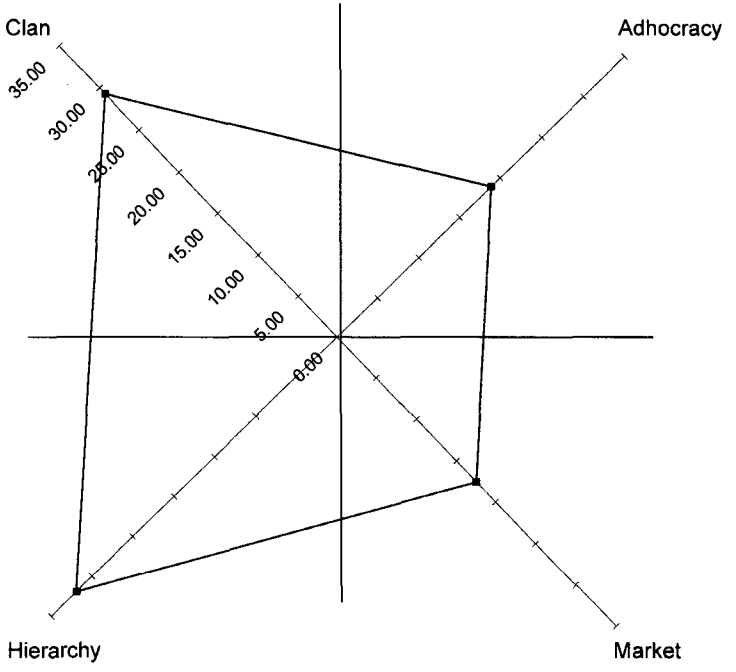

Figure 4.10 USFWS seeking information The mean response (n=57) is "hierarchy.

(26.76), representing an organization that tends to work with close partners and trusted allies. These profiles align with the statement representing clan behavior, "When working with stakeholders, our organization develops solutions to resource management issues through a trusted group of employees and allies" and the statement representing hierarchical behavior, "When working with stakeholders, our organization works with stakeholders to the extent that standard procedures and efficiency allow."

The strength of the hierarchy response in Figure 4.9 (36.82) represents agreement with the following statement, "When dealing with uncertainty, [USFWS] turns to standard procedures, internally produced information, and efficiently executes its plan." Finally, Figure 4.10 illustrates the strength of USFWS' hierarchical (31.93) and clan-like (29.30) cultural attributes in relationship to seeking information. These results also emphasize an internal orientation.

History of walrus and polar bear harvest assessment policy

Cultural approaches to problem solving and a history of prior interactions combine to affect agency and community expectations of future collaborations. The history of conflicts between USFWS, Alaska Native hunters, and policy choices in the early 1970s continue to affect the design of harvest assessment programs and their success. After the passage of the MMPA, the USFWS decided to institute its own harvest assessment program, the Marking, Tagging, and Reporting Program (MTRP). After the *Togiak* case, which effectively struck down federal and state attempts to regulate subsistence, takes of walrus before the population was threatened, the Department of the Interior decided to develop a monitoring program so that they could determine how many walrus were taken, and what level of harvest was sustainable. According to a Congressional report of the era:

> *The general accounting office, in its recent report on the act, notes that a monitoring program would provide essential management data on the status and condition of the walrus population. Unfortunately...it is less than clear under the existing Act whether the appropriate federal agencies have the authority to monitor the nature and extent of the native take of marine mammals. In addition, it is feared that the prohibition section contains a loophole that will allow for the commercialization of marine mammal products by Natives, which goes far beyond the obvious intent of the Act* (U.S. House of Representatives 1981).

The MTRP was introduced as a method for not only assessing harvests, but also in tracking trade in commercial animal goods, in fulfillment of American responsibility under the 1973 Agreement on the Conservation of Polar Bears and the 1975 international Convention on International Trade in Endangered Species of Wild Flora and Fauna[68] (CITES).

Although walrus were the target of the monitoring program, the USFWS decided to adopt the same program for polar bears and sea otters as well[69]. The program was included in the 1981 amendments to the MMPA, but not launched until 1988. Before preemption by the MMPA, the State of Alaska tracked polar bear harvests largely by reports from sport hunting guides as well as self-reported subsistence harvests. After the 1972 law went into effect, the State worked to develop a more robust harvest assessment method in anticipation of regaining management authority over marine mammals (see chapter three). Eventually, the State dropped its bid to regain management authority and the program was turned over the USFWS. When the Polar Bear Agreement came into force (1976), the American Government pointed to rules within the MMPA as satisfying their treaty obligations (Baur 1995).

In 1987, the government of the Netherlands proposed to list walrus under CITES, Appendix II, in response to the decline of the Atlantic walrus and reports of wasteful hunting practices in Alaska. In response, an Alaskan delegation composed of Eskimo Walrus Commission leaders Matthew Iya, Ron Nalikak, and State biologists John Burns and Lloyd Lowry traveled to the meeting and managed to have the proposal withdrawn after discussions with the Dutch delegation (Chambers 1999). Even if the CITES proposal had been accepted, the trade regime does not have the same operational oversight as the IWC and would not likely lead to enhanced local authorities.

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[68] Convention on International Trade in Endangered Species of Wild Fauna and Flora, with appendices, March 3, 1973, TIAS 8249, 27 UST 1087, 993 UNTS 243 (March 3, 1973) [hereinafter CITES].

[69] One drawback to having a comprehensive plan is that in communities with both walrus and polar bear, the presence of USFWS enforcement officers during an investigation often results in negative feelings. towards USFWS as a whole and may deter harvest reporting. During a recent heavy period of law enforcement activity in a village in Southeast Alaska, for instance, no tribal member could be found that was willing to become a tagger for sea otters, and eventually someone from NMFS ended up with this task (Anonymous pers. comm.).

Structure of relationship with stakeholders

The way the U.S. Fish & Wildlife Service engages with stakeholders affects policy choices. USFWS has authority for three marine mammal subsistence species and maintains harvest assessment as an in-house program. The stated goals of the program are threefold:

> *...1) monitoring the subsistence and handicraft harvest of polar bears, sea otters and walrus; 2) obtaining essential biological data needed to manage these species or stocks; and 3) helping to control the illegal take, trade, and transport of specified raw marine mammal parts* (USFWS 2009).

USFWS has also experimented with additional harvest assessment programs, such as the Walrus Harvest Monitoring Program (WHMP), in which agency biologists work with hunters in the villages with the largest walrus harvests to estimate the amount of walrus harvested in real time (i.e., on the day of the harvest). This program has been considered a success in the past and has been used as baseline data to compare hunter compliance to the MTRP (Burn 1998). In a 2005 meeting of the Eskimo Walrus Commission the Chairman noted that even though the WHMP is voluntary, it has had a higher rate of success than the statutory MTRP and yet as a voluntary program, was subject to budget cuts. In 2004, USFWS undertook an internal evaluation of the MTRP, including asking questions to taggers about their evaluation of the program. The program report is unpublished, but was reportedly used to reform the program. It is unclear to what extent the USFWS could or would experiment with the MTRP, as it is a statutory requirement under the MMPA and is a budget line item, meaning that the program is institutionalized within the Regional Office and supports staff that the agency would otherwise have to find additional funding for. The agency's preference has been to strengthen the MTRP program, rather than enhancing their programs that have been proven more effective, like the WHMP.

The USFWS and their research partner the U.S. Geological Survey Biological Resources Division maintain a strong polar bear research program that tracks many other indicators of polar bear population status, such as capture and re-capture studies, as well as surveys of denning sites and modeling the potential impacts to bears from climate change. It is unclear how much of this polar bear research involves the Nanuuq Commission or specific villages. Contracts in the past for the Nanuuq Commission specified particular research projects. Board meetings were observed to be a place for the agency and commissioners to exchange information about harvests, population monitoring, research projects, and interactions with industry. The USFWS consults the Commission on regulatory programs but they have also together developed new programs such as

the new treaty[70] between Russia and the United States relating to the conservation of the Chukchi Sea polar bear population.

The Commission has spent significant time building the new Alaska-Chukotka treaty and relationships with Chukotkan partners. They have not yet begun to implement the agreement. In comparison, most of the NMFS boards are either engaged in implementing specific rules or undertaking specific management tasks like research and harvest assessment. At an IPCOMM meeting in 2006, the commissioners discussed the downside of NMFS' co-management model: some boards have taken on more agency-specific tasks versus their own priorities, and do not have the same financial security as the three USFWS co-management boards. However, there have been years in which a large portion of funds dedicated to the Nanuuq Commission and the Eskimo Walrus Commission went towards USFWS priorities, such as aerial population surveys (Meek et al. 2008).

Policy outputs and outcomes

This section compares key policy outputs and outcomes between the two agencies using the co-management policy typology. I describe performance across tasks generally and specifically for tasks related to quotas and harvest assessment. The impacts of the two programs to systemic resilience will be discussed in chapter six. Bowhead whale management in Alaska is accomplished largely through the existing research and monitoring programs, many of which rely on subsistence harvest for data. The management program is largely ad-hoc, as neither a recovery plan nor critical habitat was ever declared for the Bering-Chukchi-Beaufort stock of bowhead whales (Anonymous 2007b). Despite the lack of a comprehensive plan, management activities and, until recently, low levels of development in its habitat have been successful in recovering bowhead whales to the point at which senior NMFS biologists have suggested de-listing the species from the Endangered Species Act (Shelden et al. 2003). The ad-hoc nature of the management regime, however, combined with NMFS' external orientation and the institutional legacy of the AEWC management plan, have created conditions conducive to a devolved management program. To this day, the regime for bowhead subsistence management remains most active at the local levels, where whaling captains and AEWC officers manage and report to

[70] Agreement between the Government of the United States of America and the Government of the Russian Federation on the Conservation and Management of the Alaska-Chukotka Polar Bear Population, United States T. Doc. 107-10.

their federal partners (figure 4.11). An example of specific policy outputs relating to quotas and related power-sharing manifestations are found in table 4.2. Linkages to federal partners seem strongest in terms of the ongoing biological research plan and in negotiations with industry over offshore oil and gas exploration. Enforcement officers or other NMFS staff are rarely seen in Barrow. Under the stewardship of the AEWC, the efficiency of the hunt has improved dramatically, from an estimated efficiency rate of 50% caught whales in the late 1970s (NMFS 1977) to an average efficiency of 78% caught whales between 1995 and 2007 (IWC 2008). Most significantly, the AEWC harvest reporting program is estimated to achieve a 98-100% rate of reporting (IWC 2008). The AEWC has also been successful in regulating the harvest to achieve particular results, such as reducing the taking of large old whales (Bodenhorn 2001)[71] and punishing any intentional take of whale calves, against NMFS and AEWC regulations. Infractions have been rare over the period of the AEWC management era. In addition, all of these outcomes have positive implications for the sustainability of the Bering-Chukchi-Beaufort (BCB) bowhead whale population, as well as for the whaling communities, who are dependent upon bowhead whales for significant cultural, nutritional, and social needs.

Several respondents credit the scrutiny of the IWC as well as improved technology and training for the improvement. However, most whalers interviewed expressed frustration in that whalers are so heavily regulated, while oil and gas companies seemingly do whatever they would like to. To date, once permitted, industrial operators have been allowed to operate in whale habitat, provided that they coordinate their exploration with subsistence whaling activities through the AEWC and monitor the impact of their activities on marine mammals within a particular radius of their operations. The task of negotiating these Conflict Avoidance Agreements has largely fallen to the AEWC, who must coordinate with an increasing number of oil and gas companies.

A NMFS biologist expressed concern over the increasing responsibilities of the AEWC when discussing key challenges of co-management:

> *Well, I, the, the one I sense most recently is that...* [the] *AEWC...in addition to just managing the harvest which is...a huge effort...in itself, and instead it's being forced more and more into deal with...management issues...like...developing,... negotiating,...and issuing...Conflict Avoidance*

[71] But note that large whales are still preferred in some communities such as Gambell and Savoonga.

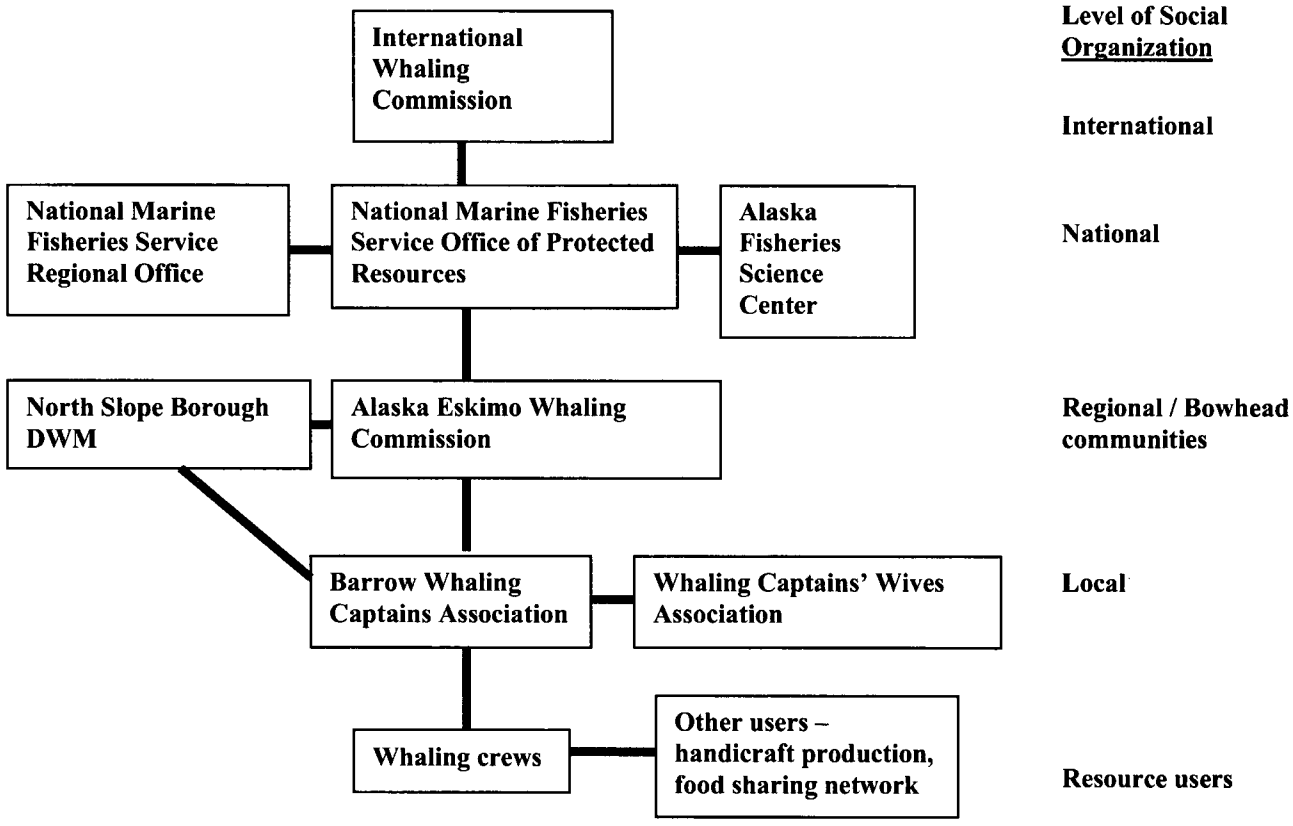

Figure 4.11 Bowhead whale harvest assessment network in Barrow, Alaska

Table 4.2 NMFS and USFWS policy outputs

Regime	Outputs	Level of decision-making	Power-sharing	Top-down or bottom-up dynamics
NMFS Bowhead Regime	Development of quotas	Constitutional	AEWC is part of US delegation to IWC but does not have executive power over decisions	Top-down but quota informed by nutritional need
	Bowhead harvest assessment	Operational	Devolved policy implementation	Bottom-up
	Enforcement of quotas	Operational	Devolved policy implementation with federal back-up	Bottom-up
	Enforcement of non-wasteful hunt	Operational	Devolved policy implementation with federal back-up	Bottom-up
USFWS Polar Bear Regime (Southern Beaufort)	Development of quotas	Constitutional	NSB-IGC develop quota with technical support from USFWS and DFO	Joint activity*
	Polar bear harvest assessment	Operational	Contracted local taggers	Top-down
	Enforcement of quotas	Operational	USFWS gives a set amount of tags to local taggers	Top-down
	Enforcement of non-wasteful hunts	Operational	USFWS patrols craft fairs	Top-down

*Quota cannot exceed federal definitions of sustainability (e.g., in the U.S., rate of potential biological removal (PBR)) expressed in the Marine Mammal Protection Act that implements the Agreement on the Conservation of Polar Bears.

> *Agreements, or CAAs, which is...a kind of a big part of the coinage of what goes on up there in these days. That is...something the National Marine Fisheries* [Service] *uses to demonstrate that they have reasonably complied with the subsistence requirements on these MMPA authorizations...that they haven't...unreasonably...interfered with the subsistence...needs. But by doing that...AEWC, while they're looking out for their...the interests of their subsistence hunters... and you know, people in the community...it places huge demands on them in terms of...time and staffing and going to meetings, all that stuff, and you just kinda see...those paths diverging* (Anonymous 2007b).

The responsibility of coordinating with many oil and gas companies is a downside to devolved policy arrangements as NMFS could potentially bring more regulatory weight to bear on the negotiations, if the agency chose that direction.

The Nanuuq Commission has been involved in a range of management activities, including: mapping polar bear habitat in Alaska and Chukotka through traditional knowledge studies, high level treaty negotiation and design of co-management structures for implementation of the Agreement on the Conservation and Management of the Alaska-Chukotka Polar Bear Population, and harvest guidelines for hunters and handicraft makers (Johnson 2001; Meek et al. 2008). The Agreement creates a new management regime for the Chukchi Sea polar bear population, including an international commission and enforceable quotas on harvests. On the U.S. side of the border, these enforcement powers can be legally devolved to the Nanuuq Commission or local entities, which would create the political conditions for active management of the polar bear harvest. To date, the USFWS has not had the policy tools to actively manage the harvest due to the Marine Mammal Protection Act's exemption for Alaska Native harvesters unless a marine mammal population is officially found to be depleted. This exemption has empowered Alaska Natives in some ways and bound their governments in other ways. For instance, the exemption has enabled *de facto* institutions around harvesting to persist parallel to federal institutions. However, the lack of clarity in management rules has also lead to conflict between local hunters and enforcement personnel (Robards and Joly 2007-2008; Anonymous 2009).

To manage this type of conflict, many co-management bodies and their federal partners have sought the power to manage before depletion, with the thought that active local management

would reduce the likelihood that populations would become depleted or threatened (e.g., under the Endangered Species Act). This policy change would require an amendment to the Marine Mammal Protection Act, something the State of Alaska has actively lobbied against (see chapter three). The subsistence[72] take of Southern Beaufort Sea population of polar bears is managed through an interlocal agreement between the Inuvialuit Game Council in the Northwest Territories (Canada) and the North Slope Borough Fish & Game Management Committee (IGC-NSB agreement). Both parties agreed to a voluntary quota system developed in 1988 (Brower et al. 2002; Lovecraft 2007). During joint meetings, the parties set and divide the quota based on technical advice from federal and territorial biologists and other considerations such as economic return for sport hunting on the Canadian side. On the American side of the border, the quota is distributed through hunters reporting their harvests to federally authorized taggers through the USFWS' Marking, Tagging and Reporting Program. Polar bear management in Barrow is a diffuse network (figure 4.12), as compared to the vertically integrated workings of the bowhead regime. Taggers reside at several local government organizations and include a few at-large operators in the community.

The Fish and Game Management Committee of the Borough provides a potential forum for collective action on polar bear management, but in 2006 was not systematically connected to the Nanuuq Commission. The previous chairman of the Committee was also chairman of the Nanuuq Commission but many of these boards were in flux after a new mayor of the North Slope Borough was elected and promoted the deputy director to the leadership of the Dept. of Wildlife Management. A previous director described pulses of polar bear policy activity, especially around the development of the IGC-NSB agreement. As of 2007, the situation of staffing had normalized. However, with a drop in the USFWS' funding for co-management and other activities, connections between the Nanuuq Commission and Barrow remained weak.

Harvest reporting is encouraged by Borough staff and USFWS personnel, who in times past had threatened enforcement action in order to improve compliance. Now taggers and borough staff are more likely to call on successful hunters to come and report their catch if they have not yet done so. However, the estimated rate of compliance is low as compared to reporting

[72] Subsistence includes the right of Inuvialuit communities to sell a certain portion of their polar bear quota to sport hunters, as per their land claim agreement with Canada.

