ABUNDANCE AND BLAME: THE CASE OF THE CALIFORNIA SEA LION

by

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Since the enactment of the Marine Mammal Protection Act, California sea lions have become increasingly abundant along the West Coast of North America. Their predation on commercially valuable and depleted salmon populations has contributed to a social conflict over their management. My research uses in depth interviews with stakeholders in Oregon to examine the historical and social roots of the current conflict, social values associated with sea lions and salmon, corresponding legal protections, and potentials for resolution. My analysis finds that while fishers and environmentalists agree on the ecological impacts of sea lion predation, disagreements about managing these impacts stem from different views of the human relationship to the marine environment, degrees of economic dependence on marine resources, and perceptions of environmental legislation. Resolution depends on a critical analysis of the values represented in current legislation and a commitment to creating laws that consider the entire ecosystem.

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THE SCIENCE AND POLITICS OF ABUNDANCE

Introduction

Over the past three decades, the number of California sea lions (*Zalophus californicus*) has been increasing along the West Coast of North America. Correspondingly, their predation on fish populations has become well known, and many groups have involved themselves in the debate as to how and if this predation should be managed. Like other species whose population levels have increased rapidly, the California sea lion's modern abundance is seen by many as a threat to human interests and other species with which it interacts (Kronman 1996, Fraker and Mate 1999). In particular, the fact that sea lions feed on Pacific salmon *(Oncorhynchus* spp.) has created problems for resource managers, fishers, and environmentalists (Fraker and Mate 1999). The growing abundance of sea lions and decline in salmon populations in the Pacific Northwest has resulted in social conflict as groups debate the actual levels of impacts on salmon from sea lion predation and the appropriate course of action to mitigate these impacts.

The conflict surrounding sea lions is fundamentally about the interactions of predator and prey, the effects that the relative abundance of species have on their environments, and the consequences for humans. While this conflict is rooted in ecological interactions, it cannot be considered apart from the anthropogenic forces that have helped to shape the population trajectories of species. Human effects on the populations of sea lions and salmon include both past events, such as historic harvest and habitat alteration, and contemporary activities, including continued habitat degradation and salmon exploitation. Further, the development and implementation of unequal legal protection for each species has important consequences for their populations. Modern human impacts on the populations of sea lions and salmon are rooted in social values that are linked to their cultural, political, and economic importance. Therefore, in order to understand the ways that the patterns of abundance and decline in sea lions and salmon have created social conflict, and how social forces influence the biological interactions, it is also necessary to consider the values of different human groups that have become involved.

Social factors, including the history of sea lion and salmon exploitation, past management and contemporary legislation, human alteration of the natural system, and the disparate values of members of different stakeholder groups involved in the conflict, have shaped and continue to shape the ecological interactions between sea lions and salmon in the Pacific Northwest, and Oregon more specifically. While the social aspects of this conflict could be considered as simply the reaction of different stakeholders to increasing sea lion and decreasing salmon populations, I argue that the biological

interactions cannot be understood independent from their historical and contemporary anthropogenic roots.

Current public opinion research has found that fishers and fisheries managers have different perceptions regarding the effects of sea lions on salmon populations and the subsequent actions that should be taken to manage the conflict (Smith *et al.* 1997). Environmentalists, animal rights activists, marine mammal biologists, and fisheries biologists have still different perspectives (Fraker and Mate 1999). My research examines in more depth the values that influence these disparate beliefs and the ways in which these disparities perpetuate the conflict and preclude effective dialogue. In-depth interviews with members of each of these groups (e.g., fishers, fisheries biologists, marine mammal biologists, natural resource managers, environmental activists, and animal rights activists) provide a contemporary view of the conflict and the social values upon which it rests. These interviews, coupled with an analysis of the historical and ecological factors that have set the stage for the conflict, can shed light on patterns and assumptions that must be understood before constructive dialogue can be undertaken.

An examination of the conflict surrounding California sea lions and salmon in Oregon provides insights into the roots of many other complex environmental conflicts. This research highlights the complications of managing species in the context of dynamic ecosystems heavily influenced by human intervention, and within a political system that affords unequal protection to species that are valued differently within society. By combining in-depth interviews with members of each group currently involved with a

literature review of the events that have led up to the conflict, my research answers the following questions:

- *What are the historical and social roots of the sea lion/salmon conflict?*
- *How are sea lions and salmon valued differently within different social groups and how do these values influence the conflict?*
- *What is the potential for resolution?*

The case of the predaceous California sea lion and its impacts on Pacific salmon presents an opportunity to deconstruct the conflict, placing it within a broader social, historical, and ecological context. The following chapters examine the diversity of factors influencing the sea lions and salmons in Oregon, from the laws that protect each species to the alteration of their habitats. Chapter One, *The Science and Politics of Abundance*, investigates the nature of the conflict, placing it in the context of similar wildlife management issues. It considers the definition of abundance, causes and effects of irruptive populations, the politics of managing abundant species on a local, state, and federal level, as well as the unique nature of marine mammal/fisheries interactions. Chapter Two, *Ecology, Culture, and Law*, examines the effect of abundant sea lions on salmon in more depth, considering the actual and perceived impacts of predation, the different ways that American society views marine mammals and fish, and the nature of their different legal protections. In Chapter Three, *History of California Sea Lion Populations*, I outline the history of California sea lions on the West Coast of North America, including the human impacts on their populations through time and the evolution of the modern conflict. Finally, Chapter Four, *Perspectives on Predation,*

examines the range of values that those involved with the contemporary conflict possess, focusing on the results of interviews conducted with stakeholders. This chapter provides a view of the conflict in the words of those involved, and points to fundamental differences in perception and social values among groups. In my conclusion, I put these perspectives in the broader context of wildlife management issues and point to potential avenues for minimizing future conflicts.

An understanding of the factors contributing to the conflict and their relative importance is essential to effective conflict mitigation and future collaboration between resource managers, fishers, and the general public. In order for members of these groups to reconcile divergent opinions and come to a better understanding as to how and when the conflict should be managed, a common, contextualized base of knowledge must be established. Perhaps more importantly, a more complete understanding of this conflict contributes to the understanding of modern environmental conflicts and helps highlight reasons why such conflicts develop. While this research is case-specific, it outlines a set of criteria to consider in the analysis of other similar conflicts, such as increasing populations of terrestrial predators that many regions are experiencing as a result of reintroduction programs and increased social awareness of the value of top predators.

The sea lion/salmon conflict is of particular interest because it not only provides a window into the social causes and consequences of wildlife abundance, it also involves species that are unique representatives of particular cultural values at different levels of social organization. Marine mammals represent American interest in environmental concerns, the intrinsic value of species, and symbols of the ocean wilderness (Lavigne *et*

al. 1999), while salmon symbolize the economic and cultural distinctiveness of the Pacific Northwest (Safina 1998). An analysis of this issue allows a better understanding of the various ways that humans value nature and the conflicts that ensue when these values are incompatible.

The Nature of the Conflict

Many contemporary conflicts in natural resource management exist in which one species benefits from recent human actions, and subsequently begins to impact another species of concern. Often the tendency is to place blame on the increasing populations of the "favored species" without considering the broader social and historical context of an apparently biological interaction. Several examples exhibit such tendencies, including the well-known case of the endangered Steller sea lion (*Eumetopias jubatus*). Decreasing numbers of sea lions have been blamed on, among other things, predation by orcas (*Orcinus orca*) (American Oceans Campaign 2000, Lord 2001,). The Steller sea lion and orca debate is one example where the decline of one species is blamed on its natural predator. Countless other examples exist. The recovery of striped bass (*Morone saxatilis*) in the Chesapeake Bay has been pointed to as the cause for declines in the blue crab (*Callinectes sapidus*), as the bass feeds on juvenile crabs (Clines 2001). Decreasing bighorn sheep (*Ovis canadensis californiana*) populations in the Sierra Nevada have been blamed on the recovery of one its predators, the mountain lion (*Puma concolor*) (Rauber 2001). In southern California, a state-listed island fox (*Urocyon littoralis*) was the object

of a culling program in order to save one of its prey species, the federally endangered San Clemente Island loggerhead shrike (*Lanius ludovicianus mearnsi*), a bird that is endemic to the island (Schoch 1999). These examples have much in common with the case of the California sea lion, in which recovering populations have been blamed for localized decreases in salmon.

While the abundance of a predator can significantly impact a prey species' population, the ultimate cause of decline often can be found in the alteration or degradation of natural habitats (Noss and Cooperrider 1994, Meffe *et al.* 1997). Steller sea lions are thought to be affected by nutritional stress due to overexploitation of their favored prey fish by commercial fisheries (Lord 2001), blue crab juveniles require sea grass beds that suffer from human pressures (Chesapeake Bay Program 2001), and bighorn sheep have suffered "130 years of human indifference and hostility to [their] habitat needs" (Rauber 2001: 38). The San Clemente Island shrike has felt the impacts of habitat destruction both from the effects of introduced goats and Navy bombing on the island (Schoch 1999). And of course, salmon have suffered from numerous impacts to their upstream habitat, from the construction of dams to siltation of their spawning grounds from logging and agriculture (Committee on Protection And Management Of Pacific Northwest Anadromous Salmonids 1996, Fraker and Make 1999).

Whether the cause of decline is driven by habitat degradation, increases in predators, or something else entirely, a host of historical factors have contributed to each contemporary situation. The desire to look up the food chain rather than at the underlying conditions that led to the situation, or to cite habitat destruction without considering the

social forces that drive the degradation, does little to resolve or bring clarity to the issue. An examination of the historical, ecological, and social causes of the conflict provide a more accurate context that helps to clarify the particular issue. Such an examination places the conflict in a context that not only identifies the larger issues involved, but also provides a framework for analyzing other such conflicts.

Overabundance

The contemporary sea lion/salmon conflict in Oregon is fundamentally based on the increased abundance—or overabundance—of California sea lions in relation to population levels in the past 150 years. The issue of overabundance has been recognized by both biologists (Garrott *et al.* 1993, McShea *et al.* 1997) and anthropologists (Smith 1995) as one that is inherently both biological and social. Overabundance of a particular species can be defined in relation to historical population levels or relative impact on other species, but, as Garrott *et al.* (1993: 947) state, "overabundance is largely defined by one's interests, likes, and dislikes." Wildlife is managed and populations are controlled based on human values, whether they are a desire to maintain a population of game species such as deer or elk, or an aspiration to protect sensitive species impacted by the proliferation of one of their predators or the destruction of their own habitat. As Anderson *et al.* (1987: 234) write, "In one form or another, everything done in wildlife management is done for people."

Caughley (1981) describes four classes of overabundance or overpopulation, all but one of which have distinct socio-political origins. These categories are: 1) animals that threaten human life or livelihood, 2) animals that depress the densities of favored species, 3) animals that are "too numerous for their own good" (Caughley 1981: 8), and 4) animals whose abundance causes ecosystem dysfunction.

Species that threaten human life or livelihood include pinnipeds that directly compete with fishers, wolves and coyotes that prey on livestock, cougars that attack house pets, and raccoons that raid suburban garbage cans. Seals and sea lions destroy fishing gear and eat fish that might have otherwise been landed by humans. Similarly, wolves and coyotes attack and kill sheep and calves, infuriating ranches and reducing their incomes. Cougars and raccoons often impact residential communities that abut less developed patches of land; while cougars are often seen as a threat to small children and house pets, raccoons are often regarded as mere pests. Each of these animal animals may cause economic or physical harm to humans, but they "are too numerous only because their presence is inconvenient... No delicate ecological balance is at risk" (Caughley 1981: 7).

Animals that depress the densities of favored species also can be regarded as overabundant. This category designation is predicated on the fact that "few people enjoy all species equally" (Caughley 1981: 8). A common argument for the reduction of predators, from wolves in the United States to lions and hyenas in African national parks, is that the reduction in predator density would increase the population levels of herbivores that have value for hunters, such as elk or zebras. Similarly, high densities of

herbivores have been controlled to increase trees that have aesthetic value, such as aspen in Yellowstone National Park (Caughly 1981).

Overabundance has been cited when animals are thought to have overshot their carrying capacity, or to have increased in population to an extent that individuals within that population experience a reduction in resource availability. The idea that species can be "too numerous for their own good" (Caughley 1981: 8) is based on the concept that populations are resource-limited. If an animal is artificially kept at a lower density, each individual will have more resources and therefore be larger, healthier, and more productive than individuals in a population allowed to reach carrying capacity. For example, thinning deer populations to prevent sickness and starvation has been a common resource management practice (Porter and Underwood 1999). The theory that populations kept at lower densities will both be healthier and will reproduce at a higher rate, therefore providing maximum sustainable yield to hunters or fishers, underlies the management of harvested species of both fish and game (Wallace *et al.* 1994, McShea *et al.* 1997).

While each of these categories describes biological interactions, the species they include would not be considered overabundant in the absence of human values. Whether the values are based on economic interest, aesthetic preference, or recreational enjoyment of wildlife, they do not relate directly to an ecological problem. The final category of overabundance refers to a situation that involves less direct human subjectivity, the idea that the overabundance of one species can cause ecosystem dysfunction. Irruptive population increases—or those characterized by "a sudden, explosive increase in

population numbers, which if unchecked, will exceed the capacity of the resource base to sustain the population" (McCullough 1997: 70)—can ultimately lead to an erosion of the resource base and a subsequent population crash. During this boom and bust cycle, these overabundant species can impact both their prey and those species with whom they compete for resources (Meffe *et al.* 1997). In this case, as in the others, overabundance is a term relating to human understanding of the system, but rather than perceiving high numbers of animals as directly impacting human interests, we understand them as affecting the ecosystem.