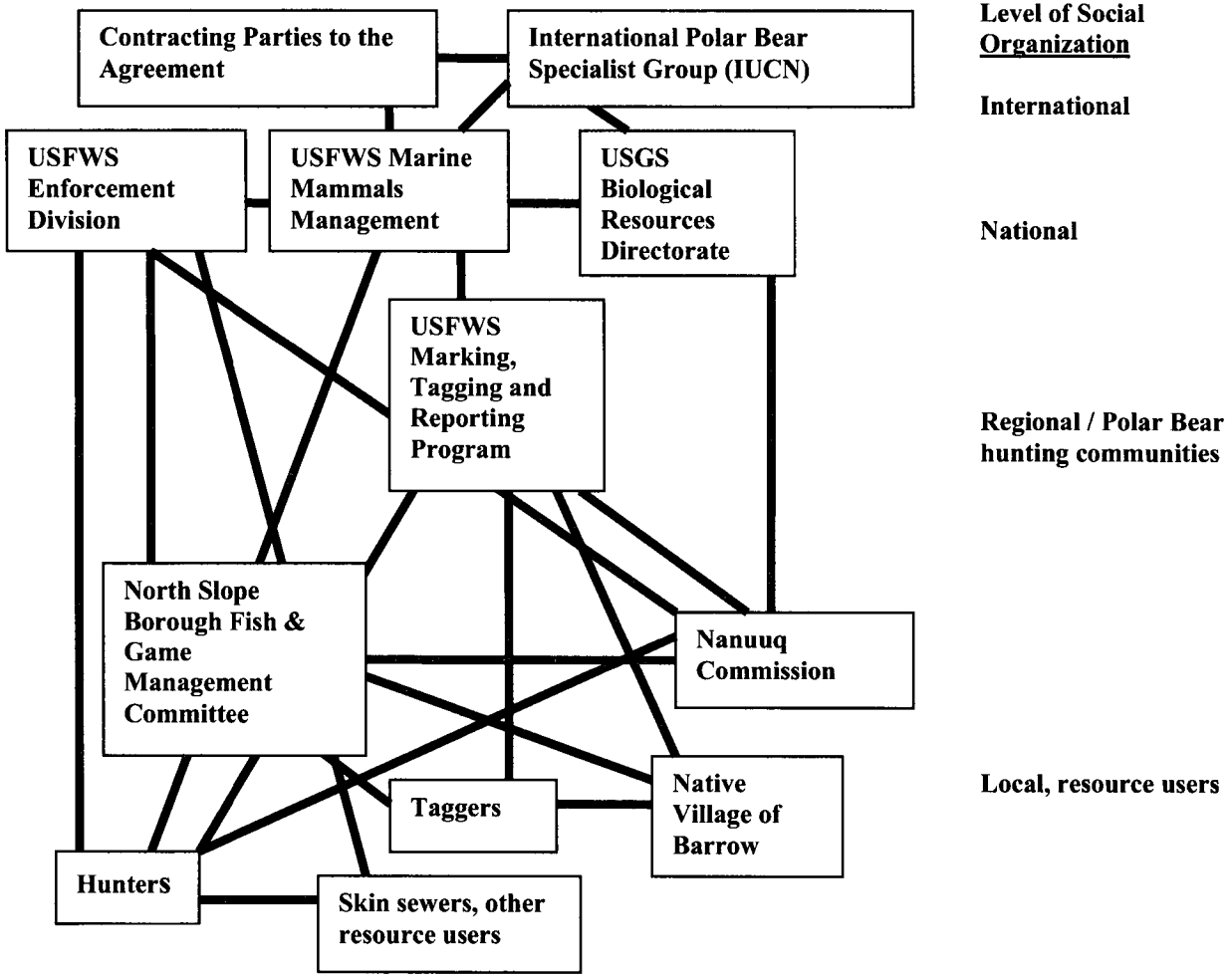

Figure 4.12 Polar bear harvest assessment network in Barrow, Alaska

under the Inuvialuit regime on the Canadian side (Anonymous 2006b). USFWS personnel, including biologists and harvest monitoring staff, periodically visit town to discuss ongoing studies and enforcement issues. It is important to note that the USFWS is also responsible for several other subsistence-harvested species, such as birds protected under the Migratory Bird Act, and walrus. Residents of Barrow have responsibility for following hunting regulations enforced by USFWS for all of these species. Visits to Barrow by enforcement staff became more conflictual in 2007 and 2008, as they conducted a series of investigations into wildlife management issues.

The Southern Beaufort Sea stock of polar bears has not been actively managed in Alaska for years, as harvests on the American and Canadian side have not been substantial since the 1972 Marine Mammal Protection Act ended sport hunting in Alaska and the 1973 Polar Bear Treaty came into force in Canada. Barrow polar bear management activities in recent years have involved public safety and food management issues. Polar bear patrols were organized in the past to assist residents in keeping bears out of town. Now the Borough sends out polar bear guards on an on-call basis. Polar bear guarding is also an entrepreneurial activity; many residents work part-time guarding industry or researchers in the field. Hunters report that the numbers of bears coming ashore in Barrow and other North Slope communities have increased in recent years; biologists predict this number to increase as habitat pressures push bears off the pack ice towards near-shore environments. With the May 2008 federal decision to list polar bears as threatened under the ESA, an increase in active management is likely. At the time of this study, though, the government had not publicly proposed any new rules affecting the Alaskan harvest.

Discussion

All federal agencies are constrained from sharing ultimate authority by governing institutions and executive policy interpretations. Agencies often have discretion, though, in developing new approaches, reforming old ones, and creating operational rules sets that work from a position of power sharing, given the resources to do so. Where agencies do have discretion, their organizational cultures, history and structures shape policy adoption and implementation. Table 4.2 illustrates how the choices adopted earlier in an agency's history (e.g., harvest assessment method) shape the everyday experience of these policies at the operational level – where villages hunt subsistence resources and interact with agency rule sets.

Agency reactions to crises in the resource reveal key differences. In the case of the whalers, to reduce conflict NMFS devolved enforcement powers to the whalers themselves as

legal threats were a significant source of distrust and conflict. When faced with a similar crisis, USFWS reached inward to develop a harvest assessment program, even as distrust and conflict were intensified. The cases also illustrate how the intense focus on international relations can create windows of opportunity for innovation. For instance, it is conceivable that NMFS may not have devolved management functions to the AEWC if the resource had not been under such intense scrutiny. In addition, it is plausible the AEWC may not have formed if there had not been an intense threat from international regulation. Polar bear hunters do not yet have access to international decision-making structures in ways similar to the whaling captains.

Even though the polar bear quota-setting exercise is a shared process (within federally defined limits of sustainability), the day-to-day experience of most people interacting with the agency is in a top-down fashion. In contrast, as a part of the U.S. delegation, the AEWC strongly influences the quota-setting process at the IWC. The U.S. government has the final say in how they implement IWC quotas[73]. Despite this limitation, the AEWC is largely experienced day to day as a community-organized regime. That is not to say that whalers accept the jurisdiction of the IWC in theory (in practice, however, IWC regulations are more internalized into local discussions than are polar bear rules developed by USFWS, their international partners to the 1973 Polar Bear Agreement, and the Nanuuq Commission). In Barbara Bodenhorn's (2001) analysis of local decision-making among whalers in Barrow, many respondents related how they are making decisions about sharing, waste, and other local rules to how "they" will see it if Iñupiaq don't follow the rules. With the 2008 Endangered Species Act Listing decision for polar bears, this type of cross-scale rhetoric has become more evident in Barrow for polar bears as well. Whether or not polar bear hunting communities will be able to control their fate in relationship to international scrutiny is an open question.

The weight of evidence presented points to agency cultures as an important factor in how the USFWS and NMFS interact with stakeholders. When placed in historical and structural contexts, the externally oriented culture of NMFS has shaped co-management regimes to be more open, scientifically oriented, with local management authorities. USFWS has relied on working with a small group of trusted allies, and so its co-management relationships often focus on joint activities and information sharing. With a more hierarchical organization, and management authority over species with high commercial value, USFWS has had a more contentious

[73] In 1977, the U.S. could have objected to the IWC's deletion of the aboriginal whaling exemption but it did not due to its stance promoting a moratorium on commercial whaling. In doing so, the U.S. recognized Alaska Native whalers as under the jurisdiction of the IWC.

relationship with its boards in general. The Nanuuq Commission and the USFWS seem to have worked out a relationship at the international and regional scale that works based on largely autonomous activities pursued by the Nanuuq Commission, co-funded by the National Park Service. These high-level policy dialogues have not yet translated into greater autonomy at the local scale. In Barrow, relationships between USFWS and local hunters remain strained by heavy enforcement actions.

Scaling up from the local level, regulatory regimes for marine mammals exist across scales and interact with other institutions for both commerce and conservation. Additionally, exogenous forces such as climate change may significantly affect Arctic marine mammals. A full analysis of institutional effectiveness, therefore, must also address the larger political, ecological and economic contexts such as international policy regimes, industrial development, and environmental change. These drivers of policy impact will be analyzed in chapter six.

Implications, challenges, and limitations

This chapter attempted to empirically evaluate the affect of agency culture, history and structure on policy choices and general outcomes (e.g., whether or not the policy has its intended social effect). Data on this topic was difficult to access, and the low rate of return on the agency culture survey from both agencies makes inference a complicated affair. However, I have been able to rely on multiple sources and methods in constructing my analysis, the most important of which has been to observe interactions at multiple co-management boards and relate those discussions to conversations with hunters in Barrow and Wainwright.

I suggest future research at the board-level scale, with a retrospective of co-management through a longitudinal analysis of meeting minutes; additionally, a period in observation at the international level for both polar bears and bowhead whales would help to discover how problems and management visions are framed at the international scale, in comparison to the local scale. Unfortunately, the polar bear policy regime at all scales is insular and difficult to collect data on. Part of this difficulty arises from the development of the regime itself, as the agreement was developed among a small group of polar bear specialists, the quasi-governmental International Union for the Conservation of Nature (IUCN), and negotiated during the cold war when there was considerable mistrust between the Soviet Union and the other Arctic states (Larsen and Stirling 2009). Consequently, the parties decided to create a regime without implementation protocols (Fikkan et al. 1993) and in the United States, there is a limited paper trail on program accomplishments or benchmarks for evaluating policy success against except for their

participation in the IUCN Polar Bear Specialist's Group[74]. The new international regime designed for the Chukchi population shared with Russia establishes a more formal commission structure, open to public scrutiny. This format may allow a more transparent process than exists at present, one that could easily be followed and analyzed. At the present time, the U.S. Fish & Wildlife Service and the Nanuuq Commission co-manage through funding contracts, as they have not negotiated an agreement describing roles, responsibilities and authorities. Consequently, governing through contracts for services results in a fragmented public record that is difficult to access for constituent villages and the interested public. The formalization of the process as a governing board may give co-management partners more certainty as to their standing in the management scheme, leading to more openness and data sharing, as is common with the International Whaling Commission. At the present time, however, the status of the Russian-American Polar Bear Commission is unclear, as it has not been appropriated funding and its power to regulate resources now listed as threatened under the Endangered Species Act is in question.

This chapter described and analyzed interactions of agency culture and relationships with stakeholders in the post-Marine Mammal Protection Act era in order to predict patterns of interactions. The most concrete techniques of wildlife management take place at a local level, however. Most laws related to subsistence hunting of marine mammals require hunters to report their catch, although none of the programs uses permit systems familiar to other resource management regimes. Harvest reporting programs for subsistence, then, require dedicated cooperation from hunters. Whether or not these policy programs fit into existing community patterns of interactions is the focus of the next chapter.

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[74] The USFWS is a particularly opaque agency, even though it has presented a lot of Q&A pages on the polar bear listing, twice staff pointed me to information about their programs on other federal or foreign partners' websites, as the staff considered their agency's website uninformative. During the study period, the Bush Administration was evaluating the polar bear as a candidate for listing under the Endangered Species Act and this fact, combined with the Administration's antagonism towards climate change, the obstruction of oil and gas and the ESA reportedly left many staff members with low morale across the Department of the Interior line agencies. One respondent described the political pressure felt within some of the agencies, "*I could feel* [Vice President] *Cheney's claws in my frickin' back.*"

Chapter 5: Harvest assessment networks in Barrow, Alaska: the relationship of agency preferences, policy devolution and harmonious outcomes

The task of network managers is to increase the stock of trust and reciprocity by creating incentives (using resources) and to increase their collaborative skills to build relationships within the network to accomplish network goals, whether it is environmental cleanup, alleviating homelessness, reducing teen pregnancy, or responding to a natural disaster. – H. Brinton Milward and Keith G. Provan, A Manager's Guide to Choosing and Using Collaborate Networks (2006: 10)

Introduction

Previous chapters have traced modern developments of Alaskan marine mammal governance in order to explain why agencies with similar missions choose different policies. In this chapter, I orient my analysis of the effectiveness of each policy choice at the local level, in two Alaskan marine mammal subsistence hunting communities. The local level, after all, is where wildlife management policies most materially affect the world.

Successful policies shape the management of living marine resources through structuring human behavior in a way that is meaningful to social and ecological drivers of population dynamics. A current thread in institutional analysis is to examine how well institutions "fit" ecological dynamics (Folke et al. 1998a; Young 2002a; Galaz et al. 2008); other works have examined the fit between institutions and social dynamics (Ebbin 2002; McCay 2002; Olsson et al. 2007). Wildlife management policy usually focuses on the ecological dynamics (see chapter six), assuming that persuasion, scientific data, and outreach will encourage compliance to government rules. In this chapter, I describe and compare two different institutions for harvest assessment, one for bowhead whale and another for polar bear subsistence hunting, in order to examine how effective each is in encouraging participation. The social processes behind such effectiveness are also explored.

As discussed in chapter two, many resource management scholars have touted co-management as a method in which user organizations or representatives are part of the decision-making, and therefore will have more buy-in to the policy-making process (Pinkerton 1989; Berkes et al. 1991; Singleton 1998). Stakeholder buy-in and a belief that the policy-making process is fair (Tyler 1990) leads to more legitimacy, and, ultimately better congruence between *rules in force* (i.e., what the law requires) and *rules in use* (i.e., what people do).

Local actors in a co-management regime often implement particular policies, such as those requiring hunters to report their harvests. Policy networks can map how this implementation happens on the ground, as well as determine which actors are most influential. The difference between *rules in force* and *rules in use* is a measure of policy fit to the social environment in which implementation takes place (Eckstein 1969; Jentoft 1989; Meek et al. 2008). Many communities with longstanding use and occupancy of a place will have indigenous rule sets. Additionally, resources may be governed by multiple rule sets, for instance, international, federal, state, tribal and local. Co-management often aims to bring these rule sets closer, either through harmonization, persuasion, or sometimes coercion (Nadasdy 2003b).

Where federal or international authorities apply new rules to a common pool resource that already has other local or institutional legacies attached to it, local communities often resist (Spaeder 2005). In this situation, some communities have argued for devolution, the transfer of *de jure* authority from the federal to the state or local level, so that the local community gains control of the policy implementation process. Devolution as a policy strategy arguably allows for the development of local implementation capacity as well as the fostering of local norms relating to the social goal of the policy in focus. Fehr and Rockenbach (2003) and Cardenas et al. (2000 as cited in Ostrom 2005) have studied the impact of the imposition of new, external sets of rules and monitoring efforts on existing patterns of cooperative behavior. These and other authors working with game theory find that social norms can work as well or nearly as well at generating cooperative behavior as external rules and monitoring efforts (Ostrom 2005). Ostrom argues that norms often reinforce the desire for cooperative behavior while cooperation driven by external efforts is difficult to sustain without consistent efforts from the external actors (2005). She notes:

> *...the worst of all worlds may be one where external authorities impose rules but are able to achieve only weak monitoring and sanctioning. In a world of strong external monitoring and sanctioning, cooperation is enforced without any need for internal norms to develop. In a world of no external rules or monitoring, norms can evolve to support cooperation. In an in-between case, a low level of external monitoring discourages the formation of social norms, while also making it attractive for some players to deceive and defect, given the low risk of being caught* (pg. 130-131).

Federal agencies in Alaska have engaged in collaborative processes, in no small part because of the great distances and costs to implement wildlife law in remote parts of the state. Arguably,

devolution of wildlife management tasks such as harvest assessment can be an effective method of supporting local social norms relating to resource use, engaging with federal agencies and broader governance agendas. Devolution may not succeed in furthering agencies' goals, however, if the rules are not salient or they contradict local understandings. Skeptics may still follow local rules, regardless, because they are involved in other social relationships that acculturate norms of trust or helpfulness. One persuasive argument for devolution is that policy that follows local social patterns requires less of an effort (i.e., less cognitive dissonance) for a local participant to understand the informal norms surrounding interactions with distant others (Eckstein 1998). Relevant norms include an understanding of sanctions. Relevant questions include the following: whom can residents talk to about sanctions, when are rules likely to be legally enforced or are people generally motivated to participate?

Analytical framework

Social network analysis maps interactions between people (or organizations) and can empirically measure the strength of linkages (i.e., ties) between members in the network. Social scientists have utilized social network analysis to examine the structure of social relationships and derive a measure of social capital[75]. For instance, network researchers use density, or the extent to which actors are connected to each other, as a proxy for social cohesiveness (Scott 2000). The concept of network centrality describes the power and control structure of the network, or who has the most influence within the group (Freeman 1979). Structural holes, or the absence or weakness of a connection between actors, is another key concept, based on sociologist Mark Granovetter's pioneering work, "The Strength of Weak Ties" (Granovetter 1973). Much of the original work on social networks took place in the sociological literature, focusing on business or friendship ties. Public policy researchers have only recently begun to use social network analysis to examine policy implementation structures such as co-management or inter-agency collaboratives. Carlsson (2000) likens network analysis to an empirically based model of collective action[76]. Each policy community, the group of people involved in public policy, can be conceptualized as an interactive network of participants.

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[75] Social capital is used in the sense of Putnam (1993) to identify the value of relationships in making collective decisions.

[76] For purposes of this discussion, collective action is defined qualitatively as the totality of purposeful joint activity a group of people engage in while trying to achieve some particular end.

Policy researchers have also examined how network structure affects policy success. In their landmark study of health policy networks and outcomes, Provan and Milward (1995) examined how the network structure and functioning of community mental health systems in four cities affected the successful delivery of services to clients. The authors found that stakeholders were most likely to rank networks with a centralized active node as successful. Networks with decentralized authorities were less successful than those networks with a centralized node, especially one with direct authority and local systems of monitoring and sanctioning. Schneider et al. (2003) compares two networks of estuary conservation stakeholders and argues that central federal coordinating programs, such as the National Estuary Program, can act as a central node even if they act as an informational rather than a regulatory force. The authors find that the estuary program catalyzed linkages between multiple scales of government, integrated experts into discussions, nurtured stronger interpersonal ties between stakeholders and generally created greater confidence in the fairness of policy. Networks can also act to diffuse innovation among policy actors. Lubell and Fulton (2008) found that exposure to policy networks significantly increased the likelihood that a farmer would implement best management practices on his or her farm.

Borgatti and Foster (2003) note that studies examining why networks form a particular way are lacking, whereas more studies have been devoted to the consequences of network shape for actors within the network. The formation of co-management networks are interesting to study because structures can be intentionally designed, emergent, or some combination (Carlsson and Berkes 2005). Connections between partners are shaped by the interplay of: institutions, history, the power of key actors, funding resources to mobilize activities, and agency cultures. Carlsson and Sandström (2008) define co-management networks as a variety of actors participating in a management system in which the central government may not be the central player. The authors also note the increasing overlap between conceptions of policy communities as co-management regimes, networks, and governance structures. Building on empirical studies of co-management (e.g., see chapter two), they theorize that networks characterized by many ties (density), diversity of actors and ties (heterogeneity), and number of ties to central actors (centrality) perform better than those not having those qualities (2008). Carlsson and Sandström (2008) consider co-management bodies performing a range of tasks; the primary goal of these bodies is learning about the system. In contrast, the participants in this study are homogeneous groups of hunters and whalers in two communities in Alaska who perform one of many tasks: harvest assessment.

A key assumption in social network analysis, Mizruchi notes, is that "*...the structure of social relations determines the content of those relations*" (1994: 330). Accordingly, successful policy networks for harvest assessment would have active linkages between hunters and those responsible for collecting harvest information. This study compares ideal networks, those connections between policy actors established in federal rules in force, to advice networks, those connections between policy actors that are self-organized in response to particular issues. The closer the ideal and the advice network resemble each other, I argue, the better the social fit between federal rules and existing social networks.

Drawing on the policy network literature cited above, I test the following hypotheses through a comparison of the marine mammal harvest assessment policies of two agencies (described in chapter five):

(1) network structures are affected by policy and agency preferences;

(2) devolved networks have more active local centers than decentralized networks;

(3) devolved networks are closer in shape to self-organized networks than are decentralized networks; and

(4) differences in network shape affect support for and participation in policy implementation.

Methods

To examine harvest assessment policy in practice, I conducted cases studies of whale and polar bear subsistence hunting in Barrow and Wainwright, Alaska. Data were collected through multiple site visits to Barrow between 2006 and 2008 and to Wainwright in fall 2007. I investigated local institutions (formal and informal) related to harvest assessment through an analysis of policy documents, observation of transactions at co-management meetings, a six week period of participant observation in Barrow during the Fall of 2006 during the whaling season, and a survey of whalers and hunters. I observed whalers successfully harvesting whales, distributing the shares of meat and discussing the process of harvest reporting with members of the Barrow Whaling Captains' Association and the Wainwright Whaling Captains' Association. I investigated social dynamics of community engagement and perceptions of co-management

through a social network analysis framework. In this study, I use networks for harvesting rules as a proxy for harvest assessment and participation in resource management in general[77].

In order to compare ideal and advice networks within the bowhead whale co-management regime to the network within the polar bear co-management regime, I first identified local subsistence hunters participating in each regime with help from the Barrow Arctic Science Consortium. In 2006 to 2007, there were 52 whaling crews registered in Barrow, Alaska, with the Alaska Eskimo Whaling Commission (AEWC). Since a crew must be registered with the Commission and the local Whaling Captains Association in order to participate in either fall or spring bowhead whaling in Barrow, the 52 crews represent the known universe of respondents eligible to whale in 2006 to 2007. My research assistant, a local elder, and I contacted potential respondents. After the whaling season ended in early October, we attempted to contact captains or co-captains of every registered whaling crew via phone or through a relative if the captain did not have a published phone number. Non-respondents were contacted an additional time by phone or in person. Of the whaling captains we were able to contact, I interviewed 22 (43%).

In contrast to the registration requirements for whaling captains, any "Indian, Aleut or Eskimo in Alaska and who dwells on the coast of the North Pacific Ocean or the Arctic Ocean" (MMPA § 101(b)) may hunt polar bears for subsistence. The take must not be wasteful and guidelines only allow artisans to make particular types of products for sale from the bear's fur, claws, and meat. Accordingly, my research assistant and I took a different strategy in order to identify the universe of polar bear respondents. We first contacted federal and local wildlife officials to develop a list of individuals who were known polar bear hunters in the community. Pursuant to the Privacy Act, the U.S. Fish & Wildlife Service is barred from publishing names of subsistence hunters, but it does employ local agencies and individuals to mark and tag subsistence hunted polar bear and walrus. Those individuals were contacted in order to generate additional names, who were then contacted by telephone and in person. In addition to research questions, we asked respondents to name additional persons they knew of who had hunted polar bears in the recent past. These respondents were interviewed in a second round, until no new names were generated. One polar bear hunter volunteered to be interviewed after he heard about the study.

Using a snowball technique, I sought to identify and interview as many polar bear hunters in Barrow as possible. However, if the snowball technique was less effective in identifying hunters than the registration process with the whalers, then some of the differences discovered in

[77]The advice network is assumed to approximate "rules in use."

the study might be attributable to sampling techniques. Of the identified pool of respondents, 6 (N=13) hunters agreed to be and were interviewed, with a response rate of 53%. Two additional hunters agreed to be interviewed but were unavailable at the time of my fieldwork. We also interviewed two hunters outside of the network; their experiences are discussed in the analysis. The number of identified respondents is similar to U.S. Fish & Wildlife Service reports that the mean harvest in Barrow for 2003-2006 was 15.75 bears (USFWS 2007).

An important difference between the population of bowhead whalers and the population of polar bear hunters lies in the rules and opportunities to hunt for both groups. Generally, anyone can hunt polar bears, and a significant proportion of bears are taken each year as opportunistic harvests. Whaling carcasses are known bear attractants; if a whaler or other "coastal Indian, Aleut, or Eskimo" takes a bear for the purpose of defending life or property, it generally counts as a subsistence hunt as long as it is salvaged and reported. Subsistence harvests of Southern Beaufort Sea polar bears are subtracted from the yearly voluntary quota for the North Slope Borough and the Inuvialuit Game Council (Brower et al. 2002).

This open opportunity to take bears creates a larger potential pool of respondents, but for the purpose of this analysis, the network represents hunters who intentionally take bears for subsistence purposes. I talked to whalers and polar bear hunters about their networks of self-organization; in this chapter, I compare these networks to ideal policy networks. Ideal networks were constructed from policy documents. Respondents were asked about whether they felt policy-making was accessible to them as constituents and if they felt policies conserving whales and polar bears are effective. In field research, I took care to ask questions in a culturally sensitive manner, meaning that it was more appropriate to ask questions of how hunters interacted with others in different resource management situations, rather than ask directly, "Do you report your catch to the proper authorities?" Hunters were asked whom they would talk to about questions relating to harvesting rules, animal health, and industrial impacts (see the appendix). This type of question is used in many social network analyses to illustrate so-called advice networks (Knoke et al. 1996).

Finally, during the study period, a whaler in Barrow violated an Alaska Eskimo Whaling Committee (AEWC) and International Whaling Commission (IWC) rule and was questioned by an enforcement tribunal. This event was well known among whalers and combined with rumors of Japanese plans to obstruct the Alaskan whaling quota at the next IWC (see chapter one) ; it created a stressful social environment in which to conduct my social network analysis.

To validate my findings, I added a round of interviews[78] for both policy networks in Wainwright, Alaska. Whalers in Wainwright likely knew about the Barrow incident but were not actively involved in the incident. The Wainwright interviews were all conducted over a four-day period with a local Iñupiat contact to help identify and recruit respondents. Of the identified pool of respondents, six whaling captains (N=11) and three polar bear hunters (N=undetermined) agreed to be and were interviewed, with a response rate of 55% among whaling captains. The population of polar bear hunters in Wainwright is variable but respondents noted that anyone is a hunter when a bear comes into town. Although there are few self-identified polar bear hunters in Wainwright, most harvests are now opportunistic in that the bear is killed in self-defense, but then salvaged as a subsistence hunt. As a comparison to the three polar bear hunters we identified, the U.S. Fish & Wildlife Service reports the he mean harvest in Wainwright from 2003-2006 was 4.5 (USFWS 2007).

Results

Bowhead whaling harvest assessment networks

The Alaska Eskimo Whaling Commission (AEWC) is responsible for assessing the harvests of bowhead whales in member communities. This responsibility is detailed in periodic co-management agreements signed by the AEWC and their partner agency, the National Marine Fisheries Service (NMFS). The harvest assessment program is also published as a federal rule in the federal register whenever the IWC issues a new quota for bowhead whale harvests (ideal network). The AEWC in turn relies on local associations of whaling captains to gather harvest reports from individual captains at the close of each whaling season (two times per year for Barrow). The AEWC developed the harvest assessment institution as a compromise with NMFS after the IWC asserted its authority over the bowhead whale hunt in 1977 (Langdon 1984; Freeman 1989; Huntington 1989). NMFS agreed to co-manage the hunt after realizing that accuracy in reporting was dependent upon its relationships with whalers[79], whose expertise in building ice trails and navigating potentially treacherous ice conditions during the spring hunt is required for safe travel (Eicken et al. 2009).

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[78] I thank F. Stuart (Terry) Chapin for this suggestion as a way to adapt my fieldwork in response to shocks in the system.

[79] One NMFS enforcement agent reportedly learned this lesson the hard way when he lost his snowmachine out on the ice in a card game and had to negotiate a ride back to Barrow (Anonymous 2006e).

Although there have been occasional violations of law and the agreement, whalers consistently report their catches to NMFS at an estimated rate of 98-100% (IWC 2008). The consistency of harvest assessment is influenced by the following factors: 1) the intensity of international scrutiny, 2) the dependence of whaling communities upon bowhead whales, 3) a tightly interconnected multi-generational network of whalers, 4) the public nature of the harvest (e.g., it is difficult to hide your catch), and 5) a comprehensive bowhead whale research program that involves measuring and sampling in many villages. These relationships have been institutionalized into a governing network through the close working relationships between NMFS, the whalers, Borough Department of Wildlife Management biologists and a few State biologists. Figure 5.1 presents ideal and advice networks for bowhead whaling in Barrow. Figure 5.2 presents ideal and advice networks for bowhead whaling in Wainwright.

Polar bear harvest assessment networks

Polar bear harvest assessment is conducted through an institution of the U.S. Fish & Wildlife Service called the Marking, Tagging, and Reporting Program (MTRP). The MTRP was launched in 1988 in order to track harvests and authentic handicrafts made from harvested marine mammals under the jurisdiction of the USFWS (Burn 1998). For polar bears, hunters must present the skin and skull of a bear to a registered tagger within 30 days of harvesting it. Many coastal villages have registered taggers; in 2006 and 2007, the North Slope Borough Department of Wildlife Management, the Native Village of Barrow, and several individuals were listed as registered taggers in Barrow (ideal network). This program had an estimated 75 to 94% success rate for tagging walruses in 1994 to 1995 in the most active walrus-hunting communities when compared to an experimental, more extensive harvest assessment program and known lost animals (Burn 1998). A local expert familiar with the program estimated that in Barrow in 2006, 35% of harvested bears were reported (Anonymous 2006b)[80]. USFWS reported in 2007 that polar bear harvests reported through the MTRP were believed to be as low as 30% to as high as 80% in the communities most affected by industrial development (USFWS 2008a).

[80] By 2008, a larger number of bears came into town and two irregular bear harvests brought the bear harvest under more federal scrutiny. Reporting appears to have decreased during this period.

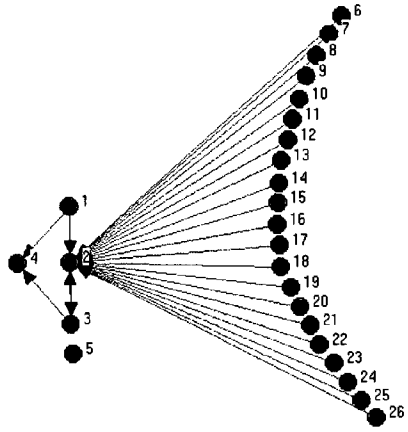
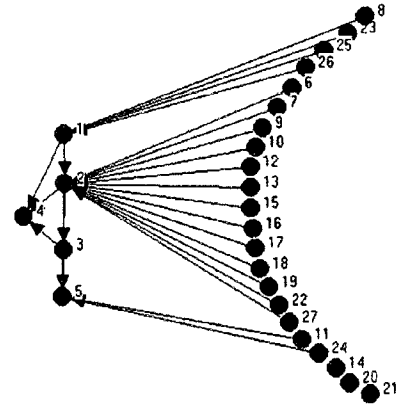
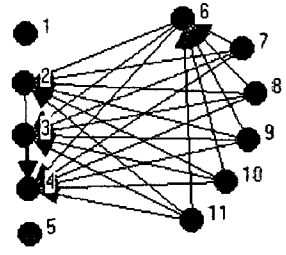
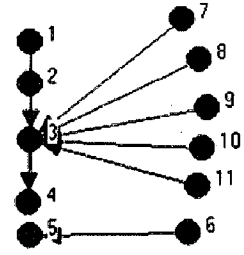
Location and type	Ideal Network	Reported Advice Network
Barrow whaling captains 1. AEWC 2. Village whaling captains' association 3. Borough 4. National Marine Fisheries Service 5. Elders 6-26 Whaling captains		
Barrow polar bear hunters 1. Nanuuq Commission 2. Village Council 3. Borough 4. U.S. Fish & Wildlife Service 5. Elders 6-11 polar bear hunters		

Figure 5.1 Policy networks among whalers and polar bear hunters in Barrow, Alaska (2006-2007)

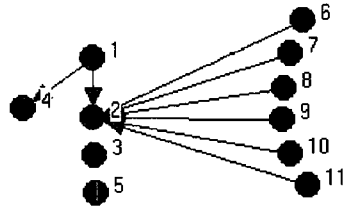
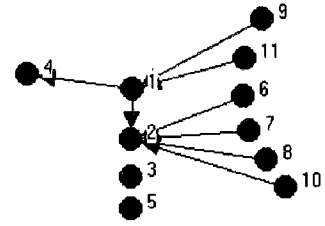
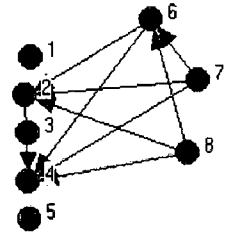
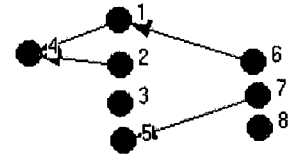
Location and type	Ideal Network	Reported Advice Network
Wainwright whaling captains 1. Alaska Eskimo Whaling Commission 2. Village whaling captains' association 3. Borough 4. National Marine Fisheries Service 5. Elders 6-11 Whaling captains		
Wainwright polar bear hunters 1. Nanuuq Commission 2. City 3. Borough 4. U.S. Fish & Wildlife Service 5. Elders 6-8 Polar bear hunters		

Figure 5.2 Policy networks among whalers and polar bear hunters in Wainwright, Alaska (2007)

Several respondents during interviews recounted past incidents of bears killed in self-defense that were not intended to be used for food or handicrafts and so were not reported. Similarly, occasionally one hears of bears reported as, "struck and lost[81]" – meaning shot and not recovered before sinking in open water. The consistency of reporting bear harvests in Barrow is related to the following factors: intentionality of the hunt, whether the person is prepared to skin and bring back the bear parts with them[82], connection to other bear hunters, and whether or not the community learns of the harvest. Because anyone can potentially harvest a bear, when compared to whaling networks, there is no comparable group of all hunters in Barrow that engage in management activities. When seeking advice, polar bear hunters in Barrow are most likely to talk to the Borough Department of Wildlife Management rather than co-management or federal partners, illustrating a difference between self-organized and ideal policy networks (figure 5.1). Wainwright hunters do not have a central point of contact (figure 5.2). However, respondents mentioned that the VHF radio serves the same function[83]. Wainwright hunters reported taking few bears intentionally; harvests are mostly opportunistic.

Policy outcomes

To discover satisfaction with and participation in resource management decision-making, I surveyed whaling captains and polar bear hunters about policy process fairness, hunter representation, and effectiveness of policy. Outcomes are listed in table 5.1. Whalers in both villages had more confidence in the fairness of the policy-making process when compared to polar bear hunters; additionally, they were also more likely to report that their concerns would be addressed in rule making. The questions (Appendix) were open-ended; a significant amount of hunters answered "maybe" when asked their opinion of the policy process and policy effectiveness. If those who answered "maybe" are combined with the "yes" group, then both groups in both towns are approximately equal. Barrow whalers were more likely than Barrow polar bear hunters were to report harvesting rules as effective; in Wainwright, the result was reversed. Again, if the "maybe" answer is added to the "yes" group, then the answers of both groups in both towns are approximately equal. I emphasize the "yes" answers due to the

[81] This term is most often associated with the unintended loss of seals and walruses.
[82] This process can take up to 72 hours, according to several respondents.
[83] One respondent noted that when guided sport hunting was still legal (before 1972), hunters were very well organized as a group.

Table 5.1 Comparison of whalers and polar bear hunters in their perception of policy

	Are harvest rules made fairly?	Would your concerns be addressed in rules?	Are harvesting rules effective?
Barrow whalers	**50% yes**	**64% yes**	**64% yes**
	9% no	5% no	5% no
	14% maybe / DK*	5% maybe / DK	5% maybe / DK
	27% NA	27% NA	27% NA
Barrow polar bear hunters	**33% yes**	**33% yes**	**50% yes**
	0% no	17% no	0% no
	33% maybe / DK	17% maybe / DK	17% maybe / DK
	33% NA	33% NA	33% NA
Wainwright whalers	**50% yes**	**67% yes**	**33% yes**
	0% no	0% no	17% no
	17% maybe / DK	17% maybe / DK	33% maybe / DK
	33% NA	17% NA	17% NA
Wainwright polar bear hunters	**0% yes**	**33% yes**	**67% yes**
	0% no	0% no	0% no
	67% maybe / DK	67% maybe / DK	0% maybe / DK
	33% NA	0% NA	33% NA

*DK means "do not know"; NA means "no answer"

potential bias from the small size of the Wainwright sample of polar bear hunters and the number of respondents across groups who did not answer[84]. The lower level of participation and support expressed by polar bear hunters is likely influenced by the fact that at the time of the 2006 interviews, the only new rules contemplated by the U.S. Fish & Wildlife Service were related to

[84] I did not subject results to an analysis of variance because for polar bear hunters, the sample size was small and several respondents stated that they did not know or did not answer the question, complicating the comparability of the data sets.

the concept of introducing hard quotas under a treaty for the subsistence hunt of the Chukchi Sea bear population shared with Russia. In 2006, the treaty was awaiting ratification by the U.S. Senate, which had not yet acted for six years since the U.S. and Russian governments had signed the treaty (Meek et al. 2008). Village consultations for this treaty had taken place in 1996, and updates had been given periodically through the Nanuuq Commission thereafter as it developed an interlocal agreement with Chukotkan partners. Therefore, rule sets for polar bear harvesting in 2006 were not an active agenda item in Barrow or at the Nanuuq Commission, the co-management body for polar bears at a statewide level. By 2007, however, when interviews in Wainwright took place, the USFWS had proposed to list the polar bear as a threatened species under the Endangered Species Act (ESA), which stimulated an active discussion.

There were many uncertainties around what, if anything, a listing would mean for existing harvest and harvest assessment institutions, including the new treaty with Russia, that the Senate finally ratified in December of 2006. The combination of significant institutional change and uncertainty among polar bear hunters and communities at large in how to influence the direction of change likely made polar bear hunters less confident of their role in any new rule making. One polar bear hunter in Barrow lamented how "... *these rules come down on us*,"(Anonymous 2006f) reflecting common sentiment that hunters do not control their own fate or have a meaningful role in wildlife management rule making. During an official public hearing on the ESA listing process in Barrow in February 2007, many community members expressed frustration that the process seemed to be moving so fast that there was not adequate time to build a plan from the bottom up. Instead, many in the meeting expressed a sense that they were being treated unfairly by the imposition of rules from above. The Borough Mayor Edward Itta later compared the fates of automobile drivers in Los Angeles, California to those of polar bear hunters in Alaska under an ESA listing:

> *The real tragedy would be if people in the lower 48 hear that the polar bear is now being protected and they...they feel good and they feel reassured while they're listening to their radio sitting in traffic. And they don't have any idea that they're letting the Iñupiaq Eskimos take the heat while nothing changes down there where the problem comes from* (Southern 2008).

For the USFWS, the time constraints come from the ESA (§4(b)(3)), as it has statutory deadlines for publishing findings on the merit of a petition and then again on publishing rules for a proposed listing or a declination to list[85].

Although tribal and local governments do have the opportunity to be specially consulted on the ESA decision, the decision to list or not to list is the decision of the Secretary of the Interior alone. This type of constitutional rule-making is not co-managed, although the implementation of the rule itself may be co-managed through the development of "special rules" designed to balance the joint responsibilities of the government to the resources and to protected tribal uses of those resources.

Whalers were not without their own uncertainties and challenges in controlling their own fate. In 2006, when interviews began, whalers in Barrow knew that representatives of the Japanese government had threatened to use the Alaska aboriginal bowhead whale quotas as leverage for achieving their whaling policy goals at the 2007 International Whaling Commission. This fact made some whalers nervous when talking about rules with me; one whaling captain cited the threat as the reason he declined to participate in my survey. Additionally, the circumstances regarding the whaling captain who harvested a calf during the 2006 fall season also created tension in the community. However, in both Barrow and Wainwright, whaling captains' associations meet consistently, reinforcing social capital and their roles in the policy implementation process. The whalers' 2007 successful collective action in securing another five-year block quota for bowhead whaling in Alaska together with their partner federal agency, the National Marine Fisheries Service (NMFS), contributed to the sense that whalers have a large degree of control over their policy fate when it comes to subsistence harvesting.

Discussion

The study described in this chapter was designed to compare self-organized and federally sanctioned policy networks in the relative success of harvest management programs for marine mammals. A devolved management program such as the harvest assessment program for bowhead whales is highly successful because of the importance of the species to the community, as well as the ability of local networks to capitalize on a variety of ways of achieving their goals.

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[85] The USFWS did not willingly publish its findings; it was directed to do so by a federal court ruling *Center for Biological Diversity v. Kempthorne* (2008 WL 1902703 N.D. Cal 2008) on a lawsuit brought by environmental groups.

For instance, if a whaler is late in reporting his harvest, there are multiple channels his co-management representatives can use to ensure the report is submitted. These efforts create a "nagging" network with local powers of persuasion. A strong local co-management group, such as the local whaling captains association, maintains active linkages among whalers and between scales of government.