Causes of Overabundance

Several causes of overabundance can be enumerated. McCullough (1997) outlines three major types: a reduction in mortality, an increase in the carrying capacity, and a confinement of the population and subsequent reduction in dispersal ability. Each of these sources of overabundance can be either anthropogenic or a result of natural processes. Historically, populations have experienced natural disturbances that have affected the abundances of species. For example, the Pleistocene glaciations caused dramatic shifts in climate and species distributions that drastically altered carrying capacity and population distribution (McCullough 1997). Natural disturbances continue to shape community structure and population density. The theory of the "balance of nature"—that in the absence of humans, nature exists in a stable equilibrium—has been questioned (Worster 1994), and ecologists have pointed to biotic and abiotic factors that

cause irruptive population increases in species (McCullough 1997). Examples include a decline in predator populations due to disease or another natural cause, change in climate conditions that results in increased carrying capacity for a particular species, and dispersal to new habitats (e.g., previously unoccupied islands) from which outmigration is difficult (McCullough 1997).

While natural disturbances continue to impact species, anthropogenic impacts have caused further cases of irruptive populations. Human contributions to overabundance can include alteration of habitats that favor certain species, a reduction or cessation of hunting, and successful conservation programs whose design is single-species in nature (Jewell and Holt 1981, Cisin-Sain 1982, Garrott *et al.* 1993, Noss and Cooperrider 1994, McCullough 1997). Each of these human causes of overabundance merits further discussion.

Alterations in habitats can have a significant effect on the densities of wildlife populations, as well as public perception of species abundance. Not only does habitat alteration allow for non-native species to invade, it also creates a situation in which certain native species will become disproportionately abundant. Garrott *et al.* (1993: 948) observe:

> During the coming decades, the populations of many native species that thrive in these human-altered environments will increase and overwhelm more sensitive species, predictably leading to biotic impoverishment and threatening the ecological integrity of many communities, ecosystems, landscapes, and regions.

Some species are able to take advantage of human developments, such as California sea lions that exploit the feeding opportunities provided by dams. Like terrestrial generalists

such as raccoons and deer that can exist in fragmented landscapes, these animals will thrive and become overabundant at the expense of other species that are more sensitive to human disturbances (Noss and Cooperrider 1994). White-tailed deer, a common terrestrial animal, illustrate the potential effects of human land use patterns on populations of wild animals. Production of agriculture crops displaces many naturally occurring species, but provides added food resources for these deer, effectively elevating their carrying capacity and leading to irruptions in population densities (McCullough 1997). Because these species thrive in human-altered environments, they will come into contact with humans more frequently (Garrott *et al.* 1993), adding to the public perception that they are overabundant.

While alteration in habitat changes the carrying capacity of species, reduction or limitation of hunting affects mortality. Both can result in dramatic increases in population levels. Several examples exist of species that historically were hunted, and whose later protection resulted in the perception that they had become overabundant. The sea otter (*Enhydra lutris*) provides an example of the effects of hunting and protection on population densities and public perception of populations. During the eighteenth and nineteenth centuries, sea otters were hunted for their pelts on the West Coast of North America. The southern sea otter (*Enhydra lutris nereis*) was driven to near extinction in California at the beginning of the twentieth century. Its subsequent protected status has allowed populations to rebound—although their numbers are still to low to be removed from the Endangered Species Act's list of threatened species (Ralls *et al.* 1996) —but hunting had depressed their population during a time that the fishing industry was

expanding (Cisin-Sain 1982). Humans were able to take advantage of greater quantities of shellfish than they would without simultaneous harvest of sea otters. As the otter's population grew, it was seen as "the destroyer, annihilating underwater stocks of shellfish" (Cisin-Sain 1982:10).

> Contemporary Californians have become accustomed to utilizing and enjoying the shellfish resources that grew abundant during the absence of the sea otter. And, the continued expansion of the sea otter...precludes this enjoyment (Cisin-Sain 1982: 10)

The sea otters' recovery in the absence of hunting threatens both commercial and recreational fishers. As a result, the otters are perceived as overabundant regardless of their current threatened status, their historic population densities, and their natural of predation on shellfish prior to human harvest.

Finally, reintroduction or protection programs designed to augment or restore declining wildlife populations can be so successful that they result in population densities of the restored species that have unforeseen effects on surrounding flora or fauna. These programs are often designed to benefit a single species and do not contain provisions for mitigating potential impacts on other parts of the ecosystem. Jewell and Holt (1981: 3) comment:

> Many early endeavors in conservation failed to set the protection of the whole ecosystem as their objective. Sometimes the preservation of a particular population of a single species, often one of the more spectacular ones, provided the false start... Ironically, many of the problems that have arisen occur where action directed towards conservation was successful.

The previously cited case of the mountain lion, or cougar (*Puma concolor*), provides an example. Its protection in California has ensured recovery across much of its range, but "when an expanding cougar population in the 1980s turned its attention to the Sierra

Nevada bighorn [sheep], it drove the sheep to the brink of extinction" (Rauber 2001: 36). While historic factors such as ranching and habitat destruction in the past had impacted the bighorn sheep populations, the biggest threat today comes from this natural predator. The 1990 voter-passed regulation that protects cougars in California, Proposition 117, "had no provisions for culling lions that lunched on vanishing species" (Rauber 2001: 38), and managers are now faced with trying to restore bighorn sheep populations without the option of managing their main predator (Rauber 2001). Further, organizations such as the Mountain Lion Foundation are opposed to such management approaches and voters demonstrated that "even though mountain lions are neither endangered nor even threatened, Californians didn't want to see them killed" (Rauber 2001: 36).

Managing locally abundant native species—especially those that have been historically endangered—challenges the notion of conservation and complicates the role of the conservationist. Garrott *et al.* (1993: 948) note the irony and political dilemmas involved with limiting the overabundance of once rare species.

> If reintroduction or enhancement programs are successful, the same conservationists that have spent years trying to increase populations of rare or protected species may eventually find themselves searching for socially acceptable ways to limit them.

The fact that managing abundant wildlife can be as challenging as managing threatened species has not gone unnoticed by wildlife biologists and managers (Wemmer 1997). Large numbers of abundant animals have been culled to minimize their impact on some other facet of the environment (Jewell and Holt 1981). Such action "would seem to be the very antithesis of conservation" (Garrott *et al.* 1993: 947-948), and conservationists have noted the onerous nature of such tasks (Jewell and Holt 1981). Managers must defend

themselves against claims that the abundance they helped create is impacting other species, as well as those that culling is not a practice in line with conservation ethics.

Politicizing Overabundance

The issue of overabundance creates political quandaries for the biologists and managers charged with the task of managing wildlife. Garrott *et al.* (1993: 946) write:

> Populations of actively managed and protected species that were once considered rare, but have recovered to the point where the public now perceives them to be locally overabundant present some distinct socio-economic problems for conservationists.

One Fish & Wildlife Service biologist dealing with sea otter management complained, "We were never trained to work in an arena where everything is controversial and everything is political" (Booth 1988: 157). Because members of several groups have immediate stakes in the wildlife, their management is often contentious. Jewell and Holt (1981: xiii) summarize the situation in which many managers have found themselves when populations of protected animals have increased beyond expectation.

> The question of the degree to which protected animals may be allowed to increase in number, with possible detriment to human interests and to their own habitat, is one which is of increasing concern to many people. Farmers, pastoralists, and fishermen may be worried about competition from such animal populations, for space and fodder; managers of reserves, parks and industries based on exploitation of wild living resources may wish to see any "surplus" put to economic use; person and groups concerned with conservation or animal welfare may have strong views about so-called culling or other programs for environmental management; and local and national authorities may have to make decisions aiming to strike a balance between diverse interests.

While scientists can make recommendations, public support is essential for successful implementation of wildlife projects and management plans (Bath 1991). Unfortunately, wildlife management agencies often have trouble establishing politically and publicly acceptable management programs (Stevens *et al.* 1994). Wildlife managers are faced with the difficult task of juggling divergent public opinions and scientific advice. McShea *et al.* (1997: 1) write of managing white-tailed deer, "When foresters, wildlife biologists, hunters, and animal welfare activists discuss deer, one might be hard pressed to acknowledge that they are talking about the same animal." These different perspectives are often supported by with personal experiences and values that difficult to reconcile.

Management of large carnivores provides numerous examples of the problems facing managers, as well as the larger social divisions within communities dealing with these management issues. Nearly all populations of large carnivorous mammals have been disturbed or depleted by human activities (Estes 1981). Often, in large carnivore management, public opinion is split between those who support reintroduction programs and are opposed to killing these animals, and those who come out in favor of culling animals to mitigate their impacts. These splits can often be predicted by demographic and geographic characteristics, with younger, female, well-educated, and urban residents tending to be more opposed to culling predators. (Stevens *et al.* 1994, Mankin *et al.* 1999). For example, Stevens *et al.* (1994) found that in the case of coyote management in New England, those who lived farther away from wilderness areas were more likely to value coyotes, while hunters and those who lived closer to wilderness areas were more likely to want coyotes eliminated.

Splits in public opinion often reflect differences in deeply held values and economic interests. Kowalewski (1994: 306) summarizes the division in public opinion toward managing carnivores.

> Saving the wolves (who have 'rights') resonates more deeply among non-farmers than farmers, who may be plagued by the beasts. Non-farmers have less to lose by advocating *in abstracto*, the equality of all natural things. To farmers this makes little economic—or common—sense.

In contrast to farmers, urban residents have little economic stake in wildlife, and tend to value wildlife in the same way they value pets or people (Mankin *et al.* 1999). Primm and Clark (1996: 1037) observe:

> Wrangling over carnivore conservation is often a surrogate for broader cultural conflicts: preservation versus use of resources, recreation-based economies versus extraction-dependent economies, urban versus rural values, and states'-rights versus federalism.

Bath (1991: 367) observe that in the case of wolf management in Yellowstone National Park, the issue of wildlife management was "not as much a biological issue as a socio-political one," and one that warrants treatment as a major policy conflict (Thompson 1993).

Rural and Urban Perspectives

Managing wildlife involves consideration of disparate perspectives, understanding diverse groups, and finding common ground between their variable and conflicting demands. Public policy must anticipate and incorporate public opinions, a task that "requires an understanding of the values, attitudes, and knowledge…of the different

publics a policy will affect" (Reading *et al.* 1994: 350). Not only must these perspectives be reconciled on a local scale, the nearly impossible task of developing polices that are "consistent with the desires of local, regional, and national constituencies" (Reading *et al.* 1994: 350) is often a policy objective. Residents of both rural and urban areas are thought to be important constituents. Determining the degree to which rural communities differ from urban communities, and the balance of power within rural communities are important components of understanding public opinion with regard to wildlife management.

Rural Dependence on Natural Resources

Unlike urban areas, many rural areas are economically dependent on natural resources, an important factor in determining their perspective on environmental issues and government regulations. Within the United States, dependence on natural resources in rural communities can take several forms, including extractive, non-consumptive, or aesthetic (Peluso *et al.* 1994). Extractive uses of natural resources are often in direct conflict with the non-consumptive or aesthetic uses of the same resources (Reading *et al.* 1994). Aesthetic features in rural areas often generate tourist revenues or entice urban residents to relocate, while extractive industries can degrade the aesthetic quality of the environment and detract from tourist industries. Conversely, tourism can result in increased property values that exclude local people from their traditional use of the land and its resources (Peluso *et al.* 1994, Robbins 1999). Economies of many rural areas have

shifted from resource exploitation to tourism, but traditional extractive use ideologies often persist as major influences on local values and attitudes (Reading *et al.* 1994). These attitudes help direct local politics and interactions with state and federal political infrastructures.

Local relationships with state and federal regulators are often marked by resentment for regulations generated without the inputs of rural residents. The loss of local control is perhaps the most important factor in keeping rural residents from supporting environmental regulations (Sample 1998). In a study on poverty in Natural Resource Dependent Areas [NRDAs] in the United States, Peluso *et al.* (1994) found that "Residents of NRDAs commonly describe their situations in terms of colonialism" (Peluso *et al.* 1994: 31). Rural residents can view both corporations that own the resources (e.g., forests) and the government as colonizing forces.

> Where the terms of access to natural resources are controlled by state or federal government, as in much of the American West, a picture of "colonizing bureaucracies" emerges..."They interfere in everyday life. They tell you what to do and how to do it" (Peluso *et al.* 1994: 33).

Reading *et al.* (1994: 349) found that "the belief that ecosystem management would lead to a loss of local control" was common. Rural residents also believed that environmental management would "negatively affect their communities, life-styles, and natural resource-based industries" (Reading *et al.* 1994: 349). Understanding the various publics in rural communities in relation to both their perceived dependence on natural resources and their values is necessary to fully comprehend the scope and potential resolution of the conflict.

Comparison of Rural and Urban Perspectives of the Environment

While sociological research has traditionally pointed out differences between rural and urban communities in their social structure and approach to environmental problems and wildlife management (Tremblay and Dunlap 1978, Lowe and Pinhey 1980, Mohaie and Twight 1986, Freudenberg 1991), recent research has begun to demonstrate that differences are not universal (Jones *et al.* 1999, Morrissey and Manning 2000, Paolisso and Maloney 2000). These recent studies point to growing similarities between rural and urban residents that minimize or erase differences in environmental understanding, concern, and values. McBeth and Bennett (1998: 577) found that while traditional differences between urban and rural resident still exist with regard to certain aspects of environmental issues, "overall economic base was a better predictor of attitudes toward environmental concerns and policies." Because both sets of theories are relevant, I first discuss differences between urban and rural populations with regard to environmental issues and government regulation and then address ways in which residents of rural communities may not conform to these predictions.