In contrast, an official familiar with the USFWS harvest assessment program noted that reports are more likely to return to USFWS if the agent responsible for the program has a good relationship with local taggers. The taggers themselves, however, may not have a sufficient network among all possible hunters in order to rely on informal means of ensuring reporting. Agency staff also periodically make the rounds to households in villages to talk with known polar bear hunters, as well as to remind them to report and tag their animals. The ideal polar bear network shown in figures 5.1 and 5.2 lack a central coordinating hub other than the agency itself, and so the network cannot capitalize on other informal networks in the village to achieve greater efficiencies[86].

These results support Provan and Milward's (1995) findings that strong local coordination results in better outcomes. The ability of whalers to act collectively is enhanced by having a local whaling captains' association linked to a high-profile regional co-management body to regularly discuss issues and reinforce social norms. Polar bear hunters, on the other hand, self-organize towards a central actor (the North Slope Borough) but neither the Borough nor any other local actor have authority for the MTRP program; control is maintained by the agency. The agency, in order to achieve high returns in tagging, must use its connections to taggers and hunters to encourage compliance. The USFWS realizes the strong local role the NSB plays, but has not devolved authority to the Borough or a regional tribal government to date[87]. New rule sets developed under the polar bear treaty with Russia for the Chukchi Sea population allow for such a transfer to co-management partners but have not yet been enacted, as the program has not yet been appropriated funding from Congress. USFWS does periodically appeal to the Borough for

[86] During one visit to Barrow, a USFWS staff member called as I was interviewing one respondent, in order to persuade him or her to go look after some tags.

[87] The Environmental Impact Assessment for the Polar Bear treaty with Russia noted that devolution for statutory activities is possible, but made easier by explicit authority amended into existing or new laws. Other reasons the Service has not devolved authority may include a preference to maintain its lead agency status for activities on federal lands, the desire to avoid conflict with the State of Alaska over tribal sovereignty, the maintenance of program lines and budgets, potential disinterest at the local level, and potential mistrust of co-management partners.

help in increasing returns. If unsuccessful, the Borough may be then contacted by enforcement agents who operate under separate lines of authority (they report to a division in Washington, DC rather than the regional agency head) than management biologists and so may have even fewer network contacts to draw on to discover the true rules in use.

Carlsson and Sandström (2008) proposed that co-management networks would be most effective with a central node and many connections across diverse actors. This study supports the importance of a central node as a coordinating body, especially when the network is implementing a particular policy. Depending on the role the co-management body plays, density and diversity of actors may be less important than centrality. If a co-management body is a platform for group learning or a model of governance over a broad set of responsibilities, density of connections and diversity can be important for diffusion of policy ideas, technology, and new knowledge. However, networks responsible for implementing contentious or unpopular policies (such as a quota or harvest assessment) require mutual trust and are enhanced by familiarity. I argue that centrality, the extent to which a network has a central actor, is fundamental to maintaining participation among the group.

Finally, this study tested four propositions relating to network structure and outcomes: (1) network structures are affected by policy and agency preferences, (2) devolved networks have more active local centers than decentralized networks, (3) devolved networks are closer in shape to self-organized networks than are decentralized networks, and (4) differences in network shape affect support for and participation in policy implementation.

I found that the choice of each agency to devolve or maintain its harvest assessment function played a necessary, if not sufficient, role in determining network structures. For instance, NMFS has not followed USFWS in creating a specific agency-controlled harvest assessment methodology. Part of the reason for this is that when the AEWC proposed its original management plan in response to the IWC moratorium on bowhead whaling in the 1970s, NMFS did not have any plan or institutions in place to conduct the assessment itself. The trust built between the whalers, the biologists and NMFS over the next 30 years in addition to the intense international scrutiny of native whaling has created the foundation for highly effective, coordinated management. USFWS made the opposite choice in determining to implement its own harvest assessment program. This program comes up for renewal periodically, but USFWS has not publicly analyzed alternative methods for harvest assessment, except to determine how many

animals are likely unreported (Burn 1998). Few incentives for hunters (other than not going to jail) exist for improving polar bear harvest assessment. A key difference is also important to note in terms of effective reporting; the dependence of people in Barrow upon bowhead whales is significant and structures the seasonal activities, making the stakes of policy implementation extremely high[88].

The devolved whaling networks –both ideal and advice-- have an active local center node, the local Whaling Captains' Association. These centers are important in creating sustained collective action. The center node, combined with real management authority, provides whalers a sense of control over their own fates, at least as far as harvesting rules go. Polar bear hunters in Barrow seek information through local organizations, but have little influence over many policy initiatives relating to polar bear conservation. Responsibility for harvest assessment is fragmented along many levels of social organization and results in an ad-hoc ideal network that can not capitalize on local social networks to enhance rule compliance. This model of agency engagement in Barrow may work well with other management functions such as research and outreach. Specific policy implementation through an ad-hoc network with low capacity for monitoring but with an aim to achieve collective action is not effective in this case, as predicted by Ostrom (2005) and others.

The devolved whaling networks in this study are closer in shape to their ideal networks than are the decentralized polar bear networks. Although the small sample size limits the strength of the analysis of polar bear networks, the similarity between whaling ideal and advice networks is striking. Findings support the proposition that the devolved networks result in a greater social fit. The co-management network has become the official policy venue for bowhead whaling management activities and is perceived as a source of local power. Whether or not this model would work for polar bear harvest assessment is unclear, given suggested antecedent conditions for success (Ostrom 2005) including high dependence upon the resource. Nevertheless, even dependence upon the resource is not sufficient, as the walrus harvest assessment program challenges (Burn 1998) illustrate in other parts of Alaska.

Finally, differences in network shape correlate with participation in and support for policy, as measured by the rates of harvest reporting and perceptions that the policy-making

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[88] The Chairman of the North Slope Borough Fish and Game Committee underscored this point at a meeting in Barrow after hearing a presentation of this study.

process is fair, addresses local concerns and is effective. The routine nature of whaling deliberation and collective action institutionalize policies that whalers may not particularly support as individuals, but will implement as a network. Peer monitoring and sanctioning around Barrow and Wainwright are effective means for achieving high rates of harvest reporting and lead to whalers (in most cases) having more confidence in their role in policy-making. In contrast, the ad-hoc polar bear network does not encourage routine deliberations and does not affect other modes of decision-making.

Limitations of the study

Limitations to the study include the small sample size of polar bear hunters, as well as the equivocal answers many respondents expressed to the questions of policy fairness, representation, and effectiveness. In addition, the population of self-identified polar bear hunters does not represent the known universe of potential polar bear hunters, as anyone can kill a bear in self-defense. If one is an Alaska Native, then such a defense kill can be counted as a subsistence hunt as long as the bear is salvaged and used according to the law. I addressed these limitations through attending public meetings including a USFWS hearing and a local meeting of the North Slope Borough Assembly where any concerned person in town could discuss policy relating to polar bears. I also attended two meetings of the Barrow Whaling Captains' Association and a discussion of polar bear management with hunters in 2008 during a meeting of the North Slope Borough Fish and Game Committee. Polar bears and whaling camps were also briefly discussed at the Alaska Eskimo Whaling Commission Mini-Convention in 2008. These experiences support my conclusions that the whalers have a stronger network that is more active in policy-making and whalers have a greater sense of control of their own fates in relationship to harvest assessment policy.

Conclusion

The key goal of this chapter was to examine policy success through its fit to the social environment. Drawing from the policy network literature, I tested four hypotheses relating to social fit. I described and compared two different institutions for harvest assessment, one for bowhead whale and another for polar bear subsistence hunting, in order to examine how effective each is in encouraging participation as well as to examine the social processes behind such effectiveness. Using social network analysis I mapped the ideal harvest assessment policy

network (what the law says) for both cases and compared it to reported social advice networks (what people actually do). I found that the advice network of whalers in Barrow and Wainwright were more similar to their ideal networks than were the advice networks of polar bear hunters. Findings demonstrate that this congruence between networks is a measure of policy fit to the social environment. Support for policy appears to track with having a more congruent network. In these cases, devolved policy results in networks that meet regularly and consistently reinforce social norms relating to participation in harvest assessment.

After the field work for this study was complete, Barrow and Wainwright experienced a heavy ice year with many more bears coming into town. This event coupled with a few negative bear-human interactions and the nomination of a new Nanuuq Commissioner for Barrow led to a mobilization of polar bear hunters and wildlife managers to re-invigorate local polar bear discussions. The mobilization of stakeholders in an ad-hoc network is an efficient response for these types of management issues. The more routine issues, however, like harvest assessment require sustained interaction in order to cultivate and maintain norms.

The analysis of individual actors at a community level is the most relevant scale for understanding the effectiveness of particular wildlife management policies as guides to human behavior. Unless the resource in use is bounded at the same scale, a local analysis cannot assess the broader effect of policy regimes at an ecologically relevant scale. An ecologically relevant approach is one at which critical drivers are addressed at the appropriate ecological scales. In the next chapter, I build an analysis of policy effectiveness at the scale of a social-ecological system in order to examine the fit of American bowhead whale and polar bear policy regimes to broader policy problems.

Chapter 6: Institutional fit through successful coupling: an analysis of bowhead whale and polar bear conservation policy

If ecosystems were simple, ecological-economic research would consist of finding accurate production functions for ecological resources and services and fitting those functions into economic models. Complex institutional arrangements governing ecosystem management would not be necessary for solving ecological problems although they might be necessary for solving social problems; institutions would chiefly govern the level or intensity of use. – Folke et al. (1998a)

Introduction

As a solution to contentious international resource conflicts of the 1970s, bowhead whales and polar bears, as well as Iñupiaq use of those animals, have been governed by a complex, cross-scale system of local, interlocal, regional, federal, and international institutions. Management of these two species is complicated by rapidly changing ecological, political and economic conditions. In the absence of new institutions, as sea ice retreats, the projected increasing trends in shipping and oil and gas operations will require communities and their management partners to use existing institutions in reflexive ways to manage valued resources in a changing environment. To date, the design of institutions to manage human interaction with living marine resources have, for the most part, not addressed complexity in ecological, social, or coupled systems (Wilson 2002)[89]. Considering these policies were not designed with current conditions in mind, it is reasonable to evaluate how well they match policy problems as they exist today. This idea of policy match, or "fit," has developed in political and other social sciences to examine the relevance of particular policies towards sustainability.

In chapter five, I proposed that policy implementation strategies that fit local social patterns are more efficient and successful. However, human activities at the local scale are only part of a broad system encompassing multiple ecological and human scales congruent to life histories and migratory paths of bowhead whales and polar bears. This chapter examines several aspects of policy fit. The theoretical goal of the chapter is to examine the concept of policy fit at a system level, examining policy feedback loops. The applied goal of this chapter is to analyze

[89] The Steller sea lion recovery plan developed by NMFS is a promising move towards incorporating uncertainty into decision-making, and using an adaptive management approach to discovering system drivers. Most marine mammal management plans lack sophisticated analyses of linked social and ecological dynamics beyond analyses of nutritional need and subsistence harvests to fulfill those needs.

bowhead whale and polar bear conservation with efficacy and feasibility as a combined measure of policy effectiveness. Additionally, I aim to evaluate to what extent these institutions enhance resilience of the system. Through qualitative, in-depth case study evaluations of conservation policy affecting both species, I answer three questions: 1) which activities affecting ecosystem services are addressed by existing policy, 2) how do these policies affect social-ecological systems dynamics and resilience of these systems, and 3) how successful are these institutions in sustaining ecosystem services?

These three questions lie at the intersection of writings on social-ecological system dynamics, institutional fit and governance. A successful policy approach must arguably fit the policy problem, but fit is only half of the solution. Policies must also be efficacious, in that they must have the power to effect sustainable use of ecosystem services. I argue that efficacy is a measure of the magnitude of fit of policy to policy problem. Whether the most efficacious policies will be adopted depends on social processes such as competing uses, understanding, and the political process. The political process in turn shapes the feasibility of policy solutions.

The chapter proceeds in the following way: in section one, I draw on the following literatures to orient the reader: resilience, institutional fit, and feedback channels. I argue that the extent to which institutions operate as an effective feedback channel between both ecological and social subsystems is a measure of policy fit. In section two, I describe historical and current drivers of system dynamics for both regimes. I utilize Chapin et al.'s (2006a) social-ecological system model to characterize both systems. In section three, I compare institutional responses for the governance of both systems, using the Endangered Species Act five-factor analysis model and report on the relative effectiveness and scale of policy approaches given system vulnerabilities. For this analysis, I draw on the U.S. Fish & Wildlife Service's 2006 Range-wide Status of the Polar Bear report, biannual reports of the International Union for the Conservation of Nature (IUCN) Polar Bear Specialist Group (PBSG) spanning the years 1965 – 2005, the 2008 National Marine Fisheries Service Environmental Impact Assessment for awarding bowhead whaling quotas to Iñupiaq whalers, annual reports from the International Whaling Commission from 1969 to 2007, interviews and supporting materials. In section four, I examine governance gaps and analyze the extent to which these gaps affect the system's ability to recover from or resist disturbance (i.e., systemic resilience).

Defining and bounding the systems for analysis

The interactions between many, if not most, ecological and social systems are so tightly linked that they can be recognized as a coupled social-ecological system (Berkes and Folke 1998; Chapin et al. 2006a). Marine ecosystems are spatially and temporally complex (Wilson et al. 1994; Walters 1997; Jentoft 2000; Levin and Lubchenco 2008); and thus subject to significant uncertainties in assessing the cause of population growth, or decline of interrelated complexes of marine animals. Wilson (2002) argues that mismatches between the spatial organization of complex marine systems and contemporary management approaches inhibit the collection of information that is essential for moving towards systems management. At the present time, formal marine mammal management in the United States is organized around a single-species approach (as opposed to an ecosystem-based approach), largely driven by federal population assessment research (Robards 2008), programs for reducing bycatch, and subsistence harvest monitoring programs. Additionally, all three populations of animals of interest in this study (the Bering-Chukchi-Beaufort stock of bowhead whales, the Southern Beaufort Sea stock of polar bears, and the Chukchi Sea stock of polar bears) are managed internationally, interlocally, and across scales through co-management agreements (Freeman 1989; Brower et al. 2002; Lovecraft 2007; Meek et al. 2008). Parallel to increasingly complex governance arrangements, many subsistence communities in Alaska maintain local institutions and norms traditional regarding harvests (Spaeder 2005; Fernandez-Gimenez et al. 2008). These rules may or may not be congruent to federal policy regimes[90].

The social-ecological system of interest in this chapter includes the social and ecological drivers acting upon human uses of bowhead whales and polar bears as ecosystem services in Barrow, Alaska. The place and people are described as part of a system to place an emphasis on the interactions of human and ecological components – here called subsystems. Due to an institutional legacy dating from the reorganization of marine governance in the 1970s[91], bowhead whales and polar bears are managed by two separate agencies, the National Marine Fisheries Service (NMFS) and the U.S. Fish & Wildlife Service (USFWS). Although the systems for both animal populations are linked, they are managed under different institutional and social contexts. The analysis in this chapter is drawn from a comparison of both systems, as they exist in Barrow and Wainwright, Alaska. The human subsystems are reflected in contemporary accounts of the

[90] The use of the word congruent is meant to convey the fact that the local and non-local sets of rules complement or work together as compared to the "two solitudes" of many co-management arrangements.
[91] See the 1969 report of the Stratton Commission on Marine Science, Engineering and Resources.

nature of interaction between humans and bowhead whales and humans and bears. The description of the ecological subsystem is a contemporary account of key ecological features affecting bowhead whale and polar bear population ecology.

Social-ecological systems and resilience

Social-ecological systems are spatially heterogeneous and temporally dynamic (Berkes et al. 2003; Turner et al. 2003; Steffen et al. 2004). Interactions between state factors and multiple drivers of change create emergent, systemic change (Lambin et al. 2001). As a result, the production of ecosystem services[92] and human uses of those services change over space and time, often in non-linear ways (Holling 1986; Hughes et al. 2005; MEA 2005; Liu et al. 2007; Chapin III et al. forthcoming). Chapin et al. (2006a) describe social-ecological systems through a schematic illustrating slow and fast drivers as well as the institutions linking human uses and ecological conditions. Among other policy strategies, the authors recommend the strengthening of negative (stabilizing) feedback through policy focused on slow variables that structure ecosystems rather than focusing on the intensity of use of one ecosystem service. As an example, the authors note that state and federal agencies in Alaska's interior boreal forest region are most likely to have the mandate, funding, and capacity to address a single type of ecosystem service, such as subsistence resources like moose. The authors further note that few managers have an equal ability to address critical slow or medium variables, such as habitat degradation (2006a).

Similarly, marine ecologists recommend ecosystem-based management approaches that support biodiversity, redundancy in function, and modularity (Ruckelshaus et al. 2008). Modularity refers to the compartmentalization of the system in space, time, or organizational structure (Levin and Lubchenco 2008). These concepts apply to both ecological and social subsystems; a focus on modularity in bowhead whale conservation would protect multiple pulses of migration (e.g., making sure that cows and calves are protected as well as other age classes of whales) and within the management framework, strengthening self-organization at multiple social scales. Maintaining ecosystem modularity as a management strategy tightens feedback loops (Levin and Lubchenco 2008) and can foster conservation through better information, incentives and rewards, but can also increase greed (Levin 2003) or discounting of future benefits from ecosystems if all actors in the system exploit the system simultaneously at high levels of removal (Satake et al. 2007).

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[92] Ecosystem services are the processes and material benefits humans derive from ecosystems (MEA 2005).

Institutional fit

Fit is a measure of institutional effectiveness, focused on how well institutional characteristics match the socio-ecological system characteristics (structure, processes and linkages) they seek to address (Young 2002a). Sources of misfit include imperfect knowledge, institutional constraints and rent-seeking behavior (Young 2002a). Types of misfits between governance systems and ecosystem dynamics include spatial misfits, temporal misfits, and a lack of provisions for thresholds or cascading effects (Galaz et al. 2008). These categories of evaluation are diagnostic, in that they aim to discover problems in order to design better solutions. I consider efficacy, the power to effect change, as a measure of the *magnitude* of fit of a policy tool to a policy problem. However, social and political forces affect the likelihood of implementing any public policy. Policy effectiveness, then, requires a further look at how the institution is accepted, adopted, or considered possible at all. Marine resource managers from the National Marine Fisheries Service and stakeholders developing recovery plans for northern marine mammals have begun to evaluate policy tools for their efficacy and feasibility (NMFS 2008a). Rapid ecological change in the North makes fit a particularly important factor for addressing the conservation of ice-dependent species as the northern seas become warmer. In this chapter, I am interested in the extent to which institutions address key drivers related to the conservation of bowhead whales and polar bears. The social-ecological system (SES) model also recognizes both species as being important to people not directly involved in policy implementation, but with important feedbacks to the governance drivers (e.g., public support for the listing of both species on the Endangered Species Act list).

Institutions as policy feedback mechanisms

Levin (1999) argues that tight feedback between social and ecological processes are an important component of sustainability. Chapin et al. (2006a) illustrate how different categories of institutions create functional linkages between ecological and social subsystems. Anderies et al. note that effective institutions, "*...transform information about the state of the system into actions that influence the system*" in desired ways (2004: 12). I propose that the strength of these linkages, the extent to which social goals[93] are actively promoted through the coupling of the system, is also a measure of policy fit. Institutions that are only recognized on paper or do not shape behavior would obviously not fit this description.

[93] Keeping in mind that social goals are dynamic and change through time and under varying circumstances (see chapter three).

Much writing on feedback within coupled systems has focused on how and whether or not the social subsystem is processing ecological feedback (Adger et al. 2005; Beier et al. 2008). Social theorists also discuss the way in which political processes and policies can change slow social variables. Institutionalist Theda Skocpol describes policy feedbacks as the ways in which "...policies, once enacted, restructure subsequent political processes" (Skocpal 1992). Two processes drive such transformation. First, state capacities may be affected when new policies reinforce or undermine existing ways of doing business. Second, policies may affect the identities, political goals, and capabilities of social groups (Skocpal 1992; Putnam 1993). In questions of natural resource management, Westley reminds us that systemic interactions can produce emergent conditions or behavior that do not resemble the dominant traits of either social or ecological conditions (Westley et al. 2002). For instance, the rapid pace of resource development may trigger a surprising failure of critical ecosystem services that then feeds back into political change[94].

Cumming et al. (2006) note the importance of matching monitoring efforts to the relevant spatial or temporal scale in order to access useful feedback that includes the most critical kind and amount of information. The authors note that incorrect or incomplete information may obscure the type or magnitude of problems occurring in the system. Mismatched governance efforts sometimes collect too much information of the wrong kind, Cumming et al. (2006) argue; data gathering and analysis can become a trap that distracts an agency from critical problem-solving. For instance, the Marine Mammal Protection Act mandates frequent population assessments (annually for vulnerable stocks and every three years for others) (§117) despite the considerable difficulty in surveying stocks with extensive home ranges or associated with sea ice. In seeking to conserve species, arguably too many resources can be directed towards this "numerology" (Kareiva et al. 2006) instead of strategies that focus on reducing known vulnerabilities (Robards 2008).

At the same time, managers have many sources of uncertainty to grapple with in designing interventions; these uncertainties also effect to what extent the right feedback is collected. Francis and Shotton (1997) identify four sources of uncertainty in fisheries management with relevance for learning about marine system dynamics. The first kind, observation error, arises from mistakes in sampling and monitoring of resources. The second

[94] The development of the oil and gas industry and its effects on the political organizing of Alaska Native regional associations (and later, corporations and tribal governments) is an example of this phenomenon.

kind, model structure error, arises from a lack of knowledge of population dynamics: reproductive rate, sex-ratio, stock structure, key sources of mortality, inter-species competition and carrying capacity of the environment. The third source of uncertainty, process error, arises from natural variability in population parameters affecting abundance. The fourth source, implementation error, arises from problems in enforcing policies designed to manage wildlife.

Hanna (2001) argues that in ignoring social drivers as sources of uncertainty across these categories (rather than simply lumped into the implementation error box), that fisheries policy has largely failed to develop the ability to understand and anticipate human behavior in advance of regulation, or to craft regulations that effectively shape human behavior in ways that promote management goals. In these cases, institutions do not serve as effective mechanisms to take socially defined management goals (e.g., appropriate level of harvest vis á vis estimated population size or an acceptable level of risk to the population of extinction) and transform individual or group behavior to accomplish those goals[95]. Drawing from the above literature, I propose that an effective feedback channel decreases positive feedback that is potentially destabilizing, relies on a suite of indicators that inform actors about ecological and social conditions at multiple scales (e.g., information about thresholds is particularly important), and uses this information about the system to design policy corrections.

Drivers of ecosystem service provision and use

Drivers for both species of interest are listed in figures 6.1 and 6.2. As with Chapin et al. (2006a), I characterize drivers in both temporal and spatial dimensions. Drivers affecting the production of whales and polar bears as ecosystem services include the following: the fastest drivers are either temporally limited to seasons or spatially limited to home range or migratory paths; the slowest drivers are either temporally long such as the Endangered Species Act (ESA) time horizon for determining extinction probabilities – "within the foreseeable future" (§ 4(b)(1)(B)(ii)). Slow drivers can also be spatially vast such as the broader oceanographic conditions that affect ecosystem productivity. Social drivers are categorized similarly: the fastest drivers are temporally limited to the seasonal rounds of subsistence harvesting and spatially limited to traditional use areas; the slowest drivers are temporally limited to the rate of change in whaling policy and Iñupiaq population dynamics and spatially limited to ideas of nationhood and

[95]Rice and Connolly (2007) note that social, economic and governance drivers can be so dominant in shaping actual fishery system dynamics that, "*...the implementation phase may be characterized as the place where most good ideas of fisheries biologists simply die*" (p. 578).

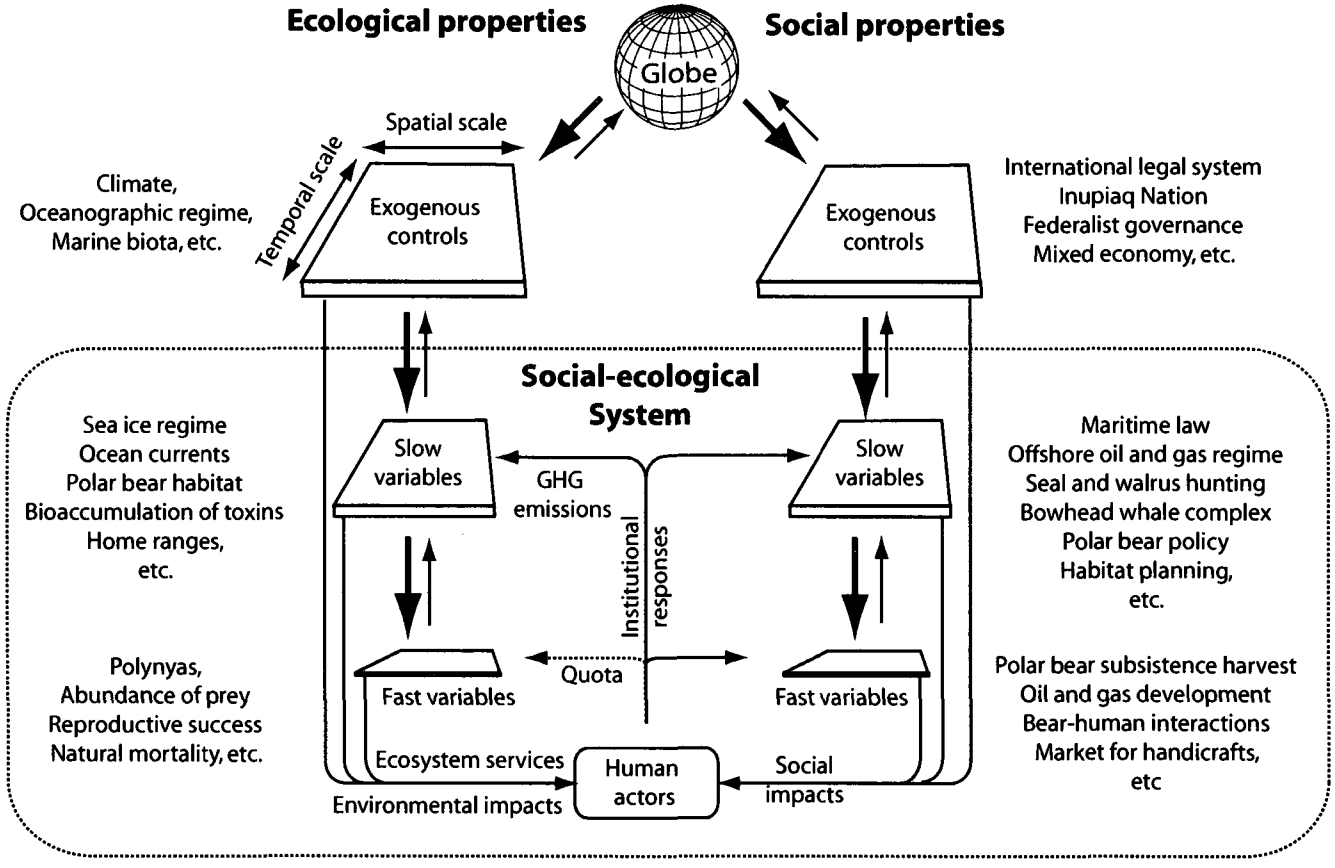

Figure 6.1 Polar bear social-ecological system (both Chukchi and Beaufort Sea populations) Figure adapted from Chapin et al. (2006a).

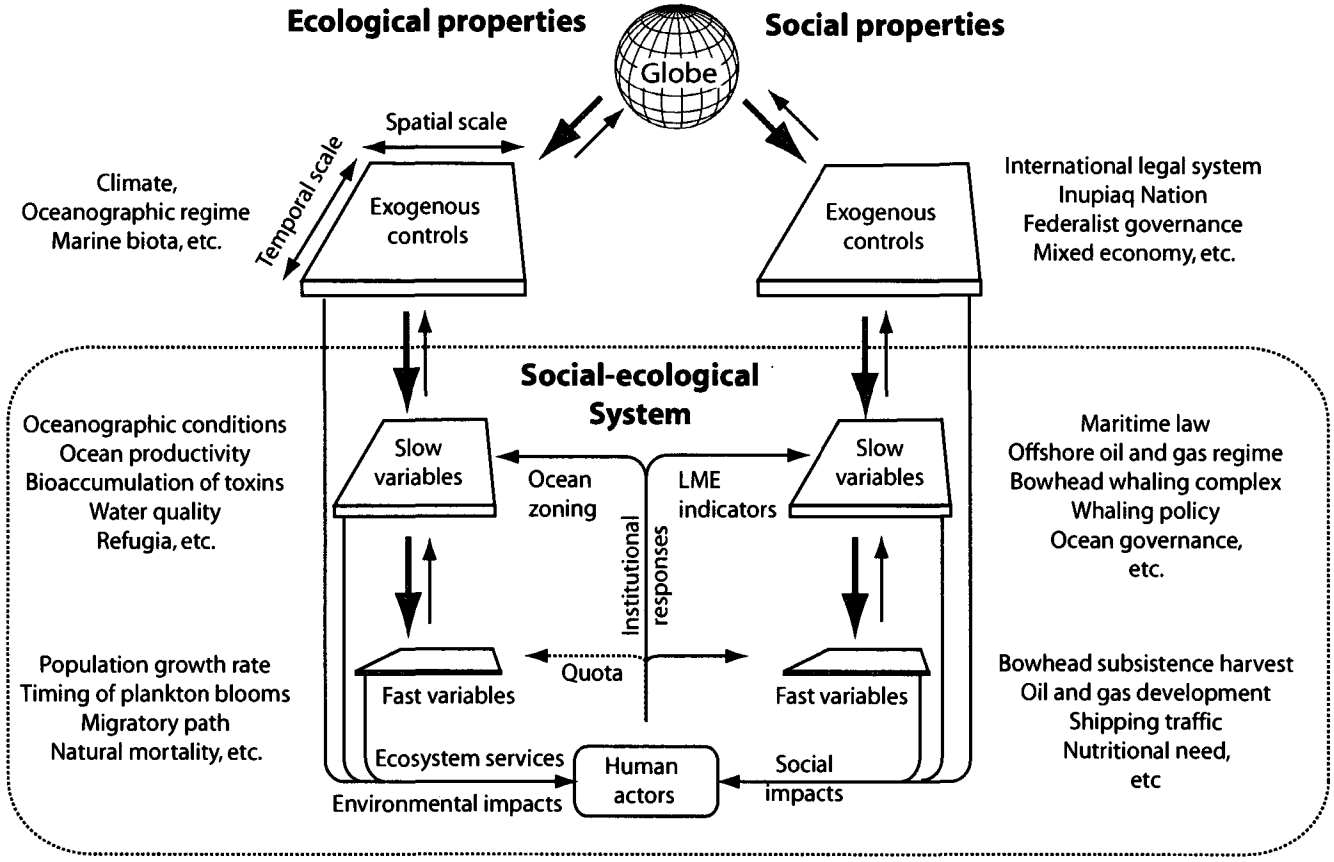

Figure 6.2 Bowhead whale social-ecological system Figure adapted from Chapin et al. (2006a).

Arctic North America. Below, I briefly contextualize the system and describe ecological and social drivers involved in the provisioning of bowhead whales and polar bears as ecosystem services as well as linkages between the two.

Since the 1940s, the Arctic has been experiencing rapid systemic change, such as climate forcing (Arctic Council 2005) with the resulting loss of multi-year sea ice, (Richter-Menge et al. 2008) and internationalization of resource management (Young and Osherenko 1993). Arctic Alaska has also been changed through social and political processes such as the oil boom in the 1960s (Chance 1990), military activities (Hughes 1965), and change in political and cultural boundaries through the Alaska Native Claims Settlement Act of 1971 (ANCSA) (Berger 1985; Mitchell 2001; Hensley 2008). Fieldwork in Barrow during this study took place during 2006 to 2008, and in 2007 in Wainwright. During 2006 and early 2007, several fast social drivers were negatively affecting the communities: the proposed reauthorization of bowhead whale strikes by the International Whaling Commission and Japanese threats to block passage of the rule; growing oil and gas exploration in the Beaufort Sea; and the Endangered Species Act listing process for the polar bear. Pronounced fast environmental drivers included an unprecedented (in the modern era) loss of summer sea ice in 2007, increasing numbers of grey whales migrating along the Beaufort Sea coast, and a low level of polar bear activity on land. By 2008, ice conditions for polar bears had changed and many bears were seen directly offshore of Barrow; more bears than usual were seen near and into town (Eicken pers. comm.).

Drivers of bowhead whale population change

As one manifestation of climate change, marine mammals are projected to and have been observed to be responding to climate change in proportion to their dependence on multi-year sea ice (Laidre et al. 2008). As ice-associated species (Laidre et al. 2008), bowhead whales are thought to be somewhat resilient to the loss of multi-year sea ice, but vulnerable to other changes such as the growing acidification of the oceans or projected increased competition from seasonal migrants such as humpback, minke, gray and killer whales (Moore and Huntington 2008). Due to favorable ecological conditions (slow drivers[96]) and a successful international moratorium on commercial whaling (fast driver), bowhead whales in the Bering-Chukchi-Beaufort Seas (BCB)

[96] The Bering Sea, where the whales are believed to overwinter, is undergoing a significant ecosystem regime shift from a benthic-dominated to a pelagic-dominated state (Grebmeier et al. 2006).

population as well as some other Arctic areas have seen a recovery[97] from colonial whaling. Ecologically, bowheads play an important roles in the near-shore environment by maintaining leads in the seasonal ice zone, consuming zooplankton, vertically mixing nutrients, making plankton available to other species at the water surface, and providing energy to predators and scavengers (all fast drivers) (Moshenko et al. 2003). Bowhead whales have done well in the Bering, Chukchi and Beaufort Seas as benthic-dominated ecosystems; a projected shift to a pelagic-dominated ecosystem with the reduction of sea ice may increase competition for plankton through increased fisheries biomass (Hunt et al. 2002; Øien 2003; Bluhm and Gradinger 2008). The BCB population has a broad migratory path, wintering near marginal ice fronts and polynyas in the Central and Western Bering Sea, and migrating North and East into the Eastern Chukchi beginning in April, following leads in the sea ice. In the summer, whales are found in the Beaufort Sea, along outer continental shelf and slope habitats (NMFS 2008b and references within; Moore et al. 2000; George et al. 2003; Galginaitis and Funk 2004).

Linkages between bowhead whale and polar bear systems

Ideally, one could present both bowhead whale and polar bear system in one graphic to indicate linkages between ecological and social drivers. I have split the Barrow SES into two figures (figure 6.1 and 6.2) due to the complex, separate governance of each species and the fact that bowhead whales and polar bears have very different life histories. However, there are obvious linkages between the two systems. For instance, whale carcasses harvested by Iñupiaq whalers provide a significant source of nutrition to polar bears before and after the summer sea ice minimum (Miller et al. 2006). In addition, although the demographic characteristics of most self-identified polar bear hunters and whaling captains in Barrow are different, whaling captains and crew do take a portion of the polar bear subsistence harvest each year, partly as a defense against bears and a protection of their bowhead catch before they can finish butchering it, and partly for direct uses. Dead whales that float ashore often provide a draw for bears[98]. A significant proportion of harvests have been attributed to defense kills in recent years (Schliebe et al. 2006a),

[97] The BCB stock has recovered to an estimated 10,545 whales (Zeh and Punt 2005), between 46 and 101% of its estimated historic maxima (Woodby and Botkin 1993). The IWC estimates that the Davis Strait stock consists of 6,344 whales (95% CI=3,119-12,906) and that this estimate is negatively biased due to survey methodology (IWC 2008).

[98] In 2006, a whale that had been struck and lost near Barrow appeared onshore with polar bear claw marks on its back. In the case of these "stinker" whales, the crew that struck the whale will salvage the muktuk (blubber and skin), but leave the meat for bears and other foragers out at the carcass dump towards Point Barrow (see Bodenhorn 2001).

as bears have been found on shore more frequently as the distance to the ice pack in summer increases (Schliebe et al. 2006b).

Drivers of polar bear population change

Polar bears, an ice-obligate species, are more dependent upon sea ice than bowhead whales. They rely on multi-year sea ice as a platform for a whole host of activities including hunting, resting, and denning (Stirling and Derocher 1993) although they have exhibited successful adaptation in using more terrestrial denning sites over the past 20 years (Fishbach et al. 2007) as sea ice conditions have become more variable. Iñupiaq observers note the bear's adaptive use of the seasonal ice as well (Glenn 2008). Alaska polar bear biologist Jack Lentfer noted in 1976 that the severity of sea ice conditions seemed to be related to the density and number of bears encountering people in the near-shore environment and on land (Lentfer 1980). Sea ice physicist Hajo Eicken (pers. comm.) noted that in the summer and fall of 2008, an "ice finger" lodged into the shore near Barrow and was potentially a vector for a large number of bears observed in and around town that summer and fall.

In other locations, ice floes carrying bears have been known to transit great distances, potentially confounding management boundaries[99]. In the Bering Sea, floes have traveled south to the Pribilof Islands (Tikhmenev 1978); on the East coast of Greenland, bears occasionally ride floes to the South Coast and occasionally show up in Iceland, as noted in one of the Sagas and Icelandic press. Whether the traveling floe in Barrow during 2008 delivered mostly Southern Beaufort Sea or Northern Beaufort Sea bears is unknown. In addition, the management boundary between these putative populations is under negotiation in response to a reduced population estimate for the Southern Beaufort Sea population, bear movement data, and reduced economic opportunities for Canadian bear hunting guides (Ashley 2008).

Drivers of bowhead whale and polar bear harvests

Social drivers of harvests for these two species reflect the relationships people have with each. Iñupiaq communities have structured major cultural, social and economic activities around the bowhead whale harvest for thousands of years (Chance 1990; Stoker and Krupnik 1993; Braund and Associates 1997). Anthropologists describe this type of relationship as a complex, meaning that human communities and the animals they are dependent upon are highly

[99] Apart from the Arctic Basin population, which very little is known about, management boundaries are qualitatively supported by movement data and genetic analyses.

interconnected. Harvests are affected by social drivers: the number of whaling crews taking to sea, the efficiency of the hunt, and the quotas allowed by the International Whaling Commission. Fall whaling is generally more successful than spring whaling in Barrow (IWC 2008) as whalers have faster, larger boats. Working with Cross Island whalers from Nuiqusut, Galginitis and Funk (2004) documented the role of equipment malfunction, variable effort and time to butcher whales. Whalers consistently report interference from oil and gas activities; however, success in whaling despite the presence of industry can be positively affected by the dedicated use of a negotiated conflict avoidance agreement[100] even if it the offshore activity is largely unacceptable to the whalers.

Biologists working with the North Slope Borough note that successful whale harvests per unit effort also depend on a variety of ecological factors, including variability in sea ice conditions (e.g., choked ice leads), high winds and other aspects of poor weather, (George et al. 2003), and migratory path distance from shore. Whales that are struck may also be lost due to some of the same (fast) factors. Whalers from Nuiqusut have also reported whaling success as a function of variability in whale behavior (e.g., "spooked" whales hiding in-between ice floes) (Galginaitis and Funk 2004). Below, figure 6.3 illustrates the catch history and population estimates of the Bering-Chukchi-Beaufort Seas stock of bowhead whales since 1848. Scientists and Iñupiaq experts have been working together to census the population since 1978. The figure illustrates the recovery of the population under a consistent but low level of harvest after the end of the Yankee whaling period (1912).

Iñupiat and polar bears, however, have a different type of relationship, one that has changed through time depending on economic opportunities for using bear products, the number of bears near town, and the dominant economic mode of the village. In 1976, Lentfer noted that the increase in the wage economy around Barrow reduced the amount of bears harvested, as well as the amount of skins and products in the local economy (Lentfer 1980). Limited economic opportunity from bear hunting, skins, and handicrafts, as well as the decline in polar bear meat consumption have shaped relationships between people and bears[101]. As compared to the bowhead whale complex, these relationships between people and polar bears in Barrow resemble the "respectful co-existence" model developed by (Clark 2007) based on grizzly bear-human relationships in First Nations territories in Canada.

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[100] Personal observation from whalers' reports at multiple AEWC meetings.

[101] This observation may not translate to other communities with fewer wage-oriented jobs or a different relationship to bears, such as on St. Lawrence Island or Point Hope.