Several factors have been thought to separate rural residents from their urban counterparts in terms of environmental concern. Tremblay and Dunlap (1978) point to differential exposure theory and extractive commodity theory as explanations for differences between rural and urban citizens' attitudes toward environmental issues. Differential exposure theory is based on the notion that because of the low concentration

of human settlements in rural areas, "rural residents are less exposed to environmental problems and hence are less concerned and less supportive of environmental policies" (McBeth and Bennett 1998: 577-578). Although resource extraction can have obvious impacts on rural landscapes, on the whole rural environments are less heavily modified by human activity than are urban areas (Lowe and Pinhey 1980, Mohai and Twight 1986, Freudenberg 1991). This fact, as well as the perception that government regulations are based on urban standards (McBeth and Bennett 1998) lead to a smaller degree of environmental concern and greater resentment for imposed regulations on the part of rural citizens.

Extractive commodity theory states that because rural economies are often resource-dependent, citizens in these communities value the economic potential of resources rather than the aesthetic or recreational quality of the environment (Tremblay and Dunlop 1978). These communities often depend on the extraction of a single resource, whose ownership may be highly concentrated within the community or controlled by outside power, thus rendering individual members of the community vulnerable to forces outside their control (Peluso *et al.* 1994, Robbins 1988, Robbins 1999). Members of these communities are therefore more likely to favor economic growth over environmental protection (Trembaly and Dunlop 1978, Freudenberg 1991) and are likely to view government regulations that protect the environment as detrimental to their livelihoods (Peluso *et al.* 1994). Writing about the American West, Peluso *et al.* (1994: 8) state:

> Game laws, the establishment of parks, nature preserves, and the protection of endangered species have all served to reduce the public access to subsistence and economic uses of natural resources.

These restrictions have real and perceived consequences for communities already suffering from persistent poverty due to processes of advanced capitalism and internal colonialism (Peluso *et al.* 1994). The transformation of much of the landscape in the American West as outside capitalist forces have searched for both raw materials and, more recently, vacation destinations reinforces the perception of long-time residents that they lack control over their environment (Robbins 1999). Writing about coastal Oregon, Robbins (1988: 8) says:

> The movement of capital has become more sophisticated in the last half of the twentieth century as the Pacific Northwest economy has become more closely integrated at the national and international level... Meanwhile the communities creating the surplus capital suffer the consequences. Which is to say that resource capital in the United States (and worldwide) has become increasingly mobile, and investment decisions under those circumstances have been made without community health and stability as a consideration.

Shifts from labor to capital-intensive resource extraction, profit squeezes, and increased capital mobility have resulted in rural poverty. In these communities, government regulations are seen as a further limitation of the options of rural citizens (Peluso *et al.* 1994).

Although these ideas about unequal control over the environment, resource dependence, and a reduced exposure to environmental problems have been thought to make rural residents less supportive of environmental policies, several recent studies have found no significant difference between rural and urban residents in terms of environmental concern. Jones *et al.* (1999: 482) state, "Though past research on the social

bases of environmentalism in the United States generally found that urban residents are more concerned about the environment, recent research suggests that this may no longer be the case." This study found that "environmentalism has broadened its appeal in rural areas, especially in communities located near national and state parks, wildlife refuges, and other outdoor recreation sites" (Jones *et al.* 1999: 482). This shift may be due in part to the changing composition of rural communities, as urban residents relocate to areas that allow them access to such amenities (Howe *et al.* 1997). While these shifting demographics can be seen as further limiting the economic and political power of longtime residents (Robbins 1999) and reinforcing their anti-regulation sentiments, increasing tourism and urban migration can also provide a degree of economic diversity and a broader tax base (Rasker and Glick 1994, Machlis and Field 2000), resulting in a desire to protect the aesthetic value of the resource. In either case, as urban migrants bring their ideas about the environment to their new homes, the diversity of perspectives on environmental issues in rural areas broadens and becomes more similar to that of urban areas (Walker and Fortman Under review).

As community composition changes and diversifies, so do perspectives on environmental issues. Several studies have pointed out that economic background and profession are better predictors of environmental attitudes than where a person lives (Kowalewski 1994, McBeth and Bennett 1998). Kowalewski (1994: 297) pointed out that "education, media publicity, urban flight, and other transmission processes over the past few decades" have diminished differences between rural and urban residents. Citizens that live in rural environments are not necessarily employed in resource extractive

occupations, but the degree to which individuals are dependent on natural resources is a good predictor of attitudes toward their management. McBeth and Bennett (1998) found that individual resource dependence was the most important factor in determining support for efforts to save salmon, wolf introduction, and restricting of bear hunting in Idaho. Those who had economic stakes in the resources were less likely to support wildlife management that interfered with their traditional use of the resources. Similarly, Kowalewski (1994) found significant differences between non-farmers and farmers, but none between rural and non-rural residents in terms of their views of environmental management.

Morrissey and Manning (2000) found relatively few differences in environmental values and ethics between rural and urban residents and posit that values "may measure more fundamental relationship between people and the environment" (Morrissey and Manning 2000: 12) than the traditional measure of environmental concern. Issues are often more complicated than can be measured with questions about environmental concern. The perspectives of residents and those of other stakeholders, as well as the deeper issues within opinions about wildlife management, must be considered when analyzing the forces perpetuating conflicts such as the one that occupies the current study: the sea lion/salmon conflict in Oregon.

Marine Mammal/Fishery Interactions

The California sea lion/salmon conflict in Oregon embodies issues of overabundance, splits in community and cultural values, and differential faith in environmental management, but it is set apart from most of the previously cited examples in that it is a marine mammal/fishery interaction, a class of interactions that does not truly have a parallel on land. While conflicts surrounding marine mammals and fish are similar to the issues surrounding terrestrial carnivores (e.g., wolf and coyote predation on livestock and game), they differ in several important ways. The first has to do with the unique nature of commercial fisheries. As the last hunter-gatherer profession (Safina 1998), commercial fishing is different from hunting as it is not a recreational industry, and it is set apart from ranching in that the fishers do not own the animals they exploit. While predators on land interfere with commercial livestock operations and prey upon wild animals that provide recreational hunting opportunities, predators in the marine system impact wild fish that are targeted by a commercial industry. These impacts are far more ecologically complex than those on livestock, as fish have evolved as parts of an ecological system while livestock tend to inhabit simpler landscapes. Further, marine mammal/fisheries interactions are far more socially complex, as the ownership of the fish is not established. While ranchers can make a case that they should be reimbursed for losses of their livestock to predators and should have the authority to take action to minimize these losses (St. Phillip 1996), other social groups (e.g., recreational fishers, environmentalists) have a stake in the fish. The nature of the commercial fishery industry,

the complexity of the ecological interaction and the wide range of stakeholder groups separates marine mammal fisheries interactions from similar interactions on land.

While the interactions between sea lions and salmon in Oregon are based on predation and interference with fishing operations, marine mammal/fishery interactions can take many more forms than predator impacts on coveted prey (Rosenberg 2000). The National Oceanic and Atmospheric Administration publishes an annual list of problematic marine mammal fisheries interactions. In 2000, over 250 interactions were listed, ranging from harbor porpoises interfering in Alaskan crustacean pots to right whales becoming entangled in Caribbean gillnet fisheries (Rosenber 2000). Beverton (1985: 7) outlines the differences between types of interactions, the primary distinction being operational versus biological interactions.

> In the former, the marine mammal becomes involved in (often literally entangled with) fishing operations to the detriment, usually of both; this form of interaction is typically local and immediate in its manifestation. Biological interaction arises mainly through the marine mammal being a predator on fish or invertebrate marine organisms which are also exploited commercially, or which are the food of other commercially important species.

Like issues of overabundance, both operational and biological marine mammal/fisheries interactions only create social conflict when humans develop a stake in either resource (Cicin-Sain 1982). One of the largest complaints of fishers is lost fishing time as a result of time spent repairing or replacing damaged and tangled gear (Beverton 1985), demonstrating the stake that fishers have in the resource, and the direct threat that marine mammals pose. Similarly, the public stake in marine mammals as "the symbols, in many respects of man's attachment to and fascination with the sea" (Cisin-Sain 1982: 1) has

resulted in a public outcry against the incidental mortality of marine mammals in fisheries operations (Safina 1998). While issues concerning cetaceans, such as the high mortality of dolphins in the tuna fishery, have received the most public attention, pinnipeds have generally benefited from the attention paid to the issue of marine mammal bycatch in general. Because there are many conflicting stakes in the resource, "the options facing the unfortunate decision-maker are…strongly loaded with emotional and political overtones" (Beverton 1985: 5).

Finally, while research on land has addressed the diet selection of predators (e.g., Cunningham *et al.* 1999) research on marine mammal/fisheries interactions historically has been driven by conflicting interests, failing to directly address the impacts of marine mammals on fish, and instead focusing on two disparate research goals: quantifying the impacts of fishing on marine mammals, and determining population levels of species for exploitation (Smith 1995). The problems inherent in managing species interactions are complicated by this state of the scientific knowledge. "The central question for the scientists to try to answer was simple enough: what is the true nature and extent of interactions between various species of marine mammals and fisheries?" (Beverton 1985: 6). However, research priorities have not addressed the key issues necessary to answer this question, such as changes in food chain dynamics and the cumulative impacts of fishing and marine mammal predation on fish stocks (Smith 1995). Fisheries biologists most often have addressed issues immediately important to the fishing industry and have "tended to see the world from the continually changing point of view of the fishermen" (Smith 1995: 532). These research initiatives have been generally single-species driven

and tended to direct their efforts to issues related to exploitation. In contrast, "the nature of most research related to marine mammals has been defined by biologists within the government" (Smith 1995: 533-534) and have had a tendency to address the effects of marine mammal by-catch. These efforts have focused on impacts on marine mammals and have given lower priority to measuring the effects of marine mammals on fish, such as "effects of rapidly expanding pinniped populations on their fished prey populations" (Smith 1995: 534). This disconnect between the fishing industry interest in single-species research, and government interest in impacts on marine mammals has overlooked a critical aspect of marine mammal/fisheries interactions: the actual effects of marine mammals on fish stocks.

Though the tendency in fisheries biology has been to address issues of immediate importance to the fishing industry, recent research has begun to focus on multispecies interactions (Beverton 1985, Smith 1995, Ulltang 1998). Even with efforts to measure species interactions and to incorporate them into management plans, questions about the effects of predators on fishery resources have not been adequately addressed (Smith 1995: 533). Part of the problem is the complexity of the natural system compared to the simplified web of human extraction (Beverton 1985). Humans can harvest species at all levels of the food chain, but fisheries tend to be single-species in nature (Smith 1995). "In practice, it is rare for a marine mammal, but not unusual for a fishery, to be dependent on a single 'prey' species" (Beverton 1985: 9). Similarly the prey species in question is likely to "have other predators (non-mammalian) than man and the marine mammal in question" (Beverton 1985: 9). Ecological models of species interactions fail to capture

the complexity of these interactions (Morin 1999, Yodzis 2001) and often insufficient data exist to insure predictable results.

Even if scientists were able to develop methods sophisticated enough to properly address multispecies interactions and the competitive effects of marine mammals, increasing public awareness about marine mammals—and subsequent concern for ethical, social, and economic issues—would prohibit science-based management from taking place (Beverton 1985). Like overabundance issues, marine mammal/fisheries interactions are viewed by different sets of stakeholders with conflicting social values. Further, these issues cannot be addressed solely at the regional scale, as stakeholders exist at local, regional, and national levels (Cisin Sain 1982).

Marine mammal/fisheries interactions are fraught with biological and social complexities. In the case of the California sea lion/salmon conflict, these complexities are compounded by those involved with managing an abundant carnivore that has direct impacts on a sensitive species, whose precarious state is well known in the region. Finally, divergent values between people dependent on the resources for extractive use and those who value wildlife for its aesthetic or non-consumptive qualities add yet another degree of complexity to the issue. Only by sorting through these layers and untangling the historical strands that have led up to the current conflict can an understanding of the issue and its causes be reached.

CHAPTER II

ECOLOGY, CULTURE, AND LAW

Since the inception of the Marine Mammal Protection Act (MMPA) in 1972, the numbers of California sea lions have been increasing, approximately tripling from 1975 to 1995 and expanding northward into new breeding and migratory ranges (Demaster *et al.* 1982, Fryer 1998, Fraker and Mate 1999). These trends contrast starkly with those of many fish species, especially several salmonids in the Pacific Northwest on which sea lions are known to prey. Based on declining population trends, Nehlsen *et al.* (1991) identified 214 runs of salmon as at risk. Twenty-six Evolutionarily Significant Units (ESUs)[1]—representing five species across seventeen geographic units—have been listed as threatened or endangered under the Endangered Species Act (ESA) (NMFS 2001), although 25 of these are currently under review (Lent 2002). The degree to which California sea lions impact specific fish stocks is not clearly understood, but feelings of frustration about pinniped impacts run high among some groups, including fishers and businesspeople who depend on commercial and sport fisheries (Smith *et al.* 1997). Many are concerned that both their livelihoods and the fish populations are at risk because of

[1]An Evolutionarily Significant Unit is defined as "a population that is reproductively isolated from other conspecific population units, and represents an important component in the evolutionary legacy of the species" (Meffe and Carroll 1994:161).

pinniped predation (Fraker and Mate 1999). The issue of sea lion predation on salmon is complicated by the cultural status of salmon in the Pacific Northwest and that of marine mammals in greater American society, as well as the corresponding legal protection of each species.

This chapter examines the legal, ecological and social components of the current conflict, and the links between these elements. The most obvious links may be between the legal and management structure and the ecological interactions, as environmental management exists in order to control elements of the ecological system and is theoretically based on our understanding of the ecological interactions. The influence of social values related to these species cannot be overlooked, however. The reactions of different groups to the interactions of sea lions and salmon are the fundamental cause for the social conflict; these perceptions of the interactions are based on different values associated with each species. Similarly, the effect of social values on the legal system is apparent. Therefore, an exploration of the interaction of law, ecology, and culture is critical to understanding the current situation.[2]

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[2] Historical use of salmon and sea lions is also an important component of the sea lion issue and will be addressed in Chapter Three.