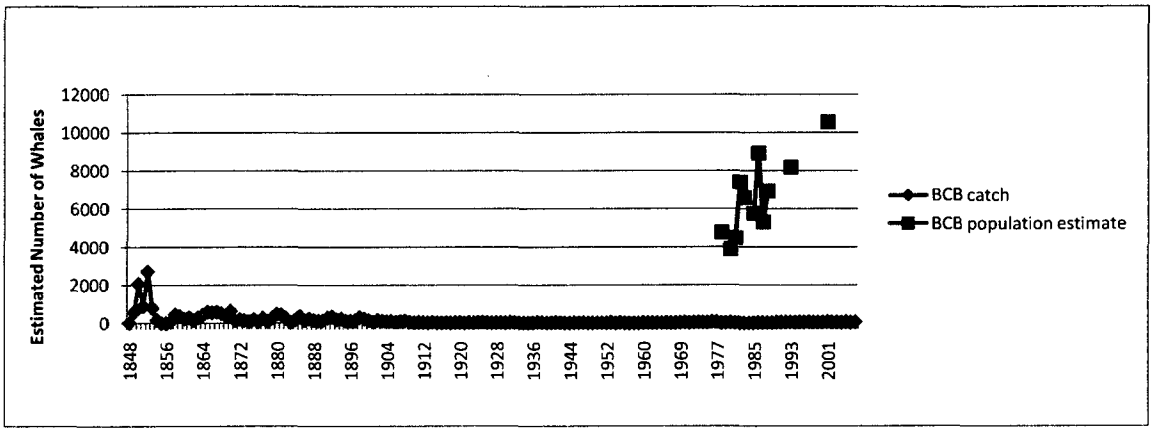

Figure 6.3 The Bering-Chukchi-Beaufort Seas bowhead whale catch history, 1848-2007
Sources: (Zeh and Punt 2005), (IWC 2009), (Brandon and Wade 2006).

Iñupiat and polar bears, however, have a different type of relationship, one that has changed through time depending on economic opportunities for using bear products, the number of bears near town, and the dominant economic mode of the village. In 1976, Lentfer noted that the increase in the wage economy around Barrow reduced the amount of bears harvested, as well as the amount of skins and products in the local economy (Lentfer 1980). Limited economic opportunity from bear hunting, skins, and handicrafts, as well as the decline in polar bear meat consumption have shaped relationships between people and bears[102]. As compared to the bowhead whale complex, these relationships between people and polar bears in Barrow resemble the "respectful co-existence" model developed by (Clark 2007) based on grizzly bear-human relationships in First Nations territories in Canada.

Polar bear harvests are also affected by ecological conditions. Iñupiaq hunters have described migratory paths for polar bears, following the development of shore-fast ice in the fall. In Barrow, bears are known to forage near persistent leads in the offshore environment. Oil and gas platforms can also create areas of open water in the ice, due to the flow of currents around the structures; these areas of open water then attract seals and bears, creating a feedback between the social system responsible for placement and monitoring of infrastructure and the ecological system (Lovecraft et al. unpublished data). Polar bear harvest statistics (figure 6.4) represent a modest level of harvest but within a much smaller population than the BCB bowhead whale

[102] This observation may not translate to other communities with fewer wage-oriented jobs or a different relationship to bears, such as on St. Lawrence Island or Point Hope.

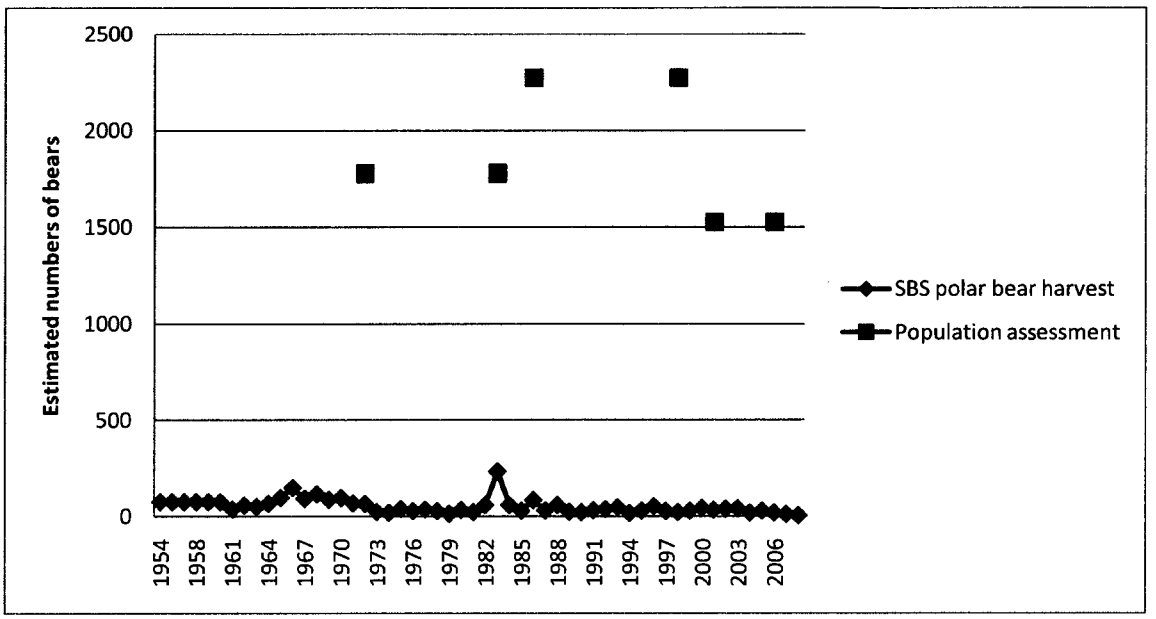

Figure 6.4 The Southern Beaufort Sea polar bear harvest, 1954-2008 Sources: PBSG reports (1970-2005), MTRP data (1994-2008).

population. Additionally, although the polar bear population assessments have large confidence intervals, the population is believed to be in decline. If the bears are declining and reduced in population, then the harvest would typically be reduced in order to foster a population recovery. However, rapidly changing habitat conditions makes determining a precise allowable level of take difficult, if not impossible.

Institutional Responses

Polar bear policy dynamics

The modern American polar bear policy regime has been described elsewhere (Fikkan et al. 1993; Baur 1995; Lovecraft and Meek 2007) so I will simply summarize its features here. Modern American polar bear policies stem from the original Agreement on the Conservation of Polar Bears, which was signed by all Arctic countries in 1973. The Agreement defined the policy problem as one of both overuse and habitat modification at a global scale. At the time of ratification, both the U.S. Department of State and the President noted that although they were recommending that the Agreement be ratified by the U.S. Senate, it would not dictate American policy because key provisions of the agreement were already adopted into the newly passed

Marine Mammal Protection Act. The Agreement was ratified by the Americans unanimously and without fanfare (Baur 1995). The commercial moratorium for polar bear sport hunting was successful, largely because it was a blunt policy instrument and effective social norms and legal enforcement were brought to bear on a small population of resource users (Lentfer 1980). A black market for polar bear skins does exist[103], but it not thought to be significant in the United States (Schliebe et al. 2006a).

Over the years, parties to the Agreement and conservation groups have questioned whether or not the U.S. has fully implemented provisions of the Agreement related to habitat protection (Baur 1995). In Alaska, habitat protection for the polar bear is intricately tied up in the political debate around opening the remaining part of the Arctic coastal plain within the Alaska National Wildlife Refuge (ANWR) as well as the politics of oil and gas development generally. The majority of on-land denning sites are located within the refuge, and female bears have been trending towards denning more often on land, likely in response to poor sea ice conditions (Fishbach et al. 2007). While the coastal plain of ANWR is not currently open to drilling, allowance for drilling has been up for debate within most Congressional sessions and Alaska's governors and Congressional delegation have consistently supported drilling.

American delegation reports to the 1976 meeting of the Polar Bear Specialist Group indicated that oil and gas exploration and development onshore and offshore, as well as multiple land managers based in different departments, were a major impediment to protecting habitat in Alaska (Lentfer 1980). Lentfer discussed a proposed system of dynamic protected areas based on limiting exploration and development to active development zones, surrounded by areas off limits to development until the first zone was completed (Lentfer 1980). A similar proposal was the focus of a multi-stakeholder workshop in the early 1990s. Amendments to the MMPA in 1994 directed the USFWS to examine ways to more effectively meet habitat protection requirements of the 1973 Agreement (§113(c)). As of 1999, USFWS was studying a proposal to link protections for habitat to oil and gas development mitigation permits. The proposal included the creation of dynamic conservation measures in relationship to industrial projects in bear habitat. It is unclear what the ultimate fate of the proposal was, but neither the Clinton nor the Bush administration adopted the approach. During the twilight hours of the Bush administration, however, the USFWS settled a lawsuit with environmental groups over the administration's decision not to dedicate critical habitat for polar bears. Details of that agreement have not been made public to

[103] Past illegal harvests in Chukotka have fed the black market for polar bear skins.

date. At the same time, oil and gas leasing and exploration activities significantly increased during the Bush administration, especially after the Congressional moratorium against development of the Outer Continental Shelf was lifted.

At the National level, polar bear managers and researchers have been focused on an assessment for listing polar bears as threatened under the Endangered Species Act (ESA) largely due to the loss of its summer sea ice habitat. After a long period with several missed deadlines, on February 11, 2008 Department of the Interior Secretary Dirk Kempthorne announced the polar bear would be added to the list of threatened species under the ESA[104]. The decision was a partial victory for environmental groups and a large segment of the American public supporting the listing. When announcing the decision, Kempthorne cautioned that the Endangered Species Act was not an appropriate policy tool to solve climate problems and that he was instructing his staff to only initiate ESA consultations on projects with a direct, tangible (as opposed to indirect or cumulative) connection to polar bear populations. In addition, as many of the ESA's provisions in regards to marine mammals are duplicative of those under the Marine Mammal Protection Act, USFWS published regulations allowing industrial mitigations and subsistence harvesting to be conducted in accordance with MMPA standards (USFWS 2008b). The listing decision was immediately appealed by environmental groups in court. A key provision of the MMPA regarding the importation of polar bear skins from Canada was pre-empted by the ESA, ending the ability of American sport hunters to bring back their polar bear skins to the United States, and threatening dire economic consequences for communities in Canada dependent upon hosting hunters[105].

Harvest assessment, another management task, is largely accomplished through the USFWS Marking, Tagging, and Reporting Program (MTRP), developed in the 1980s as a way to monitor harvests simultaneously with monitoring the trade in marine mammal ivory and fur. The MTRP has taggers identified in many villages along coastal Alaska who are qualified to tag and report harvests. The taggers may be, but are not always, involved in the formal co-management structure, the Nanuuq Commission, which operates as a liaison between polar bear hunters and the USFWS as well as a policy venue in its own right.

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[104] Up until the day of the decision, Secretary Kempthorne had two proposals on his desk: to list or not to list, with arguments for each. The Vice President's Office was particularly vocal in regards to its opposition to the proposed listing (Bush Administration official 2008).

[105] See Freeman and Wenzel (2006).

Policy bear policy in the United States and within shared ecosystems with Russia and Canada is cross-scale, but with reduced local opportunities for self-organization (see chapter five) and policy experimentation. The key polar bear management policies currently in place with significant local community involvement include the following: 1) managing the subsistence hunt of polar bears together with the Nanuuq Commission, the North Slope Borough and other partners, 2) exchanging information with counterparts and developing the U.S.-Russia Polar Bear regime to share the Chukchi Sea subsistence harvest, 3) mitigating industrial development in polar bear habitat areas, 4) managing the Southern Beaufort Sea population hunt shared with the Inuvialuit in Canada, and 5) working with local partners to manage nuisance bears. Co-management within the MMPA is significantly different from its Canadian counterparts born out of land claims in the Northwest Territories and Nunavut. The MMPA includes a provision, Section 119, allowing for the USFWS to enter into cooperative agreements with Alaska Native Organizations to, "*...conserve marine mammals and provide co-management of subsistence use by Alaska Natives*" (§119(a)). The section allows for grants for collecting and analyzing data on marine mammal population, harvest monitoring, participating in marine mammal research, and developing co-management structures (§119(b)).

Table 6.1 represents examples of threats to the production of polar bears as an ecosystem service, combined with existing institutional remedies and an assessment of the relative effectiveness of those policies to conserving polar bears as part of regional ecosystems. The threats assessment and analysis of effectiveness follows the NMFS recovery plan process for Steller sea lions in Alaska (NMFS 2008a), as it is one of the most innovative, transparent and reflexive plans for marine mammals management in recent years with a critical analysis of policy failures to date. Threats are categorized through the five factor analysis required by the Endangered Species Act:

1. present or threatened destruction, modification, or curtailment of species' habitat or range;
2. overutilization for commercial, recreational, scientific, or educational purposes;
3. disease and predation;
4. inadequacy of existing regulatory mechanisms; and
5. other natural or man-made factors affecting the species' continued existence (16 USC 1533).

Table 6.1 Institutional analysis of polar bear conservation in the United States

Criteria potentially affecting recovery considered under the U.S. Endangered Species Act	Factor	Example	Fast, Medium or Slow Driver	Institutional Response	Scale of Response	Efficacy of Approach	Feasibility of Mitigation	Efficacy + Feasibility = Effectiveness
	Present or threatened destruction, modification or curtailment of habitat and range	Climate-related loss of sea ice	Slow	Kyoto Protocol*	International	Low	Low	Low
		same		Voluntary provisions by Bush Administration	Private industry	Low	Low	Low
		Oil and gas development	Fast	ESA consultations	Project level operator and USFWS	Medium	High	Medium
		same		MMPA Incidental Harassment Authorizations	Project level operator and USFWS	Medium	High	Medium
		same		Development stipulations from oil and gas leasing	Project level operator, MMS, AK and local communities	Medium	High	Medium
		same	Fast	Plan of cooperation with local communities ensures "no unmitigable adverse impact" on availability of polar bears for subsistence	Same as above	Medium	High, but with threshold effects for multiple companies	Medium
		Increased shipping	Medium	United Nations Convention on the Law of the Sea*	International	Unknown	High for vessels associated with oil & gas, low with private ones	Unknown

Table 6.1 Institutional Analysis of Polar Bear Conservation in the United States
For efficacy of approach, a rating of "low" is based on no or few demonstrated or projected benefits of policy against the associated threat, "medium" indicates demonstrated moderately positive benefits, and "high" indicates highly effective, demonstrated or theoretical benefits necessary for a viable population in the future. Feasibility of approach is similarly ranked for "low," "medium," and "high," but is independent of efficacy. Effectiveness is rated as the addition of both categories and weighting efficacy higher than feasibility. Sources: Meek et al. (2008), Lovecraft and Meek (2007), Schliebe et al. (2006), Fikkan et al. (1993). * indicates that the United States is not a signatory to this policy or has not ratified it.

Table 6.1 continued

Criteria potentially affecting recovery considered under the U.S. Endangered Species Act

Factor	Example	Fast, Medium or Slow Driver	Institutional Response	Scale of Response	Efficacy of Approach	Feasibility of Mitigation	Efficacy + Feasibility = Effectiveness
	Environmental variability	Slow	None	None	None	None	None
Overutilization for commercial, recreational, scientific, or educational purposes	Aboriginal subsistence harvest and defensive takes	Fast	International Agreement for the Conservation of Polar Bears	International	Medium	Medium	Medium
	same		US-Russia Agreement on Chukchi Sea Population	Bilateral with interlocal and co-management features	High	Medium	High
	same		Nanuuq-ChAZTO agreement	Interlocal	Medium	Medium	Medium
	same		Nanuuq Commission co-management activities	Cross-scale	Low	Medium	Low
	same		Inuvialuit-Inupiat Agreement	Interlocal	Medium	Medium	Medium
	same		Community polar bear management plans	Local	Medium	Medium	Medium
Disease or predation	Bioaccumulation of toxins	Slow	Stockholm Protocol*	International	Medium	Medium	Medium
Inadequacy of existing regulatory mechanisms	Climate change policy	Slow	None	International	High	Medium (in the long-term)	High

Table 6.1 continued

	Factor	Example	Fast, Medium or Slow Driver	Institutional Response
		same		National plans
	Other factors affecting species' continued existence	Illegal trade	Fast	International Agreement
		same		Convention on International Trade in Endangered Species
Criteria				MMPA Marking, Tagging, and Reporting Program

Scale of Response	Efficacy of Approach	Feasibility of Mitigation	Efficacy + Feasibility = Effectiveness
National	High	Medium	High
International	High	Medium	High
International	High	Medium	High
Alaska-wide	Medium	Medium	Medium

The policy problems, existing institutions, and analysis draw from the ESA determination for polar bears (USFWS 2008b) and documents of the IUCN Polar Bear Specialists' Group (1970-2005), Meek et al. (2008), Lovecraft and Meek (2007), Schliebe et al. (2006), and Fikkan et al. (1993).

Institutions as feedback channels

Institutions relating to polar bear management have varying success as feedback channels, according to my heuristic: channels reduce destabilizing positive feedback, are informed by a suite of relevant indicators of fast and slow drivers, and use information to make policy corrections. The Agreement on the Conservation of Polar Bears was successful in decreasing positive feedback through the initial moratorium, cutting off financial markets for polar bear guiding and criminalizing trade in skins. The scale of activities was amenable to tracking and monitoring at key airports. Protections for habitat were successful in many other countries, but not in the United States. The parties to the agreement have met irregularly, even as the Polar Bear Specialist Group has created norms for polar bear management, such as for the development of quotas. Because the parties have not regularly met, they have not made policy corrections at a global scale related to stickier issues such as habitat. Habitat provisions in the Agreement, the ESA and the MMPA are not designed to and have not been successful at reducing positive feedback related to climate change, with ultimate consequences for bear populations dependent upon multi-year ice. Institutions related to fast drivers such as oil and gas development have been largely successful, even as these institutions do not operate at the scale relevant for proactively safeguarding key refuge areas.

Bowhead whale policy dynamics

Bowhead whale conservation is a cross-scale enterprise. Quotas for aboriginal whaling are modeled, deliberated and decided upon at the International Whaling Commission under the authority of the International Convention for the Regulation of Whaling (ICRW). Iñupiaq whalers are part of the American delegation, but operate under diplomatic constraints imposed by the State Department[106]. At the national scale, NMFS is responsible for whale conservation under the Endangered Species Act and the Marine Mammal Protection Act. Bowhead whales were one of

[106] Within this capacity, they can not lobby other countries with their positions (Anonymous 2006c). However, many North Slope Borough officials and whaling leaders also attend as non-profit delegates, and can lobby within that role.

eight endangered whales listed in 1970. At the time, the United States was importing an estimated 20% of the world's whale-based commodities, from dog meat to automotive lubricants (DOI 1971). Because bowheads were listed before the habitat provision was established under the ESA in 1978, the designation for critical habitat under the ESA is a discretionary act. In 2000, NMFS was petitioned to designate critical habitat for the Bering-Chukchi-Beaufort bowhead whale population. The agency declined the petition in 2002, with the following reasoning:

> *(1) the decline and reason for listing the species was overexploitation by commercial whaling, and habitat issues were not a factor in the decline; (2) there is no indication that habitat degradation is having any negative impact on the increasing population in the present; (3) the population is abundant and increasing; and (4) existing laws and practices adequately protect the species and its habitat* (FR 55767 August 30, 2002).

Despite reason number four above, the fact that habitat was not protected initially has negative consequences for the subsequent assessment of industrial activities permitted by other agencies, such as the Minerals Management Service.

Section 7 of the ESA (16 U.S.C. § 1536) requires federal agencies to consult with the Interior or Commerce Secretary with regards to whether or not an activity will jeopardize any ESA listed species or result in destruction or adverse modification of designated habitat. Without a habitat designation, essentially, there is no mandate to consider proposed modifications or other habitat effects in a precautionary, versus reactionary way. This provision erodes an agency's capacity to manage for slower variables and has cascading effects through other divisions of government. For instance, as a legacy of the State losing marine mammal management authority, the State defers to federal assessment of habitat when it considers the environmental impact of oil and gas development, even if the federal government has not considered habitat issues.

Environmental mitigation strategies to date typically focus on dynamic and temporal restrictions on sound and activity, rather than absolute spatial restrictions, although ships are required to keep a safe distance from marine mammals. NMFS and the Minerals Management Service have analyzed significant impacts relating to the impact of an activity on biologically meaningful activities of whales, such as socializing, feeding, mating and seeking refuge as defined by McCauley et al. (2000). Additionally, the agencies addressed special vulnerabilities whales encounter when they are squeezed into relatively narrow migratory paths, such as during the spring lead system in the Chukchi Sea (NMFS 2006). The agencies have not explicitly

considered habitat using the Large Marine Ecosystem concept[107], in which NOAA proposes to understand activities through a focus on bathymetry, hydrography, productivity, and trophic relationships. These characteristics would meet (Chapin et al. 2006a) requirements for exogenous and slow variables.

NMFS does, however, have the following mandates (among others) in relationship to bowhead whales: population assessment under the MMPA, evaluating industrial and fisheries interactions with bowheads in order to permit activities that may harass them, and ensuring that industrial activities have no "unmitigated adverse impact" on subsistence harvesting of whales (MMPA § 101(a)(5)(A)(i)(I)). Additionally, mandates stemming from the IWC include genetic analyses for stock structure determination (e.g., whether or not the Bering-Chukchi-Beaufort bowhead whale stock is one or two populations), nutritional need analyses for justifying particular aboriginal catch levels and more. Respondents involved with the bowhead whale program estimate it costs millions of dollars per year, even though the BCB population of bowhead whales is considered by experts to be functionally recovered from Yankee whaling days (Gerber et al. 2007).