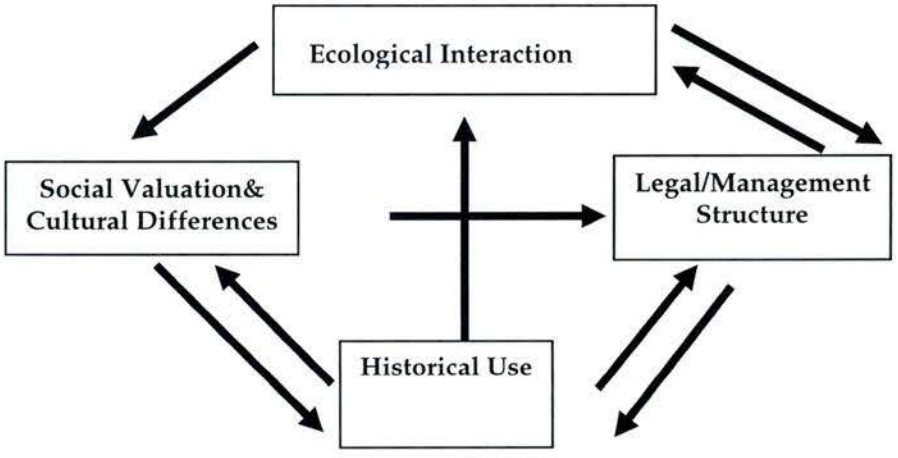

FIGURE 1. Interaction of factors related the sea lion/salmon conflict

Legal and Management Structure

A wide range of attitudes and world-views is represented in the sea lion conflict. These attitudes are not simply responses to the interactions between these species, but also help shape ecological relationships through their effects on the legal system. Population levels of species are affected by the laws that protect them; these laws are influenced by social values. Czech *et al.* (1997) describe the translation of public opinion into government policy with regard to public perception of certain species. "Public perceptions of species have a major influence on policy formulation and implementation," as the social valuation of each species determines the "political power held for them in trust by interest groups" (Czech *et al.* 1997: 1104). These interest groups (e.g., Trout Unlimited, Save our Wild Salmon, Oregon Trout, Marine Conservation

Biology Institute, Seal Conservation Society, The Humane Society), "are the fundamental units of political power in pluralist theories of democracy" (Czech *et al.* 1997: 1104). Membership in these organizations demonstrates greater public support for more charismatic or economically significant species. While membership in each of these groups represents a concentration of interest in furthering a particular political objective, the focus and relative power of each group varies. An analysis of the legal protections afforded each species demonstrates an unequal protection of sea lions and salmon based on the different ways they are valued by society.[3]

Just as membership in these organizations represents interests in particular species that translates into political power for a particular objective, the fishing industry represents an important and politically powerful stakeholder group that influences the policy process. For example, issues related to salmon are represented by both Save our Wild Salmon and the Small Boat Commercial Salmon Fishermen's Association, each of which champions particular policy objectives that may or may not be in opposition to one another. While the actual translation of interest group lobbying into public policy is outside the realm of this thesis, a brief analysis of the relevant policies and the social values that they represent is critical to understanding the issue at hand.[4]

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[3] Czech et al. draw conclusions about larger animal groups, such as mammals and fish. The application to sea lions and salmon is outside this analysis.

[4] The perceptions that environmental groups and members of the fishing industry have about their relative power in shaping public policy and how these perceptions contribute to social conflict and will be discussed in Chapter Four.

Although salmon are recognized as socially important, their management and protection are tied to their economic value. Like other marine fish, salmon are managed under the Magnunson-Stevens Fisheries Conservation and Management Act (MSFCMA), which aims to maintain fish stocks at a level sustainable for exploitation (Christie and Hildreth 1999). The MSFCMA originated as the Fishery Conservation and Management Act in 1976, with the goal of Americanizing the offshore fisheries and managing them for optimal yield (The H. Johns Heinz III Center 2000). Optimum yield is defined as the level of exploitation that "will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities..." (NMFS 1996). The 1996 amendments to the Act focused more emphasis on sustainability and protection of the habitat on which fish depend (The H. Johns Heinz III Center 2000), but the goal of this legislation remains maintaining populations of fish for economic benefit to the fishing industry.

The MSFCMA is not the only legislation that frames the management of Pacific salmon. Selected runs of five species of Pacific salmon, organized within the ESU framework, have been listed as endangered or threatened under the Endangered Species Act (ESA) of 1973 (NMFS 2001), and are therefore are required to be managed by ESA recovery plans (Ross 1997).[5] While the explicit goal of the ESA is to protect species against extinction and recover them to self-sustaining levels (Czech and Krausman. 2001)—not to return listed species to levels appropriate for exploitation—the fact that

[5] Twenty five of the 26 listed ESUs are under review as a result of petitions filed in response to U.S. District Court Ruling (*Alsea Valley Alliance v. Evans*). A new listing policy will not be available until September 2002, and therefore cannot be addressed in this thesis (Lazaroff 2002, Lent 2002).

salmon have been an important component of the Pacific Northwest economy adds confusion to the issue of salmon restoration and management (Safina 1998). More importantly, under both the ESA and the MSFCMA, management of salmon is tied to their population levels (Christie and Hildreth 1999). Whether salmon are valued for their contribution to the extractive economy or simply as species that should not be allowed to go extinct, the fact that population size is used as the means of managing salmon indicates an associated social value different from that of marine mammals.

In contrast to salmon, sea lions are managed under the Marine Mammal Protection Act (MMPA), which protects marine mammals outside of either their extractive value or based on their conservation status (e.g., endangered or threatened). The high social value placed on marine mammals, and the fact that American society believes that these animals deserve to exist apart from our consumptive use of them, has been codified into law (Christie and Hildreth 1999). The MMPA was enacted in 1972 with the goal of protecting and restoring marine mammal populations (Yaggi 1996). "The underlying tenor of the Marine Mammal Protection Act was that *all* marine mammal populations are in trouble, and need to be protected" (Matthews 1995: 104, emphasis added) and its provisions:

> ...established a moratorium on the taking (under MMPA, "take" is defined as "to harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal") or importing of marine mammals except for certain activities which are regulated and permitted (NOAA 2001).

Yaggi (1996: 8) points out that "[n]o previous federal wildlife law had used such a broad understanding of 'taking.'" Not only are populations protected, the MMPA "provides

protection to individual animals" (Baur *et al.* 1999: 73), demonstrating an ethical concern for the well-being of animals in addition to the population as a whole.

The MMPA sets as its biological goal the maintenance of the Optimum Sustainable Population (OSP) of each marine mammal species. The law states that populations:

> ...should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part, and consistent with this major objective, they should not be permitted to diminish below their optimum sustainable population level (U.S.C. 1361)

OSP is defined as "the number of animals which will result in the maximum productivity of the population of species keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element" (U.S.C 1361). Carrying capacity is "the maximum number of individuals of any species that can be supported by a particular ecosystem on a long-term basis" (Cunningham and Saigo 1999: 611). In the case of California sea lions, the carrying capacity has not been determined, as their long-term abundance in the absence of hunting is unknown. Kronman (1996: 21) quotes Jim Lecky, of the National Marine Fisheries Service's Protected Species Division:

> We can't change federal policy until the animals exceed their Optimal Sustainable Population, and we won't know what that is until growth rate declines or crashes, since there's no good record of historic populations... They may be just resettling in territory they once occupied.

Although representatives of the fishing industry argue that local population crashes have occurred and have exceeded the carrying capacity of certain environments (Kronman 1996), the continued rapid growth of the population as a whole indicates that sea lions are still recovering (Bauer *et al.* 1999).

The MMPA assumes that marine mammals are critical elements of marine systems and recognizes that they "affect the balance of marine ecosystems in a manner that is important to other animals and animal products" (Baur *et al.* 1999: 64). The assumption is that a healthy population of marine mammals will contribute to the maintenance of the "health and stability of the marine ecosystem" (Baur *et al.* 1999: 64). The protection of marine mammals is thought to benefit the ecosystem as a whole both because of their ecological relationship to other species and because it is assumed that the protection of their habitats, as required by law, also will protect other species that share those habitats (Baur *et al.* 1999). While the MMPA created a much needed legal framework to protect marine mammals—species that are often in danger due to their slow growth and low reproductive rates—the law provided nearly complete protection to marine mammals while other species continue to be protected only when their populations are at risk. Baur *et al.* (1999: 53) state, "Congress declared that the foremost goal of the Act is maintaining the health and stability of the marine ecosystem." While the protection of marine mammals most certainly has beneficial impacts on the system as a whole, marine mammals also have negative impacts on some aspects of the environment, especially if their populations increase rapidly. The full protection of sea lions contrasts with the continued exploitation of non-endangered or threatened salmon, potentially accentuating the impacts that the sea lions have on diminishing salmon runs. Consequently, the difference in protection afforded sea lions and salmon is a force in shaping the ecological interactions of these species.

Ecological Interactions

California sea lions have been increasing since they achieved protection in 1972. On average, the West Coast population has increased 5 to 6% annually since the mid-1970s (Lowry *et al.* 1992, NMFS 1997) and there has been a "northward shift in the northern limit of [its] range" (Fraker and Mate 1999). Although there are no breeding colonies in Oregon, the increased presence of migratory California sea lions (males) in Oregon has been substantial. Peak counts have increased from 1,000-2,000 in the late 1970s to 5,000-7,000 in the early 1990s (NMFS 1997). California sea lions are found at spots along the entire coast of Oregon. Areas of high concentration include Rogue Reef, Orford Reef, Cape Arago, Sea Lion Caves, Cascade Head, and the south jetty of the Columbia River. Further, increasing numbers are found in several coastal bays and rivers, especially during salmon runs. These including the Rogue River, Coos Bay, Yaquina Bay, and Tillamook Bay (NMFS 1997).

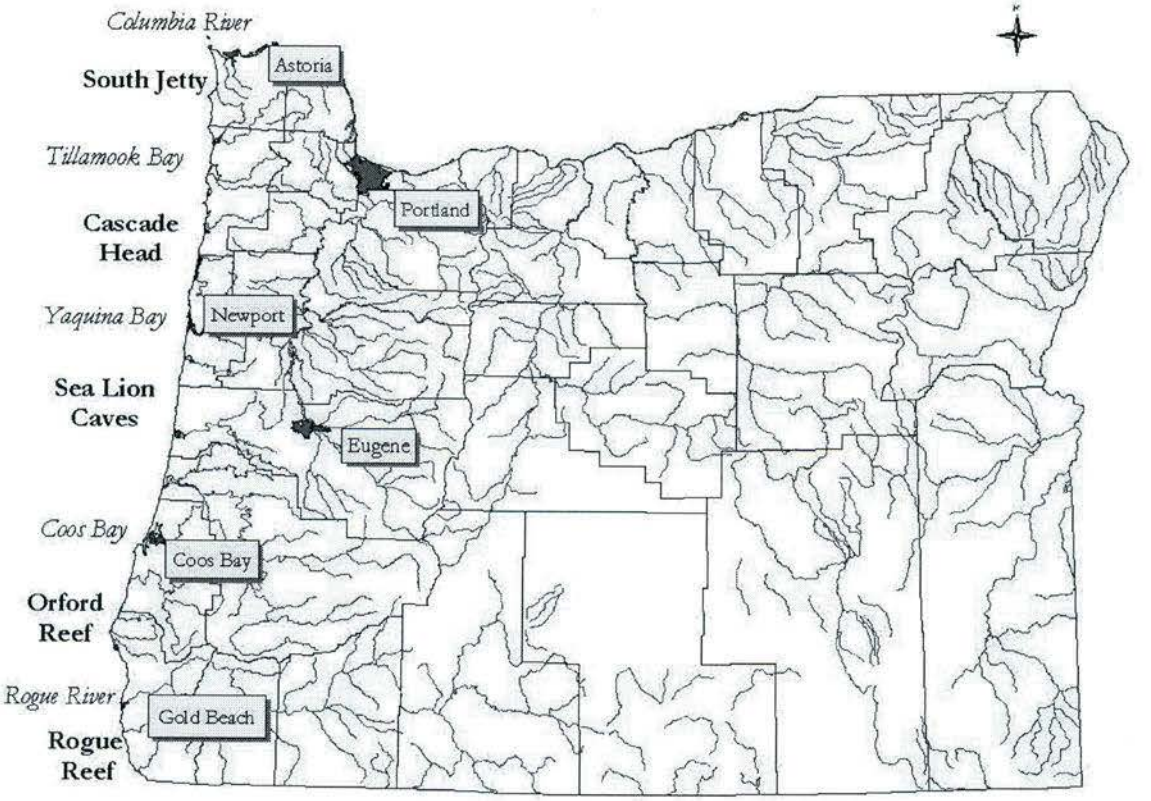

FIGURE 2. Areas of high concentrations of California sea lions in Oregon

California sea lions have not been increasing at a constant rate. Natural forces influence their populations and environmental variability has resulted in localized population crashes. Two examples of such influences are the climactic event, El Niño and the bacterial disease, leptospirosis. Leptospirosis has affected California sea lions at regular intervals through the 1980s and 1990s (Gulland *et al.* 1996). It is spread through direct contact with the urine of infected animals (WHO 2000), so as the density animals on rookeries increases, the potential for spreading this disease grows. Leptospirosis

infected mostly male sea lions in 1984, 1988, 1991, and 1994 (Gulland *et al.* 1996), and will likely continue to affect California sea lions.

El Niño, the large-scale oceanographic event that results in a reduction in productivity in the eastern Pacific, typically slows population growth or causes reductions in population size and abundance. During El Niño years, less food resources are available and sea lions spend a significantly longer time foraging (Feldkamp *et al.* 1991). Alterations in food supplies can lead to reduced fecundity and increased mortality (Huber 1991). For example, in 1983, a strong El Niño year, "pup numbers declined precipitously" (Francis and Heath 1991: 126) likely due to high abortion rates and high postnatal mortality. El Niño can have a "consistent and prolonged impact …on reproductive performance of California se lions" (Iverson *et al.* 1991: 84), influencing population trajectories.

Despite these natural impacts on their populations, numbers of California sea lions have continued to increase and influence on the environments they inhabit. Sea lions are opportunistic predators, consuming various species of fish and cephalopods (Reidman 1990). They are able to exploit several species of salmon in Oregon and the greater Pacific Northwest where and when their migratory patterns overlap with those of salmon. California sea lions breed in colonies in southern California in the late spring, and during the summer, males migrate north as far as British Columbia to feed. Non-breeding males are present in the Pacific Northwest during the fall, winter, and spring. Salmon also undertake migrations, moving between freshwater and saltwater where they cross paths with the sea lions. Adult salmon are most vulnerable to predation during

spawning migrations through river or estuary mouths, especially where passage is constricted (NMFS 1997), as sea lions are able to exploit the migrating salmon in these confined spaces.

Just as sea lions feed on salmon migrating to spawn, they can also consume juveniles migrating from rivers and estuaries to the ocean. The degree to which sea lions prey on each species is determined by the length of time that the particular stock of salmon spends developing in freshwater, and its subsequent size during its transition from freshwater to the ocean (NMFS 1997). In general, those stocks that spend the longest time developing in freshwater and enter the marine environment as larger individuals are the most vulnerable to predation, as the pinnipeds target the larger smolts (NFMS 1997). Each salmon species has its own life history patterns, and the timing of these patterns varies between stocks of the same species.

Species	Vulnerability to predation	Time in freshwater
Chinook salmon (*Oncorhynchus tshawytscha*)	Spring run vulnerable during out-migration Fall & summer runs not vulnerable during out-migration	Spring run 1-2 years Fall & summer runs 60-120 days
Chum salmon (*O. keta*)	Not vulnerable during out-migration	0
Coho salmon (*O. kisutch*)	Vulnerable during out-migration	1-2 years
Pink salmon (*O. gorbuscha*)	Not vulnerable during out-migration, vulnerable during first summer	0; may spend their first summer in nearshore ocean
Sockeye salmon (*O. nerka*)	Vulnerable during out-migration	1-3 years
Sea-run cutthroat trout (*O. clarki*)	Continuously vulnerable	1-4 years; spend most of their adult life close to shore
Steelhead trout (*O. mykiss*)	Vulnerable during out-migration	1-4 years

FIGURE 3. Salmon smolt vulnerability to sea lion predation by species

Sea lions have the most potential to impact salmon when fish passage is restricted by anthropogenic structures (e.g., dams), naturally occurring narrow channels and shallow water, and where salmon populations are already depressed (NMFS 1997). For example, in many rivers and estuaries in southern Oregon and northern California, the mouths of small rivers and streams can be temporarily closed off from the ocean by low stream flows. In these streams, salmon often congregate in nearshore waters and are exposed to the feeding pinnipeds until sufficient rainfall allows passage (NMFS 1997). Similarly, in the highly publicized Ballard Locks incident in Seattle, Washington (Fraker and Mate 1999), male California sea lions learned to aggregate near the mouth of Lake Washington where salmon had to migrate past the locks. These sea lions were able to

prey easily upon the returning steelhead trout, taking 60% of the Lake Washington steelhead in some years. Studies have found that although there is a high potential for individual sea lions to consume large numbers of salmonids, not all sea lions take advantage of these blockages and it is often a few aggressive individuals that consume the most fish (NMFS 1997, Fraker and Mate 1999).

While the concentration of salmon can make predation highly visible and increase local impacts, it is unclear how significant the effects of sea lion predation are on a larger scale. Fryer (1998: 46) pointed out that "the impact of pinnipeds on salmonids in the ocean or in a large river and estuary system, such as the Columbia River, is unknown" and significant long-term data on the effect of pinniped predation on salmon are lacking (NMFS 1997).

> Determining the impact of pinnipeds on the U.S. West Coast ecosystem is a complex assessment involving separating the effects of other predators (including commercial, sport, and tribal fishers), predator and prey population dynamics, disease, and changes in environment. Because California sea lions and harbor seals are opportunistic predators, their food habits change dramatically over areas, seasons, and years in response to changes in abundance and availability of their prey (NMFS 1997: 47).

Researchers rely on identification of the bony remains of fish (e.g., otoliths) from sea lion fecal samples, quantification of the frequency of pinniped-caused scars and wounds, and direct observation of feeding as the primary means for determining the numbers of fish consumed. These methods have shown that pinnipeds can have a high reliance on salmon during certain seasons and in specific locations (NMFS 1997, Fryer 1998, NMFS 1999, Sleeth 2000). Assuming that salmon comprises approximately 10% of sea lions' diets, Kaczynski and Palmisano (1992) estimated that sea lions consume just under 143 tons of

salmon—or 35,800 individual fish—in Oregon. In comparison, the commercial fishery removed 8900 tons of salmon in 1988, its most productive year (ODA 2000). Because populations have increased since the estimate was completed in 1992, it could be assumed that predation has also increased, but the population densities of salmon must also be considered. Virtually no data exist for patterns of prey consumption in the diet to relative abundance of prey (Demaster and Sisson 1992).

Even if accurate numbers on salmon consumption could be determined, assessing the actual effects of sea lions on salmon populations is not simply a matter of quantifying the number of individual salmon killed. Given the opportunistic feeding habits of sea lions—feeding on everything from salmon to lamprey and squid (Riedman 1990, Fraker and Mate 1999)—their effects on the food web are more complex than simply removing salmon from the system. (Fraker and Mate 1999, Demaster and Sisson 1992). Secondary food web effects must also be considered (Yodzi 2000). For example, sea lions might feed more heavily on a piscivorous fish that also feeds on salmon, consequently allowing more salmon to survive. The influence of other sea lion prey that are themselves predators of salmon is unknown. "[I]nformation is lacking on changes of abundance or distribution of other salmonid predators (e.g., mackerel) which may affect salmon populations and thus confound the effects caused by pinnipeds" (NMFS 1997: 45). In the Benguela Current system, an upwelling system that has many similarities to the California Current system, Yodzis (1998) found that the food web consists of more than 20 million pathways. Insufficient data exist on the interactions of species, ensuring that ecosystem models will fail to capture the complexity of these interactions.

Because of this trophic complexity, culling sea lions may not have the intended effects. Yodzis (2001: 80) describes the potential for unintended consequences on lower trophic levels that may result from the removal of marine predators.

> On a short timescale we might predominantly observe the effect from the shorter pathway (an increase in fisheries yield), with the contribution from the longer pathway making itself felt only on a longer timescale, possibly leading to a reversal of the response (a decrease in fishery yield).

Demaster and Sisson (1992) identified six basic types of interactions between pinnipeds and fisheries. Only two of these resulted in increased fisheries yields when pinnipeds were removed from the system. On a practical level, because California sea lions are increasing, control programs directed at reducing pinniped populations, or even maintaining current population levels, would have to remove large numbers of animals. In California, such culling would have to target "on the order of 2000 [mature females] per year to maintain the population at its current level" (Demaster and Sisson 1992: 326).

Social and Cultural Valuation

While science can provide guidance as to where and when impacts exist and can outline potential effects of management actions, the debate over management is necessarily grounded in social values that different groups have for salmon and sea lions. As discussed previously, these values influence the legislation that structures and shapes the possible outcomes. Similarly, they frame the actual debate. While salmon have cultural and economic value in the Pacific Northwest, pinnipeds possess the charisma

necessary to garner support of national animal rights and environmental organizations. The remainder of this chapter examines the social values assigned to sea lions and salmon, and the different views toward environmental management.

Marine Mammal Cultural Values

Whether or not marine mammals have immediate impacts on fish, culling is not a solution that is amenable to most Americans. As charismatic animals, as symbols of conservation, and as representatives of the wildness of the ocean, marine mammals hold a special position in contemporary American society.

> Marine mammals, after all, are the symbols, in many respects of man's attachment to and fascination with the sea. These are the animals which can be likened to man by their attributes and behavior (such as the intelligence and communicative skills of porpoises, or the nurturing behavior of sea otter females toward their young). These are also the mammals whose capabilities and behavior can be viewed as transcending man (Cicin-Sain 1985: 1).

Lavigne *et al.* (1999) demonstrated that over the past 40 years there has been a marked shift in the attitude of the American public toward marine mammals from a utilitarian perspective to one that is more ethical and non-consumptive. The development of extensive tourist economies based on marine mammal observation is an important marker of the non-consumptive role that marine mammals hold, as is the genesis of animal welfare and environmental organizations with the goal of protecting marine mammals and their habitats. Although pinnipeds have not benefited from this increased attention to the extent other groups have (e.g., cetaceans), the ethical and non-consumptive attitudes

have extended to include both seals and sea lions, as witnessed in the great public outcry against the clubbing of harp seals (*Phoca groenlandica*) in the 1980s (Lavigne *et al.* 1999). Several public comments incorporated into the *NOAA Report to Congress: Impacts of California Sea Lions and Pacific Harbor Seals on Salmonids and West Coast Ecosystems* (NMFS 1999) reflect the public indignation associated with the intentional killing of sea lions to abet fish stocks.

The protection of marine mammals has developed an ethical component that is not found in fish conservation. Beddington (1985: 3) pointed out that the "ethics of killing [marine mammals] for any purpose, have no parallel in fish." Pressure from the animal welfare lobby and the general public with regard to marine mammals has extended "beyond the prevention of suffering to the abhorrence on ethical grounds of killing a marine mammal in any circumstances" (Beddington 1985: 5). This social valuation of marine mammals over fish has not always existed, witnessed by the control of marine mammals and government-sponsored bounties that have arisen throughout history as part of fisheries management (Smith 1995). But these values have changed. "As a society, we've decided marine mammals deserve special status and should be treated differently from fish…They are perceived as man's special friend'" (Griffin 1992: 744). It could be argued that ethical attitudes toward fish exist in the growing popularity of catch and release fishing practices, championed by groups such as California Trout whose slogan is "It takes years for Mother Nature to raise a trophy trout—they deserve protection" (CalTrout 2002). While this movement is certainly ethically commendable, the fact remains that it is socially acceptable to eat fish. Until a majority of Americans

agree that fish deserve to exist outside of our consumptive use of them, the fact remains that American society embraces marine mammals more universally and on an ethical level that has no translation to fish.

Salmon Cultural Values

Salmon are not just fish, though. Their links to the history and culture of the Northwest and their tenuous future place them above most other fish in the minds of many residents of the Pacific Northwest. In part because of the complex history of resource use that is tied to the settlement of the region, salmon have taken on a symbolic stature that has come to represent the Northwest. Safina (1998: 122-123) writes:

> Think of the Northwest, and salmon soon come to mind. Only a few wild animals symbolize the heart and soul of a region…In North America, the buffalo of the Great Plains and the salmon of the Pacific Northwest supported economies, cultures, and human self-identities. And though white settlers destroyed the buffalo in greed and genocide against the natives, they embraced the salmon. The immigrants, like native peoples, saw in salmon something deep, powerful, moving, and valuable—even if they approached the fish with less awe, less reverence, and consequently, less success than the natives had for millennia. Certain other animals still symbolize their regions. But salmon are unique because their symbolic power and their economic value have survived together to the threshold of the twenty-first century.

Indeed, salmon are linked with the cultural identity of Oregon and the Pacific Northwest (see for example, new books with titles such as *Salmon Nation*). While their role in the cultures of the Native Americans is apparent in their art, stories, and religion, modern Euro-American inhabitants of the region have re-appropriated salmon as a symbol of the

region's natural wealth, the interdependence of species, and "a manifestation of our inner health" (Jay 1991: 32). Modern ecological studies (e.g., Ben-David *et al.* 1998, Cederholm *et al.* 1999) have pointed to the integral role that salmon may play in both freshwater and terrestrial systems. As the National Marine Fisheries Services' Brent Norberg (2001, personal communication) stated:

> We're only now starting to learn what benefits salmon have had in the West Coast ecosystem as a whole. And those benefits have yet to be quantified, beyond their utilization as a food source. So a lot of work is now being done in the contributions that salmon making in moving nutrients from the ocean environment into the terrestrial environment. And we know so little about that at this stage, it's pretty hard to say where the benefit analysis would come out. If it turns out that it's really important to have a lot of fish way up river so that bears can poop in the woods to grow trees, the balance is going to swing in a different direction than how many pinks can you put in a can.

New ecological findings, coupled with the links to the past, have helped to create a social value of salmon that goes beyond their economic and consumptive value.

Salmon are not only important links to the past and symbols of ecological connectedness, they have special status due to their level of endangerment. Their uncertain future causes residents to reminisce about more bountiful times, and the pervasive nature of the issue creates publicity, helping to reinforce the status of salmon as part of the regional cultural identity (Oregon 1998). It is difficult to live in the Pacific Northwest and not be aware of issues relating to salmon, as the declines in salmon populations and the resultant listing of several ESUs under the ESA have attracted much public attention. Because their restoration involves modifications in human behavior across the region—from reducing urban stormwater runoff to alterations in the ways that electricity is produced—salmon issues are familiar, if not important, to of the general

public (Cone 1995). While the impact of daily behavior on salmon is not always obvious, Steel *et al.* (1999: 498) write:

> The lifecycle of salmon touches every interest in the Pacific Northwest—from ocean fisheries to mining industries, and from the urban areas of the Puget-Willamette corridor to forest, farming, ranching, agriculture, and recreation in the interior Columbia Basin. Salmon begin their lives in inland streams, where their environment is influenced by farming, ranching, irrigation projects, and a multitude of other natural and manmade factors. As juvenile salmon migrate downstream, they must negotiate dams built for hydropower, flood control, navigation, water supply, and recreation.

Surveys have found that a strong majority of citizens in the region support restoration efforts (Smith *et al.* 1998, Lackey 2000) and restoration is a priority for many resource managers in the Pacific Northwest (Smith *et al.* 1997).