At the regional scale, the Alaska Eskimo Whaling Commission coordinates, monitors and manages reporting from the subsistence bowhead whale harvest in the eleven member communities and with its Chukotkan counterparts, with whom the AEWC has an interlocal agreement to share the IWC quota. This information is shared with NMFS and the IWC. The AEWC also organizes enforcement tribunals in the event of IWC infractions (e.g., someone harvests a cow/calf pair, too many whales are caught above quota). The AEWC has another (unfunded) mandate to improve their weapons in order to improve catch efficiency and reduce the whale time to death for humane reasons This program, the Weapons Improvement Program, involves testing and training whaling captains to use penthrite weapons. These weapons are considered dangerous and many whaling captains prefer the Yankee whaling equipment, which

[107] Large marine ecosystems are a framework for learning about systems bounded by ecological criteria: bathymetry, hydrography, productivity, and trophic relationships (http://www.lme.noaa.gov/, accessed April 8, 2009). System dynamics are examined through five data-collection modules: productivity, fish and fisheries, pollution and ecosystem health, socioeconomics, and governance. At the present time, however, the data presented in the Chukchi and Beaufort LME briefs for subsistence harvesting and socioeconomic activities is erroneous or outdated, and the governance section focuses on Russia and Canada.

they point out, they are required to use under the ICRW to preserve traditional aspects of the hunt by limiting technological development[108].

At a local scale, whaling captains' associations act as a venue for collective action relating to monitoring of the hunt, deliberating on conflict avoidance agreements and other industrial issues, exchanging knowledge across generations. Whaling captains' wives associations also organize logistical aspects of the hunt, teach the community how to sew skin boats and other traditional aspects of the hunt, and raise significant funds to support the AEWC through bingo and other activities (Bodenhorn 1990). Boat crews, handicraft makers, and community volunteers (e.g., in butchering or cooking) are also involved at the local level.

Significantly, the bowhead migration path brings it along the resource-rich Alaskan outer continental shelf, where oil and gas development is slowly developing. Thresholds for harassment have been developed based on sound pollution levels that are thought to have a potential lethal effect on whales. Industry operating seismic surveys or other loud underwater activities must power down their operations in the presence of whales (MMS 2006). The Minerals Management Service (MMS) has conducted extensive environmental and socio-economic studies to evaluate the effect of oil and gas development activities on marine life, even though to date there are no systematic baseline studies in the Beaufort and Chukchi Seas. Although these two seas are considered as Large Marine Ecosystems under NOAA research and planning purposes, the management framework is promising but unclear. Table 6.2 represents examples of threats to the production of bowhead whales as an ecosystem service, combined with existing institutional remedies and an assessment of the relative effectiveness of those policies to conserving whales as part of regional ecosystems based on the same model as the polar bear policy assessment. The policy problems, existing institutions, and analysis draw from policy documents including impact assessments conducted by NMFS (2008b) and MMS (2008), supplemented with observation of co-management meetings where many of the mitigative institutions and their efficacy are discussed.

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[108] Steve Braund pointed out to whalers at the 2008 AEWC Mini-Convention that adopting new technologies has been a hallmark of the Iñupiaq and Yup'ik cultures. Additionally, he noted that there is no support among anthropologists for the idea that one particular type of weapon makes a hunt more authentically traditional than any other. Bodenhorn (2001) makes a similar point in regards to adaptively governing the process of landing and butchering whales.

Table 6.2 Institutional analysis of bowhead whale conservation in the United States

	Factor	Example	Fast, medium or slow driver	Institutional Response	Scale of Response	Efficacy of approach	Feasibility of mitigation	Efficacy + Feasibility = Effectiveness
Criteria potentially affecting recovery considered under the U.S. Endangered Species Act	Present or threatened destruction, modification or curtailment of habitat and range	Oil and gas exploration and development	Fast	ESA consultations	Project level operator, MMS and NMFS	Medium	Medium	Medium
		same	Fast	MMPA Incidental Harassment Authorizations	Project level operator and NMFS	Medium	High	Medium
		same	Fast	Development stipulations from oil and gas leasing	Project level operator, MMS, AK and local communities	Medium	High	Medium
		same	Fast	Conflict Avoidance Agreement ensures "no unmitigable adverse impact" on availability of whales for subsistence	Same as above	Medium	High, but with threshold effects for multiple companies	Medium
		Increased shipping	Slow	United Nations Convention on the Law of the Sea*	International	Unknown	High for vessels associated with US-regulated oil and gas development, Coast Guard, low for others	Unknown

Table 6.2 Institutional analysis of bowhead whale conservation policy in the United States For efficacy of approach, a rating of "low" is based on no or few demonstrated or projected benefits of policy against the key drivers of bowhead whale population stress, "medium" indicates demonstrated moderately positive benefits, and "high" indicates highly effective, demonstrated or theoretical benefits necessary for a viable population in the future. Feasibility of approach is similarly ranked for "low," "medium," and "high," but is independent of efficacy. Effectiveness is rated as the addition of both categories and weighting efficacy higher than feasibility. Sources: NMFS (2008b), NMFS (2006), Shelden et al. (2003), IWC (2008). * indicates that the United States is not a signatory to this policy (as of July 2009) or has not ratified it.

Table 6.2 continued

Criteria potentially affecting recovery considered under the U.S. Endangered Species Act	Factor	Example	Fast, medium or slow driver	Institutional Response
		same	Fast	Commercial ships (e.g., barges) volunteer to sign conflict avoidance agreement
		Environmental variability	Slow	Kyoto Protocol*
	Overutilization for commercial, recreational, scientific, or educational purposes	Aboriginal subsistence whaling	Fast	International Convention for the Regulation of Whaling
		same	Fast	AEWC Co-management Agreement
		same	Fast	US-Russia agreement to share quota
	Disease or predation	Bioaccumulation of toxins	Slow	Stockholm Protocol*
	Inadequacy of existing regulatory mechanisms	Climate change policy	Slow	Kyoto Protocol*
		same	Slow	National plans

Scale of Response	Efficacy of approach	Feasibility of mitigation	Efficacy + Feasibility = Effectiveness
Operator and local Whaling Captains' Association	High, with threshold effects for too many operators	Low	Medium
International	Low	Low	Low
International	Medium	High	Medium
Cross-scale, co-management	Medium	High	Medium
Cross-scale, bilateral with interlocal and co-management features	Low	Medium	Low
International	Low	Medium	Low
International	Low	Medium	Low
National	Low	Medium	Low

Table 6.2 continued

	Factor	Example	Fast, medium or slow driver	Institutional Response
		Ocean use planning	Slow	Coastal Zone Management Act
		same	Slow	Outer Continental Shelf Lands Act
Criteria	Other factors affecting species' continued existence	Fisheries interactions	Fast	MMPA

Scale of Response	Efficacy of approach	Feasibility of mitigation	Efficacy + Feasibility = Effectiveness
National	High	Medium	High
National	Low	Low	Low
National	Low	Medium	Low

Institutions as feedback channels

Institutions relating to bowhead whale management also have varying success as feedback channels, according to my heuristic. The International Convention for the Regulation of Whaling (ICRW) has over time come to adopt an innovative, precautionary control law based on Bayesian modeling for regulating whaling, although it has only been used so far to regulate aboriginal subsistence whaling. The ICRW was successful in decreasing positive feedback through the 1989 moratorium on commercial whaling, cutting off financial markets for products made from endangered whales. Although advocates for whale preservation and precautionary approaches have desired the expansion of the regime to include habitat protections, to date key whaling countries have not agreed. The International Whaling Commission does maintain linkages to other issue areas and regimes, including CITES, regional marine mammal regulatory bodies such as the North Atlantic Marine Mammal Commission, and the United Nations Convention on the Law of the Sea, among others. As such, the IWC primarily manages fast variables, such as the BCB harvest by Alaska Natives and Chukotkans.

Despite the success of the cross-scale management approach to the BCB harvest, and with feedback illustrating the harvest is insignificant to recovery of the BCB population, the political body has not been able to put its efforts towards regulating the use of more precarious populations. Political and values conflicts between pro-whaling and pro-protectionist factions within the IWC have driven large investments in learning about the BCB and, to a lesser extent, other bowhead whale populations, in order to prove that aboriginal harvests are sustainable. Parties to the ICRW meet yearly and often meet between sessions. Feedback about yearly harvests for BCB whales are fed back into the harvest model to build knowledge of population dynamics; the model does not include slow drivers as parameters although it does simulate stochastic events.

Many other institutions related to bowheads address fast drivers such as aboriginal harvests and oil and gas development. These institutions (e.g., MMPA, ESA) have been successful in determining thresholds for sound pollution and diversions from migratory paths from industrial activities. Each year, a multi-stakeholder, multi-agency group meets to review the previous year's mitigation plans and modifies them based on performance. Thresholds for social impacts have largely been set by the Minerals Management Service unilaterally. Thresholds such as disruption of harvests for multiple years are not acceptable to most Iñupiat, although they are

interested in discussing thresholds through co-management and broader community consultation processes. Some communities are not amenable to this approach, however, and have stated in public meetings that the risk to bowhead whales is unacceptable based on cultural and spiritual grounds. A Tribal Council member from Point Hope at a meeting in Barrow on oil and gas development said that accepting such a risk would be a breach of Eskimo Law.

Discussion

The previous section analyzed to what extent existing polar bear and bowhead whale policy regimes are addressing key drivers of system dynamics. The analysis confirmed the findings of Folke et al. (1998b) and Chapin et al. (2006a), in that both agencies have focused on the management of fast variables. I have shown that agency mandates relating to international affairs (e.g., limit number of bowhead whales harvested and understand population dynamics) and protection from industrial activity (e.g., Incidental Harassment Authorizations) drive many of NMFS' bowhead whale policy choices. The agency has not exercised its discretion to protect habitat either through the ESA or through the MMPA, likely due to political pressure and administrative directives. Without critical habitat designation or a recovery plan, NMFS bowhead whale regime has largely been problem-focused and ad-hoc, even as it has been successful in recovering bowhead whale populations (Gerber et al. 2007). Slow social variables relating to international and national law have not provided mandates for habitat conservation congruent with a new summer sea ice regime. Existing authorities under the ESA and MMPA, while within NMFS' discretion to implement, have not been used[109]. Therefore, governing agencies such as MMS and NMFS have largely managed fast variables using institutional thresholds relating to the ability of whales to tolerate conditions (e.g., sound from underwater seismic testing) and whalers to conduct whaling with low levels of interference.

Polar bears in Alaska have been the focus of more than forty years of study and monitoring. Together with the Nanuuq Commission, USFWS has documented historic and present traditional ecological knowledge and scientific knowledge related to slow variables such as habitat selection and migratory paths. To date, this information has not been operationalized into habitat protections, other than temporal restrictions around oil and gas development and

[109] For a similar argument about habitat provisions in the MMPA with regards to walrus, see Robards (2008). Managers interviewed for this chapter could not identify any instances in which the MMPA had been used to protect habitat for the animals they monitored.

protected sites such as maternity dens. As of early 2009, USFWS has yet to implement habitat requirements of the 1973 Agreement despite directives from Congress and wide public support, although it appears the Service is moving towards such a designation.

The climate-induced loss of summer sea ice has no effective institutional oversight, and as such, managers may choose to manage for future climate scenarios that would support bear populations in Alaska, or continue to closely manage trade in bears living elsewhere. As with bowhead whales, most management activities have been focused on fast variables, such as subsistence hunting and oil and gas development mitigations and this management focus has been insufficient to counteract key threats or manage for future system states. In both cases, the primacy of oil and gas exploration and development, combined with an ice regime that constrained human activity offshore has led federal agencies with land management authority to put off managing slow variables, such as habitat.

Conclusions

I have proposed that the extent to which institutions enable the coupling of social and ecological subsystems is a measure of policy fit. I argue that evaluation of policy fit must consider the magnitude of the fit as well as the feasibility of adopting policy in relationship to other existing social goals. This study compares policy fit through two case studies of bowhead whale and polar bear conservation. I conclude that as the dominant resource use of the area shifts from subsistence marine mammal harvesting to oil and gas exploration, gaps in ocean governance relating to slow variables have emerged. Furthermore, modern institutions built upon previous iterations of related policies have not been designed to act as feedback mechanisms, especially for slow variables. In fact, chapter three illustrates how marine mammal management policies in Alaska have been the product of extensive political bargaining through time. For instance, there are few if any explicit linkages between programs designed to monitor coastal development and decision-making venues about coastal development.

Modern marine management agencies often act as problem-focused adhocracies (see chapter five) in dealing with one fast variable, such as rates of harvest. Adhocracies are credited with qualities conducive to adaptive management. However, to the extent that powerful interests are also lawfully using the same ecosystem under property rights rules such as oil and gas development leases, institutions relating to use laws (e.g., International Convention for the Regulation of Whaling) rather than control laws (e.g., Outer Continental Shelf Lands Act) will

not have the broad reach necessary for managing complex multi-use landscapes for long-term resilience (Crowder et al. 2006; Young et al. 2007).

Two important areas important for ecosystem services include Alaska's Arctic National Wildlife Refuge, an area important for female polar bear denning and the outer continental shelf, an area critical for bowhead whale migrations[110]. Crowder and Norse (2008) recommend delineating, planning for, and protecting discrete places meaningful for animal life histories before incompatible, multiple uses become embedded in the institutional landscape. Significant gains or losses could be made in the next decade, as political actors advocate for their most important ecosystem services.

In the 1980s and the 1990s, the U.S. Fish & Wildlife Service and the National Marine Fisheries Service presided over a successful recovery of most marine mammal populations in Alaska, with a few exceptions. Only one species, the Cook Inlet beluga, was overhunted to depletion and even there, recovery appears to be stalled by environmental conditions rather than subsistence takes. In the first decade of the 21st century, however, Arctic warming and increased oil and gas exploration in the offshore environment has accelerated while managers and communities struggle to adapt to new conditions. How successfully the agencies and their governance models will perform is a point of conjecture. Given that novel conditions often require innovative approaches, in the next chapter I will project the likely impacts of a loss of summer sea ice on bowhead whales and polar bears in the Beaufort and Chukchi Seas and then discuss strategies of innovative governance based on maintaining or building social capital, innovation in agency approaches, and developing new institutions. All of these strategies would be expected to enhance the ability of managers and communities to act collectively, a requirement of successful cross-scale governance.

[110] However, as Pidgorna (2007) notes, even the National Refuge System has been slow to address large-scale processes such as climate change, which has contemporary and anticipated effects on the ability of refuge lands to support ecosystem services. In addition, land ownership in Arctic Alaska onshore is split across several different federal agencies, with different organizational cultures and statutory mandates, often preventing a spatially coherent approach to land management. The outer continental shelf is managed by both the State of Alaska (within the three mile limit of jurisdiction) and the Minerals Management Service (outside of the three mile limit). The MMS has not explictly addressed climate change as a land manager.

Chapter 7: Conclusion

In a time of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists. – Eric Hoffer, Reflections on the Human Condition (1973: 32)

Marine mammal management in Alaska can rightly be called a "wicked problem" because stakeholders and agencies often have radically different conceptualizations of the "problem"; the "problem" is never solved, only managed; and old "solutions" continue to be implemented despite changing conditions (Conklin 2006). Insight into the dynamics of a complex social-ecological system requires a methodology capable of appreciating complexity. However, there is no perfect vantage point from which to study policy processes that bridge vast scales between international policy venues and local communities ostensibly governed by them. Ethnographers of the global economy have pioneered multi-sited ethnography, in which researchers trace the paths of resources flowing from local places, later transformed into commodities, and finally take on a life of their own in global trade flows (Marcus 1995). A focus on any one level of the chain of production provides an important piece, but understanding the connections and drivers of those connections across scales is important to broader insight into the potential success of policy change during a time of rapid environmental transformation. In addition, a focus on the path of particular policies across multiple scales allows the accumulation of insight into the dynamics of policy *problems* as a series of action situations, rather than a focus on the *places* where policy solutions are deliberated and/or implemented.

Each temporal and spatial scale of analysis (as in figure 6.1) required different approaches and methods, suited to differences in access to the processes, places and people as well as the social dynamics characterizing those situations. For instance, a policy narrative approach was appropriate for both long-term and mid-term scales, whereas a social network analysis drawn from interviews and participant observation was well-suited to local interactions of a short duration. Multiple methods allow for a triangulation of findings across these situations.

This dissertation examined in depth three aspects of marine mammal management when conceptualized as an action arena: history of the regime (legacies of prior arenas), character of the community (agency culture), and patterns of interactions between regime actors (stakeholder-

agency relations). Understanding these three aspects is critical to designing new policy interventions because the configuration of these aspects affects the plasticity of governance. Using a resilience lens, each configuration can be thought of as the way agencies typically "do business," in which new projects may be initiated here or there, but the agency does not make significant changes to their organizational structure, or ways of working with stakeholders, unless shocked into a new configuration. The shock can arise through a threshold event, or an exogenous change to a slow driver. An example of such a shock would be a real change in the distribution of constitutional-level decision making power or a new ocean resources policy that required an Arctic marine conservation plan based on marine spatial management rather than managing marine mammal-industry interactions project by project. Past shocks also include the ban on sport hunting of polar bears in Alaska and the implementation of the first bowhead whale subsistence hunting co-management agreement.

Increasingly, communities and governments recognize their mutual dependence as well as the benefits of collaboration, especially when the area to be governed is as broad and vast as Alaska. That is not to say that collaboration and co-management are always positive and rewarding experiences, or that actors necessarily recognize the limitations of their own knowledge bases. However, co-management and the processes of social learning that theorists predict can come of it, are persistent features of the governance landscape in Alaska now. My dissertation focused on two overarching questions: 1) why do two federal agencies with similar mandates and policy tools, working in the same geographic areas, with many of the same community partners differ in their approach; and 2) do these differences matter for conservation of resources and the communities that subsist on them?

The focus of this study was heavily influenced by institutional theory. At a foundational level, institutional theory is a body of work concerned with the mechanisms for coordinating human behavior towards public goals. As a point of departure, this dissertation focuses on the social fit of rules to the place and people subjected to management. I began by situating my study in institutional and common-pool resource theory, with a focus on drivers of policy choices and associated outcomes. In chapter three, I investigated the ways in which marine mammal management has shaped policy histories and trajectories in Alaska under Indigenous, Russian, American, State and multi-party governance. In chapter four, I examined agency culture as a driver of policy outcomes. In chapter five, I traced the emergence of policy networks for harvest

assessment as a measure of policy fit to local social and cultural conditions. Finally, in chapter six, I considered the ability of current marine mammal policy regimes to foster resilience of marine social-ecological systems. I summarize my findings from these chapters below and consider the role of institutions in Arctic marine governance.

History

History has a long arc in the story of marine mammal management in Alaska. Drivers of institutional development have included technological change (e.g., the development of sea mammal hunting) and competition for resources in the Native Nations era, quests for sovereignty and high commercial yields in the Colonial era ending in nascent conservation institutions, conflicts over "public use" and sovereignty in the early Statehood era, and the twin goals of conservation and self-government in the post-MMPA era (table 3.1). Uses and diversity of values towards marine mammals have also changed through time for both non-Native as well as Native peoples. In this chapter, I used a historical institutional lens to build a policy history of marine mammal management in Alaska. I demonstrated how the combination of sovereignty, mode of production, and value orientation shaped the adopted dominant mode of governance over human uses of marine mammals, resulting in relative measures of ecological sustainability. Findings suggest that management regimes scaled up to international political fora in the Colonial era have now largely settled into a cross-scale pattern of governance, although in many communities, harvests that have not been the focus of international political deliberation remain guided by local institutions. Finally, I noted that sustainability in the post-MMPA period is challenged by rapid ecological change.

Cultural influences

The second part of this study involved the development of a model conceptualizing how cultural differences within government agencies influence policy creation, adoption and success. I drew from primary and secondary literature to build cultural profiles and policy histories of each agency and tested these profiles with an internet survey based on the Competing Values Model of Cameron and Quinn (1999). The analysis centered on the interactions of agency culture, history and the dominant ways in which agencies engage with stakeholders to create agency approaches to co-management. The weight of evidence presented points to these approaches as an important factor in the choice of policy and its ultimate success. When placed in historical and structural

contexts, I demonstrated that the externally-oriented culture of NMFS has shaped co-management regimes to be relatively transparent, scientifically-oriented, with local management authorities.