The use of salmon as a symbol in the Pacific Northwest is not universal, nor does is necessarily translate into effective action to restore diminished runs (Lackey 2000). Norberg (2001, personal communication) commented on the modern role of salmon in the Pacific Northwest.

> I think that the vote is out on salmon in the perception of people. There are people that revere them as a cultural icon; there are people that revere them as a comestible delicacy; there are people that enjoy them as the tug on the end of a line; there are people that just view them as another commodity.

Because the impact of personal actions on salmon is not always evident, the segments of the general population that actually alter their personal behaviors to benefit salmon restoration may be limited. Norberg (2001, personal communication) explained:

> [S]almon have a hard row to hoe because the resources that they need to be sustained are resources that are also coveted by people. And those

> resources don't necessarily equate in people's minds with the killing of an animal.

While the acceptance of salmon as a regional symbol and conservation priority may be limited, it does color the debate about restoration and mitigation of impacts, such as predation by California sea lions.

Views on Environmental Management

Although resource managers, parts of the general populace, and members of the fishing industry generally share the belief that salmon are important symbolic, ecological, and economic keystones of the region, the immediacy of the salmon crisis and the goals and means of achieving their restoration are not agreed upon (Taylor 1999, Lackey 2000). As in wildlife management in general, individuals' perspectives are likely to be at least partially based on their economic stake in the resource. Steel *et al.* (1999) identified three interest factors that affect values toward salmon restoration: economic dependence on resource extraction industry (e.g., timber, agriculture, irrigation, livestock), economic dependence on the fishing/salmon industry, and membership in environmental organizations.

> …[T]hose respondents who depend upon natural resource extraction industries for their economic livelihood are significantly less likely to perceive threats to salmon when compared to their nondependent counterparts. However, those respondents dependent on the fishing industry and environmental organization members are both likely to identify a variety of threats to natural salmon stocks than those

> respondents who are not fishermen (commercial or sports industry) or who are not members of environmental organizations (Steel *et al.* 1999: 507).

Just as the immediacy of the salmon problem is not agreed upon across stakeholder groups, neither is the goal of restoration efforts. An individual's dependence on the resource is likely to affect his or her opinion of the role salmon should play in modern society and the ways in which policies should address restoration. Lackey (2000) outlined three potential goals of salmon restoration: restoring populations to 1) historic run sizes (pre-1850s), 2) fishable runs (1/3 of historic), and 3) maintaining remnant runs—those that meet ESA requirements, but are not fishable. More importantly, Lackey points out that the ways in which individuals value salmon—whether it is for their ability to support coastal economies or for the symbolic value of wild fish—influences their opinion of the what tack salmon restoration should take (Lackey 2000). These divergent goals prohibit an easily agreed-upon consensus.

Even if the public was able to come to consensus on a target for salmon restoration, different groups would continue to disagree as to the most important methods of restoration. Smith *et al.* (1997) found that while anglers believe that removal of predators such as sea lions is of high importance, resource managers believe other issues, such as habitat restoration, are more critical. Kronman (1996: 19) writes:

> But while fishermen tell numerous stories of sea lions wreaking havoc all along the California coast, federal regulators and environmentalists are less convinced that the populations of the pesky predators needs pruning. As a result, nobody is sure what to do next.

Each stakeholder interacts with salmon in a different context, and as a result, views the role of their predators differently. This divergence potentially poses problems for

managers who seek to resolve the problem. Taylor (1999: 4) notes, "resolution has been elusive because participants have little in common. How people respond to declining runs depends on who they are, where they live, what they do for a living, and how they think it happened." Steel *et al.* (1999: 510) agree. "This lack of consensus, coupled with the variety of stakeholder positions placed before the public, combine to delay definitive public action." While these statements are made with reference to salmon restoration in general, they hold true with regard to the role of pinniped predation and the possibilities for mitigation.

As in wildlife management issues in general, public opinion about managing sea lions and salmon is linked to views about the balance of power between citizens and local, state and federal government. Many rural coastal residents are distrustful of both state and federal government, because they feel that their own views are increasingly distant from those of government managers and scientists (Smith *et al.* 1997). In *National Fisherman*, Kronman (1996) writes of the resentment rural residents have for the federal control authorized by the Marine Mammal Protection Act, legislation that marked a shifted management from the state to the federal level. Demonstrating the frustration at the federal government's ability to deal with the issue, the Fisherman's Alliance petitioned Congress to "either manage the uncontrolled growth of marine mammal population or return management of marine mammals to the states" (Kronman 1996: 21). In *Boating* magazine Matthews (1995: 106) writes, "Few have faith the sea lion problem will be resolved by government action. Most fishermen believe they are on their own."

Academic research on community attitudes echoes the sentiments found in these popular magazines. In a 1997 survey of coastal residents, Smith *et al.* (1997: 8) found that "coastal residents were very skeptical of government and scientists." Respondents to this survey dealing with local support for salmon restoration efforts said, "'I just don't know whom I can trust' or 'All the information is biased'" (Smith *et al.* 1997: 12). This study found that "a substantial group did not want the government—particularly the federal government—involved at all; one respondent claimed, "[The government] messes up everything it touches" (Smith *et al.* 1997: 9). Respondents favored local control, but also recognized that dealing with complex issues was often beyond local capacities. Most respondents favored state management of salmon issues over federal involvement, echoing national surveys that "show support for giving states the highest responsibility for environmental regulation and protection" (Smith *et al.* 1997: 9).

Coastal communities are not homogenous, however, and as with salmon restoration in general, economic involvement in resource extraction and personal experience affects opinion on the subject of wildlife management and the capability of the government to deal with these issues. Smith *et al.* (1997: 14) found that residents who valued economic benefits of coastal resources "were more likely to want to reduce marine mammal populations." In contrast, "coastal respondents who showed more support for the environment were more confident about federal courts, environmental groups, conservation groups, and the Extension Service" (Smith *et al.* 1997: 14). Personal observations and experiences are very important determinants of values regarding the management of pinnipeds. Smith *et al.* (1998) found that personal observations of marine

mammals taking salmon were the key to many respondents' opinions of how the issue should be addressed. "The public…does not trust people in authority, whether scientists or government officials. They check results against their experience and the reviews of their neighbors" (Smith *et al.* 1997: 15). "…[P]eople's values affect how they perceive and receive information..." (Smith *et al.* 1997: 14). These values are shaped by personal experiences, observations, and economic dependence.

Members of the fishing community have an obvious stake in the fishery as an economic resource. For this reason, the impact of sea lions on salmon is particularly frustrating. *Boating* magazine reported that increasing populations and decreasing local authority to deal with the problem have created "a long-simmering war between fishermen and pinnipeds" (Matthews 1995: 103). As one sport fisher commented, "It is a major negative impact on our ability to make a living" (Matthews 1995: 104). Smith *et al.* (1997) found that anglers on the Oregon Coast considered predation by pinnipeds to have a significant impact on fish populations and that among anglers, reduction of pinnipeds is a high priority. More than half of the coastal respondents in this survey said that it is "quite" or "very important" to reduce predation, while other impacts on salmon populations (e.g., water quality, forest practices) were rated as less important (Smith *et al.* 1997).

The actual number of pinnipeds shot provides another indication of these attitudes and concerns. While killing marine mammals is now prohibited under the MMPA, the once common practice of shooting pinnipeds that interfere with personal fishing gear still persists (Bonner 1994, Matthews 1995, Goldstein *et al.* 1999). Goldstein *et al.* (1999)

reported that between 1986 and 1998, 306 pinnipeds were found stranded (dead) on the California coast with lesions caused by gunshot wounds, and many more were suspected to have been killed by gunshots. Between 1988 and 1994, the MMPA permitted the shooting of certain pinnipeds interacting with deployed fishing gear, but 1994 Amendments to the MMPA rescinded this right (NMFS 1999). Despite the change in the law, there has not been a significant decline in sea lion deaths related to shooting during the years when the shootings were legal and when they were not (Goldstein *et al.* 1999). San Francisco's Marine Mammal Center treats sea lions injured by gunshot wounds, some of which have up to 100 bullets in their bodies, "from BB-shot to 38 caliber lead slugs" (Kronman 1996: 12). Fishers have been tried for and convicted of harassing sea lions (Matthews 1995), but enforcement of the MMPA protections is difficult (Kronman 1996). Acknowledging the frustrations of many West Coast fishers, responding to political pressures of groups such as the Fishermen's Alliance (Kronman 1996), and acknowledging the stressed salmon runs, the National Oceanographic and Atmospheric Administration (NOAA) recommended that Congress re-authorize the "lethal removal" of California sea lions and Pacific harbor seals (*Phoca viutlina*) that interfere with fishing gear and catch (NMFS 1999).

The intersection of ecology, policy, and social factors has contributed to the current conflict surrounding California sea lions in the Pacific Northwest. It is also important to consider the history of human interactions with these animals as well as the history of their population abundances. Development of the conflict in Oregon is based on the history of human interactions with sea lions and salmon, as well as the history of

the state's management of pinniped fishery interactions. The following chapter investigates this history in depth.

CHAPTER III

HISTORY OF SEA LION POPULATIONS

The conflict resulting from sea lion predation on salmon is fundamentally based on the perceived overabundance of California sea lions and decline of salmon in relation to their population levels in the recent past. Therefore, an examination of the conflict's origins must consider the historical factors that have affected population levels. Fluctuations in animal populations can be caused by many factors, including environmental events (e.g., El Niño) and human impacts such as hunting, culling, and alteration of natural systems. While direct killing of animals is only one influence on population levels, high intensity hunting has the potential to significantly alter the population levels of the target species. Both sea lions and salmon have been heavily exploited for their value as food sources. Until the 1940s, sea lions were also harvested for their fur, their use in oil production, and the medicinal value of certain body parts. The enactment of the Marine Mammal Protection Act in 1972 ended any residual harvest of sea lions, and placed these animals under federal protection. Fishing for salmon still continues where populations are not at risk, but has been restricted or halted in specific areas to protect those stocks that are in danger of collapse or extinction. An extensive

body of literature exists on the history of salmon exploitation and protection.[6] Consequently, this chapter will focus on the history of the California sea lion population, examining what is known about historic population levels and fluctuations, especially with regard to human exploitation.

History of Sea Lion Exploitation

Native American Hunting

Prehistoric exploitation and subsequent impact on populations varied depending on location, but was closely related to the life history and reproductive strategy of the sea lions, human settlement patterns, other food resource availability, technology and cultural development, and climate. Modern archeologists rely upon a small number of coastal sites to represent historic population levels of marine mammals. Based on faunal remains on the Oregon coast, Lyman (1988) found that breeding colonies of California sea lions were present in Oregon during at least the last 3000 years. As California sea lions currently breed in southern California and only non-breeding animals are present in Oregon, the fact that California sea lions reproduced historically in Oregon implies a "major alternation in migratory and coastal use patterns" (Lyman 1988: 251). Lyman

[6] For a complete analysis, see: Committee on Protection and Management of Pacific Northwest Anadromous Salmonids, 1996, Woody *et al.* 1999, Lackey 2000, Taylor 2000.

(1989: 80) writes: "The prehistoric presence of female and newborn *Zalophus* on the Oregon coast indicates modern usage of that coast by this taxon that is not an accurate indication of prehistoric usage patterns."

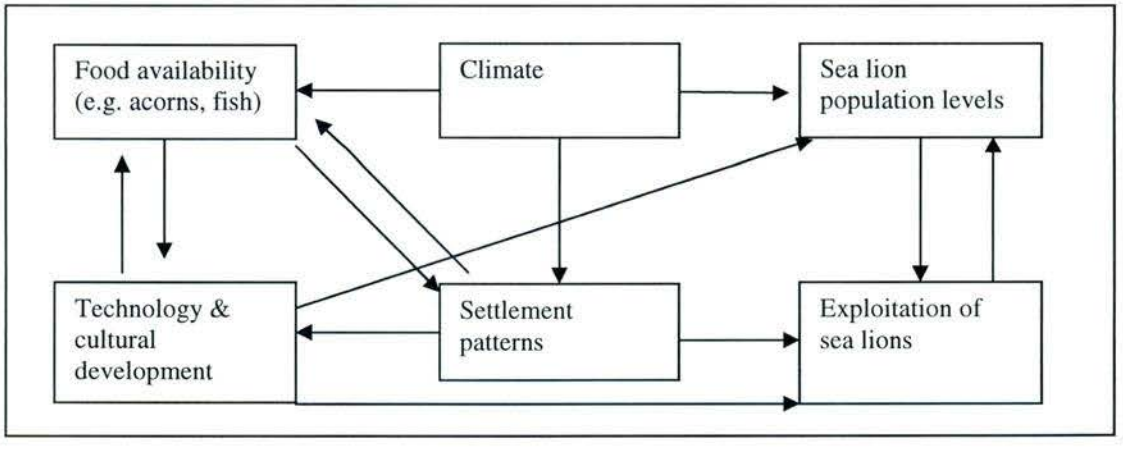

FIGURE 4. Probable influences on prehistoric populations of sea lions

Although California sea lions bred in Oregon prior to 100 years ago, their remains are less abundant than Steller sea lions and harbor seals (Lyman 1988). California sea lions were slightly more abundant in northern California during the past 1000 years, suggesting that "Oregon coastal waters thus appear to have been somewhat of a zoogeographic border zone for this taxon in recent prehistoric times as well as historically" (Lyman 1988: 256). Occupation of individual breeding colonies in Oregon ranges from 3000 to 300 years, but relatively short term (less than 100 years) fluctuations in abundances are not discernible. One of the most recent abandonments of a breeding colony, Seal Rock (15 km south of Newport, Oregon), occurred 100 years ago. This

rookery had been one of the largest for both California sea lions and Steller sea lions between 400 and 100 years ago, indicating that exploitation could have occurred in this location before European settlers arrived (Lyman 1988).

Location (from southern to northern latitudes)	Date	Number of California sea lion bones recovered
Bandon	2300-600 B.P.	2 total
Umpqua-Eden (near mouth of Umpqua River)	3000-50 B.P.	9 total
	900-200 B.P.	7 total, 4 newborn
	2000-1000 B.P	2 total, 2 newborn
Seal Rock (15 miles south of Newport)	400-100 B.P.	31 total, 19 newborn
Yaquina Head	4000-2000 B.P.	3 total
	1500-500 B.P.	2 total
Whale Cove (10 miles north of Newport)	3000-200 B.P.	2 total, 1 newborn
	3000-2800 B.P.	4 total
Palmrose (Seaside)	2600-1600 B.P.	2 total
Avenue Q (Seaside)	3500- 1700 B.P.	1 total
	1700- 800 B.P.	4 total

FIGURE 5. Archeological sites where California sea lion remains have been recovered in Oregon

Because rookeries likely existed in Oregon prior to European settlement, Native Americans likely exploited sea lions on the breeding grounds. Sea lions are polygynous

(one male mates with several females) and are colonial breeders. They congregate on rocky outcroppings and offshore islands to mate and rear pups in early summer, and migrate away from the rookery after the breeding season (e.g., Reidman 1990). Because sea lions congregate on land to breed and raise pups, later returning to sea to feed, they would have been one of the most complex resources utilized by early hunters. Hildebrandt and Jones (1992: 360) write:

> During the course of their life cycle, these animals strike drastically different poses as prospective quarry; when occupying terrestrial breeding sites, they are abundant, visible, and immobile; when at sea, they are significantly more elusive, and difficult to dispatch and retrieve when encountered.

Early hunters would have been able to take sea lion pups and mothers from the breeding colonies with simple hunting gear, such as wood or bone clubs, but would have had to employ ocean going canoes and harpoons to hunt the same animals at different times of the year. For this reason, sea lions were likely hunted seasonally when they were abundant and easily harvested. Archeological research has found that pups and females were most often hunted, supporting the hypothesis that sea lions were exploited seasonally where they were most available and vulnerable (Porcasi *et al.* 2000).

As a food source, pinnipeds would have been one of the highest ranked resources available in western North America because they would have been seasonally easy to procure and calorically rich (Hildebrandt and Jones 1992). Optimal foraging strategy predicts that early hunters with limited technological capabilities would have benefited most from harvesting mothers and pups, as they "represent much more convenient packages for killing, transport, and consumption" (Porcasi *et al.* 2000: 215). Because they

are smaller than adult males, females and juveniles require less effort to hunt, as well as less "sophisticated processing technology to obtain full caloric value before spoiling" (Porcasi *et al.* 2000: 215). Further, the exploitation of highly territorial and aggressive bulls would have been extremely dangerous on the breeding ground (Porcasi *et al.* 2000).

Because sea lion rookeries are often located on assessable rocky outcroppings, mothers leave the rookeries to forage often for a week or more, and pups develop swimming ability slowly (1-2 months), hunters would have been able to take pups easily from nearshore rookeries.[7] However, sea lions have delayed sexual maturity and typically give birth to only one pup annually (Reidman 1990), making hunting of pups an unsustainable practice over the long term. Exploitation of females would also have been possible during the breeding season. Alongside the fact that they are significantly smaller than males (Bonner 1994), female sea lions "are very protective of their pups during the first 2-4 days, and may even refuse to leave them if approached by man" (Peterson and Bartholomew 1967: 36). Therefore, it would not have been difficult to hunt females during this time period with simple weapons. Because sea lions are polygynous, there is a higher percentage of non-breeding males than females, and so exploitation of females would have had a greater impact on the reproductive capacity of the sea lion population (Porcasi *et al.* 2000).

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[7] Some disagreement exists as to whether sea lions bred on mainland sites. Erlandson *et al.* (1998: 12) assert that "accessible mainland rookeries probably always were rare due to the vulnerability of pups to grizzly bears and other large predators." Hildebrant and Jones (1992) acknowledge that terrestrial predators would have limited mainland rookeries, but assert that mainland breeding sites did exist prior to Native American hunting.

Exploitation of sea lions occurred along the entire West Coast of North America, but the timing and intensity varied by location. While Native American hunting of California sea lions is known to have begun at least as early as 7040 B.C. in the southern California islands (Porcasi *et al.* 2000), exploitation in Oregon is thought to have begun much later. Coastal settlements are known to have been occupied as early as 8000 B.P.[8] (Moss and Erlandson 1998), but the earliest evidence for California sea lion exploitation is approximately 4000 B.P. (Lyman 1995) California sea lion bones are present at Yaquina Head at this time, and by 3000 B.P. they are found in several sites along the Oregon coast at this time, including Whale Cove, Umpqua-Eden and Avenue Q at Sea Side.

Residents of early coastal villages would not have required extensive technologies to exploit the California sea lions on their breeding grounds, and would have arrived on the coast with technologies adequate to exploit nearshore rookeries, such as clubs and lances (Lyman 1991, Hildebrandt and Jones 1992). Based on ethnographic data and information about pinniped behavioral patterns during the breeding season, Lyman (1991: 190) writes:

> I believe that a complex technology, extensive cooperation among hunters and complex social organization were not prerequisites for taking most Oregon coast pinnipeds. Rather, only clubs, perhaps but not necessarily harpoons, and only one or two hunters working together could exploit a seal rookery effectively.

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[8] Remains of sites older than this would have been likely lost to erosion. (Erlandson *et al.* 1998, Moss 2002, personal communication.)

Hildebrandt and Jones (1992) and Porcasi *et al.* (2000) agree that the degree of technological advancement needed to exploit sea lion rookeries would have been small. Although no wooden clubs have been found in Oregon sites, whalebone clubs have been found, and California sea lion bones are present in the remains of Native American settlements on the Oregon coast (Lyman 1989). While the archeological data indicate that native people along what is now the Oregon coast were exploiting harbor seals and Steller sea lions more often than they were taking California sea lions, the remains of California sea lions have been found regularly in Native American middens (Lyman 1991). Asserting that sea lions were likely hunted extensively where ever breeding colonies existed, Porcasi *et al.* (2000:217) write, "California sea lions were pursued at every location where they hauled out on land."

Coastal sites in Oregon were occupied and sea lions continued to be hunted until European settlers arrived, but researchers (Lyman 1991, Hildebrandt and Jones 1992) have suggested that California sea lions had become less abundant on nearshore coastal sites since their initial human settlement. European explorers noted that sea lions were "taken with harpoons and clubbed while asleep or defending rookeries" (Lyman 1988: 248) to provide food and hides, but evidence indicates that in the centuries prior to European arrival, sea lions had become a smaller portion of the Native American diet in Oregon. After the early exploitation of California sea lions, a return to the exploitation of terrestrial resources and fish is evident, perhaps as "a response to overhunting of local pinniped populations" (Lyman 1991: 198), a hypothesis also supported by the "shifting

ratios of harpoon parts and arrow heads" (Lyman 1991: 198). Writing about California, Porcasi *et al.* (2000: 214-215) state:

> As other classes of prey became increasingly scarce relative to the survival needs of the human population, the one resource susceptible to technological intensification was fish. Whether or not they were hunted to near extinction, pinnipeds ... have natural population ceilings that limit the potential for humans to exploit them intensively.

Hildebrandt and Jones (1992) indicate that in Oregon, as sea lions were hunted on their breeding grounds they became less accessible, perhaps resulting in a similar resource switch. "[T]housands of years of primarily mainland-based prehistoric human predation eliminated mainland breeding colonies, and restricted them to islands, offshore rocks, and more remote mainland locations" (Hildebrandt and Jones 1992: 363), making hunting more difficult and less efficient.[9]

The degree to which Native American hunters pursued sea lions at offshore locations is not clear. Hildebrandt and Jones (1992) suggest that maritime weaponry and watercraft could have been utilized in order to exploit offshore breeding sites, but the high cost (e.g., time, equipment) associated with offshore hunting would have made this type of exploitation less extensive. Early European explorers noted that dugout canoes with the capacity for 28 to 30 people were employed, but no evidence of canoes exists in the Oregon archeological sites (Lyman 1988, Lyman and Ross 1988). Lyman (1989: 86) points out that in Oregon, few offshore (>0.5 km) rocks or islands are present, "except in

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9 It is important to note that very little evidence exists about the behavior and distribution of California sea lions prior to European settlement, so theories about the response of sea lions to human hunting are largely speculative.

the southern portion of that coast, south of the Blanco Reef." Therefore, in Oregon, "it seems doubtful any distant offshore hunting took place" (Lyman 1989: 86).

While the sea lions could have been pushed to less accessible areas due to hunting activity, the actual impact on their populations is not evident. Lyman (1988: 260) writes that prehistoric exploitation of these sea lions may have actually "enhanced individual survival probabilities by reducing inter- and intra-specific competition." While Porcasi *et al.* (2000) argue that the evidence does not support this aboriginal resource management theory, most researchers agree that hunting by Native Americans did not have a major effect on pinniped populations in comparison to hunting by Europeans.

When European hunters began exploiting sea lions on the West Coast of North American, sea lions had already been exploited for thousands of years. Porcasi *et al.* (2000: 217) write, "The same animals that gave birth on San Clemente Island and avoided pursuit there were subsequently hunted by other native peoples on other islands or the mainland." In Oregon, these species were exploited on nearshore rookeries, and could have been pushed to the few offshore breeding sites that existed, but the most dramatic effect did not come until the European hunters arrive. Lyman (1988: 260-261) writes:

> The most parsimonious explanation of early historic abandonment of the Oregon coast by these taxa involves significant decimation of both local and migrant populations caused by 19th century commercial exploitation. Resident population of those taxa present in Oregon in relatively small numbers (California sea lions and northern fur seals) prehistorically were locally extirpated.

Hildebrandt and Jones (1992: 362) agree, stating that after native hunters exploited the most easily accessible rookeries, "[a]quatically based historic sealers then ravaged those locations that had previously provided partial refuge from aboriginal hunters."

European Exploitation

Commercial exploitation of California sea lions by European settlers was extensive and dramatically reduced sea lion populations. Breeding female sea lions, pups and adult males were hunted from the early 1800s to the 1920s for oil, skins, whiskers, "trimmings," (testes and penises of breeding bulls) and for use in dog food. Hunters were known to eliminate entire rookeries in single-day hunting expeditions, dramatically reducing the size of populations and the distribution of rookeries. By the early 1900s, state laws were in place to protect the sea lions from hunting in California, but fishers were permitted to kill sea lions interfering with their operations, and bounty programs existed in Oregon and Washington. In 1972, the Marine Mammal Protection Act shifted the management from the state to the federal level, and except for the six-year period from 1988 to 1994, fishers were no longer allowed to kill sea lions with which they were competing for the fish resource. Conflicts between fishers and pinnipeds were officially reported as early as the 1899, and continue to the present day as populations levels of sea lions increase and many fish stock dwindle. The remainder of this chapter will examine the effect of human actions on sea lions since European settlement and the development of the modern conflict.

In the early to mid-1800s, Russian and Aleutian fur hunters killed sea lions while hunting sea otters and fur seals in California. Because "[t]heir thick, coarse-grained skins were not considered worth preparing for market" (Scammon 1874: 135), California sea lions were not a target species for commercial fur hunters. Instead they supplied meat, oil, and clothing for hunters while they were in California (Ogden 1933). The Farallon Islands became a permanent base for Russian sea-lion hunters and sealers in 1812 and remained so for two decades (Ogden 1933). Ogden (1933: 229-230) writes,

> From six to thirty Aleuts and several Russians continuously occupied those lonely rocks. ...The sea lions on that rocky outpost supplied the Aleutian Indians hunting along the California coast with the meat, blubber, and oil so essential to their diet. Every year from 100-200 puds (3,600-7,200 pounds) of sea lion meat were salted down in barrels and boxes.

Sea lion skins and intestines were also used to make bidarkas (hunting kayaks) and waterproof clothing for the fur hunters, and the meat and oil was exchanged for food, wood, water, and kegs with traders from Bodega Bay (Ogden 1933). Scammon (1874: 137) details the many uses of sea lions by Aleutians in California.

> Their hides are...stretched on frames to dry, and eventually become the covering for Aleutian *baidarkas* and *baidarras*. The fat is taken off and used for fuel, or the oil is rendered to burn in their lamps. The flesh is cut in thin pieces from the carcass, laid in the open air to dry, and becomes a choice article of food. The sinews are extracted, and afterward twisted into thread. The lining of the animal's throat is put through a coarse of tanning, and then made into boots, the soles of which are the under covering of the Sea Lion's fin-like feet. The intestines are carefully taken out, cleaned, blown up, stretched to dry, then tanned and worked into water-proof clothing. The stomach is emptied of its contents, turned inside out, then inflated and dried for oil bottles, or it is used as a receptacle for the preserved meat; and what remains of the once formidable and curious animal is only a mutilated skeleton.

The Russian and Aleutian fur hunters remained in California until 1841. By this time, the sea otter populations had become depleted and it was no longer profitable to hunt them for fur (Fort Ross State Park 2001). While nearly thirty years of Russian and Aleutian subsistence hunting of sea lions resulted in the consumption of 104,400 to 208,800 pounds of sea lion meat, the actual numbers of sea lions taken and the subsequent impact on the population would have depended on the sex and age ratio of the animals hunted. Although this information is not known, it is likely that this impact was less than the commercial exploitation of sea lions by European hunters that began twenty years later.

California sea lions became a target species of fur hunters in the 1860s and 1870s, when they "replaced elephant seals as major sources of industrial oil when elephant seals became scarce in 1860" (Jones and Hildebrandt 1995: 89). Scammon (1874: 135) writes:

> A few years ago great numbers of Sea Lions were taken along the coast of Upper and Lower California, and thousands of barrels of oil obtained. The number of seals slain exclusively for their oil would appear fabulous, when we realize the fact that it requires, on average, throughout the season, the blubber of three or four Sea Lions to produce a barrel of oil.