In comparison, I found USFWS to be an internally-oriented agency that prefers to work with a small group of trusted allies; its co-management relationships have often been more focused on research activities and information-sharing than management-oriented. USFWS has had a more contentious relationship with its co-management boards than NMFS has due to a combination of its hierarchical approach and management authority over species with high commercial value. The conceptual model was used as a framework to examine the development and implementation of harvest assessment programs as well as other management activities. The Nanuuq Commission and the USFWS seem to have worked out a relationship at the international and regional scale that works based on largely autonomous activities pursued by the Nanuuq Commission, including those funded by other agencies. These high-level policy dialogues have not yet translated into greater autonomy at the local scale; harvest assessment is largely conducted by the Service.

In Barrow, relationships between USFWS and local hunters remain strained by heavy enforcement actions; harvest assessment participation is low to average when compared to the rate of reporting for other marine mammals. Relationships between whalers and NMFS seem largely positive, as evidenced by intensive collaborations around the International Whaling Commission and the high level of performance in harvest assessment. In consideration of my findings, I do not recommend deliberate manipulation of agency cultures; rather, my findings suggest that agencies and communities may work best together when their preferred ways of working complement each other and this process may require deliberate efforts on all sides.

Social networks

The next phase of the study focused on local environments where marine mammal policy is implemented, using social network analysis to illustrate sites of collective action and policy implementation. Drawing on community interviews and surveys, I argued that the extent to which federal institutions use policy networks that mirror local self-organized networks increase their effectiveness. I compared federal networks for harvest assessment of bowhead whales and polar bears to self-organized advice networks for resource management functions. My research demonstrates that the network of whalers has a high rate of communication and coordination in their network. The central organization, the local whaling captains' association, is the primary

venue for enacting policy at the local level. Whalers also reported high levels of familiarity and engagement with how various resource management rules are created. Polar bear hunters, in contrast, did not have a local management body dedicated to polar bear policy implementation. In 2006 and 2007, they reported lower levels of familiarity and engagement with rule-making. Findings suggest that the dynamics of local networks and the reinforcement of local norms are enhanced by consistent engagement, led by a centralized local entity. Further, strong networks with real management authority encourage greater participation and buy-in, resulting in policy effectiveness.

Institutional performance

The final phase of the study concludes that as the dominant resource use of the area shifts from subsistence marine mammal harvesting to oil and gas exploration, gaps in ocean governance relating to slow variables have emerged. Modern marine management agencies often act as problem-focused adhocracies in dealing with one fast variable, such as rates of harvest. However, as harvests are no longer the most important drivers in the system, new goals for conserving marine resources will require a broad approach based around enhancing the resilience of the marine environment through managing human-environmental interactions that may fragment habitat or degrade sites of productivity and refugia. A new conservation agenda must involve stakeholders at multiple scales.

Visions of arctic sovereignty built through Congressional committees and Administration Departments are unlikely to capture a full range of ecosystem services important to local stakeholders. At the same time, the Federal Government has an important role to play in land management and conservation of slow drivers. The strategy must also ensure that the State of Alaska balances resource use and protection of habitat, as it no longer has a management regime for conserving marine mammals.

A shift towards adaptive governance would entail reorienting regimes around learning from feedback channels and developing the organizational capacities (e.g., through law and operational rules) to support institutional diversity at multiple scales. Managing for resilience through marine spatial planning and systems-oriented programs will require significant policy development. In the absence of new policy tools, political compromise across community, government, and development communities could prepare the necessary groundwork for ocean governance.

The field work for this dissertation (2004-2008) took place in a significantly changed policy landscape from the decade before it. The administration of President George W. Bush was considered by many to be one of the most conservative administrations in recent memory. In terms of marine mammal management, the story of the Bush legacy is largely yet to be told. The Bush Administration grappled with looming ecological change such as climate change and the Endangered Species Act listing of icon species such as the polar bear. The way the Bush Administration shaped policy will no doubt influence administrations to come. The new Obama Administration has kept many of the Bush era rules intact as of June 2009 (e.g., rules designed to prevent advocates from using the ESA listing to protest development outside of Alaska based on the potential impact on polar bears), but has repealed others and has vowed to restore the role of science in decision-making. Habitat conservation for marine mammals remains a difficulty across administrations, however. It could be that humans have difficulty managing for slow variables, but the fact that other jurisdictions have accomplished it gives some hope for optimism. The return of populations of whales once commercially hunted to near extinction is a positive sign and a test of our collective ability to practice ocean governance along the new arctic maritime frontier.

Governance in a time of rapid change

During the past decade, the world has witnessed an ecological regime change in Arctic sea ice conditions. As an example, the Max Planck Institute (Hamburg) model predicts changes to summer and fall arctic sea ice as a structuring habitat feature over the next forty years that would have differential effects on both the bowhead whale and polar bear regimes (Walsh 2008). The model predicts sea ice change based on the average warming rates of fourteen of the Intergovernmental Panel on Climate Change models assuming a middle-of-the-road (A1B) scenario of the growth of greenhouse gas emissions. The model predicts an open water period of 125 days per year by 2050 for the North Bering, Chukchi Sea and Beaufort Sea area with no significant areas of refugia (Walsh 2008; Moore and Huntington 2008). Considering this extreme change to ecosystems in the Arctic, questions of governance arise – how will these regimes respond to such changes? What new sources of social capital or institutional innovations are necessary to respond to the challenges?

Likely climate impacts to both species under the Hamburg model and derived through prospective studies are listed in figure 7.1. If disturbances occur at a faster rate than a system's capacity to recover, dramatic change can result (Palumbi et al. 2008).

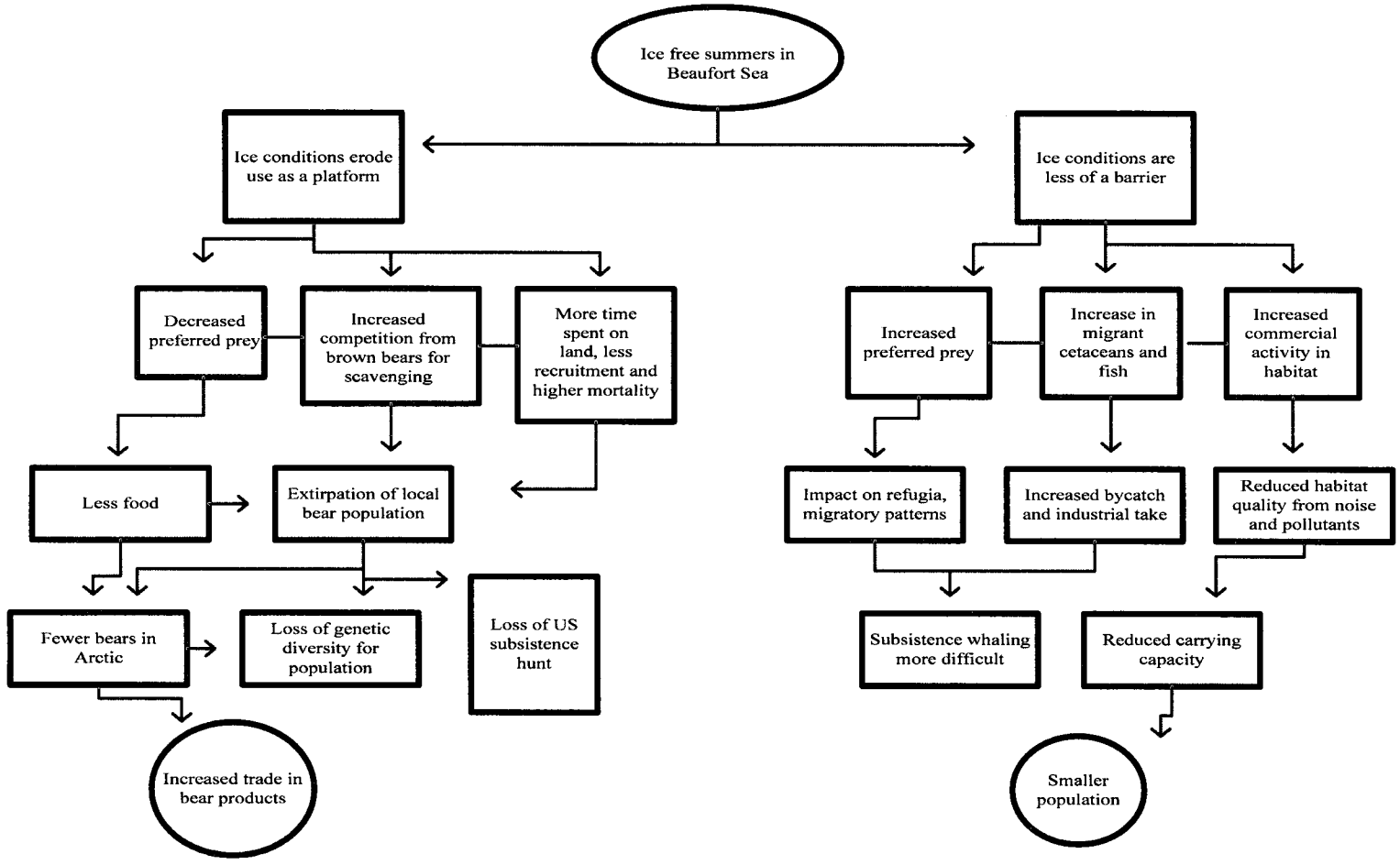

Figure 7.1 Ecological effects of new ice regime The figure is a projection of the effect of 125 open water days on polar bear and bowhead whale populations in the Beaufort Sea by 2050 (based on the Hamburg climate model cited in Walsh (2008)).

Palumbi et al. (2008) demonstrate that productivity and diversity play major roles in the resilience of ecosystems because they drive recovery from and resistance to change. Assuming that the Administration, Alaska Native communities and the American voting public desire the conservation of polar bears and bowhead whales, strategies rooted in resilience theory would accordingly focus on recovery for polar bears and resistance to change for bowhead whales. Projections of ecological change and the strong governance strategies required to address those changes provide insight into the importance of adaptive capacity (table 7.1). The concept of recovery can include time or spatial scales greater than those typically considered by managers and in the case of polar bears, may stretch into the next century and should focus on strengthening the global population for recovery generations from now rather than achieving a recovery of the Beaufort Sea polar bear subpopulation.

In closing, I do not underestimate how challenging it will be for agencies and communities to work together in a time of rapid change and under novel conditions. However, lessons learned through co-management regime success and failures to date are excellent sources of data to examine processes that foster adaptation and collective action. Both adhocracies and hierarchies have important strengths and weaknesses in confronting wicked problems. Adhocracies may have the agility and adaptive capacity to develop collaboration based on mutual learning while forging methods to deal with uncertainty in a transparent, democratic manner. Hierarchical forms of governance may work best in developing new sources of authority to regulate many diverse actors across sectors. They may also be able to better sustain relationships in the longer term due to consistency in action. Ultimately, both forms of governance are useful for different sorts of problems. Neither approach alone will be sufficient to solve climate-related conservation crises. I recommend that both agencies work within a landscape/seascape model of conservation to focus on slow variables with a view to the long term. This shift in focus from human interactions with specific species to a spatial conservation model with an active monitoring component will require new forms of social capital that connect actors in diverse sectors across scales, the development of place-based institutions such as marine spatial management, and broad visions of conservation looking past protection towards resilience.

Agencies and communities will be thrown together in a myriad of ways, but I recommend that they especially seek out governance strategies that build on joint visions and use approaches that fit into the social environments of both parties. Where there is no fit between partners, there

Table 7.1 Governance strategies for recovery and resistance

	Governance for recovery (polar bears)		
	Social capital	**Management approaches**	**New institutions**
Conserve productivity	Linkages to fisheries stakeholders across scales	Social learning of food webs and oceanography	Marine spatial management
Conserve modularity	Cross-scale networking across global jurisdictions	Experimental management under extreme uncertainty	Assisted migration
Conserve diversity	Collective action across global population for tighter feedbacks	Peaceful co-existence to reduce bear-human interactions	Enhanced local authority to react

Governance for resistance (bowhead whales)

Social capital	Management approaches	New institutions
Build constituency for ocean zoning	Pre-emptive multiple-use management	Federal, state and local authorities for marine spatial management
Maintain and strengthen network for whalers, agencies, and industry	Monitoring migratory paths	Large marine areas governance system
Maintain and strengthen knowledge network for bio-monitoring	Social learning model	Circumpolar bowhead whale monitoring

will be a need for transformation of governance, based on a mutually acceptable socio-political process (i.e., effective "adaptive co-management"). For the U.S. Fish & Wildlife Service, this may mean an increase in support for tribal wildlife grants based on creating community-based conservation plans. This may also require a shift away from enforcement actions that do not affect the overall system drivers of decline and engender community mistrust of government. For the National Marine Fisheries Service, new approaches might include active engagement with ocean zoning and other line agencies within NOAA. The agency may also need to take a more active role in negotiating conflict avoidance agreements and spend less time managing the very small global whaling industry. Finally, both agencies have a poor record of accomplishment in adopting explicit policies for habitat conservation in the marine environment. The development of an ecosystem-based plan for the marine environment of Arctic Alaska will challenge existing management mandates, ways of working, and lines of funding. However, there is no better time to start developing these programs than before they are desperately needed.

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Appendix: Interview protocols and survey tools

Questions for co-management key informants

1. How long and in what ways have you and your organization been involved in co-management in Alaska?
2. How does your agency define co-management?
3. What do you see as key events in the development of [insert name of regime] co-management ?
4. Is the regime working? Please describe key challenges and successes.
5. Is the regime resilient to change –has it withstood crisis? How is it vulnerable?
6. Are there other ways you think would improve marine mammals management in Alaska?

Questions for hunters and other resource users:

1. What marine mammals do you hunt or work with and how long have you done this?
2. How have things changed since you began?
3. Are you getting as much as you need?
4. Are you involved in the [insert appropriate board]? What do you think about their work?
5. How often and in what way do you interact with NMFS or USFWS?
6. Please tell me about your experiences with either or both agencies.
7. What do you think are the biggest problems facing marine mammals and communities who harvest marine mammals?
8. Do you know of any governmental or local groups addressing these problems?

Social Network Survey

Survey No.
Date
Who
Age
Occupation
Gender
Interviewed by

Survey of whaling captains / polar bear hunters

1. **If you had a concern about whaling / polar bear harvesting rules, who would you talk to?**

   _____

   a. How often do you talk to them?

   None Some A lot

   b. Would you say that you tend to give them more info, they give you more info, or about the same?

   You give You get About the same

   c. What kind of information do you give/receive and are you satisfied with this level of interaction and the quality of information?

2. **If you had a concern about whale / polar bear health or saw them somewhere you're not used to seeing them, who would you talk to?**

   _____

   a. How often do you talk to them?

   None Some A lot

   b. Would you say that you tend to give them more info, they give you more info, or about the same?

   You give You get About the same

c. What kind of information do you give/receive and are you satisfied with this level of interaction and the quality of information?

3. **If you had a concern about industry and whales / polar bears, who would you talk to?**

   _____

   a. How often do you talk to them?

   None Some A lot

   b. Would you say that you tend to give them more info, they give you more info, or about the same?

   You give You get About the same

   c. What kind of information do you give/receive and are you satisfied with this level of interaction and the quality of information?

4. **a. Do you think that overall, harvesting rules for whales / polar bears are made fairly?**

   b. If you had concerns, do you think that your concerns would be addressed in making harvest rules?

   c. Do the harvest rules protect whales / polar bears?

   d. Is traditional knowledge used in creating harvesting rules?

5. **a. Do you think that overall, rules for protecting whale / polar bear habitat and monitoring health are made fairly?**

   b. If you had concerns, do you think that your interests and concerns would be addressed in these rules?

   c. Do these rules protect whales / polar bears?

d. Is traditional knowledge used in creating these rules?

6. **a. Do you think that overall, rules for whales and industry are made fairly?**

b. If you had concerns, do you think that your interests and concerns would be addressed in these rules?

c. Do these rules protect whales / polar bears?

d. Is traditional knowledge used in creating these rules?

Agency Culture Survey July 2008

University of Alaska Fairbanks survey on collaborative resource management

Dear Resource Management Professional:

We would like to invite you to participate in a University of Alaska survey examining the goals and success of collaborative resource management in Alaska. Your insight is critical in our understanding of what makes for successful resource management. In the survey we ask a variety of questions relating to your opinion as an employee of a natural resource management agency.

The information you provide will be anonymously reported to the researchers. Your email address and identity will not be associated with your answers and will be erased after the survey ends. In addition, as your participation is voluntary, you may end the survey at any point.

If you have any questions about this survey, please contact study author Chanda Meek at chanda.meek@uaf.edu.

The survey will take approximately 20 minutes to answer. If you agree to participate, please start with the survey now by clicking on the **Continue** button below.

This survey is based upon work supported by the National Science Foundation under OPP grant number 0612523. The authors are solely responsible for its content.

Which agency do you work for?

- National Marine Fisheries Service (NOAA Fisheries)
- U.S. Fish & Wildlife Service
- U.S. Geological Survey
- Alaska Department of Fish & Game
- Alaska Department of Natural Resources

PART I: ORGANIZATIONAL CULTURE ASSESSMENT

The purpose of this part of the survey is to characterize the culture of your agency. In this study, we define organizational culture as the shared set of knowledge, assumptions and beliefs your group uses to guide its decision-making and priorities. In the following questions, you are asked to mark how well each statement reflects your organization. There are no right or wrong answers.

To determine which organization to rate, you will want to consider the section to which you belong (for instance: the Division of Fisheries and Ecological services in the U.S. Fish & Wildlife Service, the Sustainable Fisheries Division of the National Marine Fisheries Service, or the Sport Fish Division of the Alaska Department of Fish & Game).

DIRECTIONS: In the following questions, divide 100 points among these four alternatives depending on the extent to which each alternative is similar to your own organization. Give a higher number of points to the alternative that is most similar to your organization. For example, if you think choice A is very similar to your organization, B and C are somewhat similar, and D is hardly similar at all, you might give 55

points to choice A, 20 points to B and C, and five points to D. Just be sure your total equals 100 points for each question.

A. The organization is a very personal place. It is like an extended family. People seem to share a lot of themselves.
B. The organization is a very dynamic entrepreneurial place. People are willing to stick their necks out and take risks.
C. The organization is very results oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.
D. The organization is a very controlled and structured place. Formal procedures generally govern what people do.

Leadership in your organization is generally considered to exemplify...

A. mentoring, facilitating, or nurturing.
B. policy entrepreneurship, innovating, or risk-taking.
C. a no-nonsense, aggressive, results-oriented focus.
D. coordinating, organizing, or smooth-running efficiency.

The **management style** in the organization is characterized by...

A. teamwork, consensus, and participation.
B. individual risk-taking, innovation, freedom, and uniqueness.
C. driving competitiveness, high demands, and achievement.
D. security of employment, conformity, predictability, and stability in relationships.

The social **glue** that holds the organization together is...

A. loyalty and mutual trust. Commitment to the organization runs high.
B. commitment to exploration, innovation and development of new approaches to resource management.
C. the emphasis on achievement and goal accomplishment.
D. formal rules and policies. Maintaining a smooth-running organization is important.

The organization **emphasizes**...

A. human development. High trust, openness, and participation persist.
B. acquiring new resources and taking on new challenges. Trying new things and adapting organizational strategies are valued.
C. outcomes and achievement. Accomplishing measurable goals is important.
D. permanence and stability. Efficiency, control and smooth operations are important.

0

Our organization **defines success** on the basis of the...

A. development of human resources, teamwork, employee commitment, and concern for people.
B. finding and pursuing innovative solutions to resource management problems. It is an adaptive organization.
C. gaining broad public and/or political support for the work of the organization. Public trust in its expertise is key.
D. efficiency. Standard procedures, internal production of information and expedited review are critical.

When dealing with **uncertainty**, the organization...

A. looks inward to develop a unified approach to the problem through staff expertise.
B. finds and pursues new or alternative methods of solving problems.
C. builds external support for its approach and monitors its progress in solving the problem at hand.
D. turns to standard procedures, internally produced information, and efficiently executes its plan.

When **seeking information**, our organization...

A. uses information developed internally or by trusted colleagues.
B. seeks out, accommodates and utilizes new sources and kinds of information about resource management issues.
C. surveys our information needs and develops usable information through standardized methods.
D. pursues its management strategy using existing methods and information deemed critical to our mission.

When working with **stakeholders**, our organization...

A. develops solutions to resource management issues through a trusted group of employees and allies.
B. pursues and develops innovative stakeholder partnerships for working through resource management issues.
C. builds support from stakeholder partners who we work with to implement and monitor our preferred solutions to resource management issues.
D. works with stakeholders to the extent that standard procedures and efficiency allow.

How would you describe your agency's culture?