Cass (1985) estimates that between 3,000 and 40,000 animals would have been killed to supply quantities of oil in the order of 1,000 to 10,000 barrels. In the 1870s, the value of sea lion hides for glue stock[10] was realized, and the focus of the hunting shifted to follow the market (Scammon 1874). This industry was short lived, as prices dropped toward the end of the decade. Bonnot (1928b: 10-11) writes of sea lion exploitation in the 1860s and 1870s. "During the sixties they were commercially valuable and their numbers therefore

[10] Glue stock is defined as defined as "fleshings, hide cuttings and parings, tendons, [and] other collagenous parts of animal carcasses" (USDA 2001) and has been used in industrial products, such as paint (Petukhova and Bonadies 1993).

steadily decreased until the late seventies, when the products gained from them (oil and hides) were bringing such a low price that it was unprofitable to hunt them." The impact of commercial hunting for oil and hides occurred in a short period of time but was extensive, dropping off when both prices and populations receded in the late 1870s.

At the same time they were hunted for skins and oil, the whiskers and trimmings were harvested & sold in to markets in Asia. "[M]many bulls were slaughtered for their trimmings. These consist of the genitalia and gall bladder which were sold to the Chinese for the manufacture of an aphrodisiac" (Bureau of Marine Fisheries 1946: 19). As many as 62 sets are known to have been taken from one rookery in a single season in a trade that existed from 1860s until the1930s (Abbott 1939). Unstable political conditions in China led to a decrease this trade during the 1930s, and the industry eventually collapsed (Abbott 1939). As sea lion bulls were killed for the Asian trade, female sea lions were killed for scientific collections. While the overall significance of this hunting is likely minimal, it had some impact on the population, as it took place year round, and the death of a female sea lion during the breeding season would have resulted in the starvation of her pup as well (Bonnot 1931).

The most recent commercial exploitation of sea lions took place in the early 1900s and consisted of hunting for the use in pet food. "Sea lions in former years have also experienced heavy exploitation for their hides and blubber, and as dog food" (Bureau of Marine Fisheries 1946: 19). The demand for canned dog and cat food increased from a few thousand to several million cases each year during the late 1920s and 1930s, resulting in the increased hunting of sea lions (Abbott 1939). In 1937, the canned dog

food industry was valued at $5,000,000, one of the largest sources of income to the "tin plate industry" (Abbott 1939: 268). Although sea lions were protected in southern California after the turn of the century, Abbott (1939: 266) explains:

> It was said that the promoters were working under a concession from the Mexican government and were employing modern whaling methods in the use of these vessels: a refrigeration-equipped 'killer' ship, a factory ship, and tender. In its processed and unidentifiable form, the meat could be landed in California, where sea lions are protected by law.

Cass (1985) attempted to quantify the extent of sea lion hunting for the pet food industry, but few records exist. Fragmented records of correspondences between the formerly cited Clinton Abbot, the director of the San Diego Museum of Natural History, and others indicate that the boats that were operating were killing 180 sea lions per day (Cass 1985).

Effect on Populations

The "commercial exploitation of marine mammals had major effects on the zoogeography and demography of those taxa" (Lyman 1988: 247). Exploitation during the 1860s and 1870s is considered to be the most extensive and destructive, dramatically reducing the size and distribution of the population. "By the 1870s, the sea lion population was severely depleted and was no longer considered to be a viable source of oil, although some animals were hunted for their hides" (Jones and Hildebrandt 1995: 89). Scammon (1874: 139) writes of the California harvest, "those on our California shores will soon be exterminated by the deadly shot of the rifle, or driven away to less accessible haunts." Writing nearly fifty years later, Starks (1921: 250) agrees. "The most

accessible rookeries rapidly grew smaller from year to year, and at last completely ceased to exist as rookeries." Sea lions [11] were reported to have been "extremely numerous" along the California coast before 1860 and abundant as far north as San Francisco (Bonnot 1928: 7). By the 1920s, the populations were depleted and rare north of Point Carmel (Bonnot 1928b). Similarly, Bonnot writes in 1928 that sea lions were "rare north of Point Piedras Blancas, in San Luis Obispo County" (Bonnot 1928: 3) and mainland rookeries were nearly absent. Bonnot (1928) indicates that 20 rookeries existed in California, and only two of these were mainland sites, both in inaccessible locations.

Despite their depleted numbers, reports that sea lion populations were rebounding came as early as the 1920s. According to Starks (1921: 250),

> The sea lion rookery (breeding place) of Ano Nuevo Island seems to be increasing in size, or perhaps it would be better to say, regaining its former size. Whether this is a local or general increase in number of the sea lions, I have no means of knowing at this time. Neither do I know whether or not this indicates a temporary condition of the rookery, a maximum number, perhaps, of a fluctuation that may have taken place at periods for years without having been commented upon.

By the 1940s, nearly twenty years of census data existed, and biologists were able to quantify the population increases of sea lions, which seemed to be steadily rising in response to a reduction in hunting. The Bureau of Marine Fisheries, California Division of Fish and Game reported an increase in numbers of sea lions from about 1,450 to 7,338 between 1927 and 1946, and "by 1946 the count of 7,338 was well above that of any previous year" (Bureau of Marine Fisheries 1946: 21). California sea lions seemed to be

[11] This observation, like many early observations, did not distinguish between Steller and California sea lions.

increasing gradually "over a period of 10 or more years" (Bureau of Marine Fisheries 1946: 21) and by 1946, populations had extended northward to Point Reyes (Bureau of Marine Fisheries 1946).[12]

Culling, Protection, & the Evolution of the Fisheries Conflict

Until the Marine Mammal Protection Act was passed in 1972, individual states bore the responsibility for managing sea lions. California, Oregon, and Washington each managed sea lions differently, and in ways that reflected the different values that marine mammals and fish represented in each state. While Oregon and Washington supported bounty programs to reduce population levels of sea lions, California began engaging in a debate over the positive value of sea lions as early as the end of the nineteenth century. To the dismay of fishermen, protections against sea lion hunting were legislated at the beginning of the twentieth century in certain districts. Although fishermen could legally kill sea lions interfering with their operations in all states until 1972, natural history societies argued for the non-consumptive value of sea lions, and hunting was prohibited in certain areas. The debate about sea lions and fisheries in California closely resembled that surrounding the modern conflict, indicating that the contemporary discussion is not unique to our time.

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[12] Early California Fish and Game surveys did not distinguish between sea lions counted on rookeries or hauling grounds, so it is not clear whether these animals were breeding or migratory.

In contrast to California, Oregon, Washington, and British Columbia sponsored bounty programs to cull sea lions to mitigate their effects on fisheries. As hunting in the late nineteenth century greatly reduced the number of sea lions and restricted their range, the vast majority of sea lions hunted in Oregon were Steller sea lions rather than California sea lions. Although the subject of this thesis is California sea lions, a brief analysis of the treatment of Steller sea lions in Oregon is warranted as a means of indicating the history of thought on the management of sea lions within the state.

Beginning in the early 1900s, state-financed bounty programs in Washington and Oregon selectively killed large numbers of seals and sea lions to minimize impacts on commercially important fish species (Pearson and Verts 1970, Newby 1973). Henry (1993) reported that in 1909, the Oregon State Legislature approved $1000 for seal and sea lion control, which resulted in the killing of 670 sea lions in that year (ODFW 2000). A more intensive bounty program was implemented between 1925 and 1933 (Pearson and Verts 1970). This program was supported by a special fund raised by "imposing a graduated tax on the various classes of fishing gear" (Scheffer 1928: 12) and payments ranged from $0.50 to $7.50. Pearson and Verts (1970) reported that bounties on individual sea lions were $0.50 in 1926, 1929, 1930 and 1931, $5.00 in 1925, and $7.50 in 1927 and 1928. In 1925, bounties were paid on approximately 1400 sea lions and just under 4000 were reported in the period of 1925 to 1931 (Pearson and Verts 1970). It is likely that many more were killed than were reported to the state bounty program, as sea lions shot in the water are likely to sink (Welter 2001, personal communication). Although the bounty program did not continue past the 1930s (NMFS 1997), and sea

lions had even achieved some degree of state protection by 1970 [13], they continued to be killed where ever they hauled out (Pearson and Verts 1970). Pearson and Verts (1970: 4) "received numerous reports from diverse sources" that colonies, even within protected areas, were subjected to "extensive harassment and that many individuals were killed each year," and fishers remember when the state of Oregon subsidized this killing by providing bullets (Welter 2001, personal communication).The exact numbers of sea lions killed are unknown, but the both the official and unofficial culling programs were apparently successful in controlling pinniped populations (NMFS 1997).

The bounty program of the 1920s and 1930s was widely applauded by the fishing industry, but drew criticism from some researchers. In an article entitled "Precarious status of the seal and sea lion on our Northwest coast," Sheffer (1928: 10) points to the fact that sea lions had become scapegoats for the decline of salmon in the Northwest.

> It is conceded that salmon fishing in the northwest is not what it once was. But we have considered that the very existence of the 'silver hordes' is being jeopardized (1) by irrigation interests at the headwaters of the spawning streams; (2) by hydro-electric structures in the courses of these same streams; (3) by lumbering operations that pollute the rivers and reduce their flow at certain critical seasons; (4) by natural enemies at the entrances to these streams from the sea; and (5) by the prodigal wastefulness of the fishing industry...In this final consideration it appears that the seal and sea lion have fared ill, as being the most convenient scapegoats.

In his study assessing the state of sea lion in the Pacific Northwest, Sheffer (1928: 16) writes, "It may be readily foreseen that complete destruction of the seal and sea lion

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[13] In 1970, sea lions were protected by the state of Oregon, "except in designated areas in and around the mouth of the Coos Bay, Elk River, Nehalem Bay, Netarts Bay, Rogue River, Sixes River, Tenmile Creek, Tillamook Bay, and Umpqua River" (Pearson and Verts 1970: 4).

colonies on our northwest coast…will be accomplished in a few more years if present policies are pursued."

Although this protest against culling pinnipeds was registered, hunting continued, and the focus of the debate in Oregon in the early 1900s centered not on the protection of sea lions, but rather on rebuilding an industry to utilize the oil and hides of the sea lions that were culled. While hunting of California sea lions was greatly reduced after the 1870s, the infrastructure for a small industry remained in Oregon and Washington, and supporters of sea lion culling also championed reinstating a viable extraction industry. Townsend (1918: 33) printed an excerpt from Mr. Roderick L. MacLeay of Portland, Oregon to Mr. Madison Grant of the New York Zoological Society outlining some of the existing uses of sea lions.

> I have caused men to be equipped with boats, weapons, and facilities to destroy the sea lions on the Rogue River Reef, about six miles from our cannery, and every year we kill many hundreds of them. We save the hides and render the fat into oil, and sometimes sell the whiskers to Chinamen. One of our large barns on our ranch, is 200ft long and about 60ft wide, and is painted, entirely, with paint made from sea lion oil. We sell the hides to a firm in Seattle, the average price being 8 [cents] per pound. The hides of the pups are worth about 12 [cents] a pound...For many years the cannery men have employed parties to kill sea lions. I, myself, have shot a great many…It is really good sport to hunt these animals.

Townsend (1918: 33) goes as far as to advocate the establishment of a sea lion fishery for conservation reasons. "When the sea lion becomes the basis of a fishery, in which the leather, oil, and guano trades are interested, its conservation will be considered for commercial reasons." Starks (1921: 252) reverses this argument, writing that sea lions should be conserved because of their potential for future exploitation. "…it may develop

in time that they have as much value as may other products of the fisheries." Whether the motives were commercial or conservation oriented, at the beginning of the 1900s in Oregon, the debate about sea lions centered on their impact on fisheries and the potential to rebuild an industry focused on their consumptive value.

While sea lions were harvested and subjected to bounty programs in Oregon, California was engaging in a debate over the various values of sea lions. Fry (1939: 245) writes, "Sea lions are....a major source of friction between fishermen who insist that the creatures should be exterminated, and groups of nature lovers who object violently every time anyone shoots of suggests shooting them." In 1909, natural history societies sponsored bill for protection in Southern California. The bill (section 637c of the Penal Code) was passed "forbidding the killing, maiming, of capturing of sea lions in the waters of the Santa Barbara Channel and on land adjacent thereto, or in fish and game district nineteen" (Bonnot 1928b: 14). In response to this legislation, the fishing industry attempted to pass a second bill in 1927 repealing the 1909 protection, but this proposed bill, as well as one other, was withdrawn. A third bill, passed in 1927, more clearly defined the area of sea lion protection and enlarged it to include Catalina Island (Bonnot 1928b).

Arguments for the protection of sea lions in the early 1900s are similar to those surrounding today's conflict. In 1939, Clinton Abbott, the president of the San Diego Natural History Society, outlined eleven reasons for protecting sea lions in California, ranging from ethical considerations to their benefit to the tourism industry.

> Living seals and sea lions are considered a tourist attraction on our coast, as will be readily testified by visitors, hotel keepers, and resort owners.

> People who derive enjoyment from the sight of sea lions basking on the rocks of lolling in rafts with flippers up, amid the kelp, for out number those who are interested in fishing (Abbott 1939: 268).

Abbott further points out the degradation to beaches that occurs when the "bloated carcass of a dead sea lion" washes on shore, as well as humanitarian reasons for protection of "any inoffensive animal, particularly in its breeding season" (Abbott 1939: 268-269). Finally, he points out the high level of intelligence that sea lions possess, as demonstrated by its use in "the 'trained seal' acts of circus and stage" (Abbott 1939: 269). Scheffer (1928) agrees with these arguments and adds to this list of non-consumptive benefits "scientific interest" and "the sentimental advantages of having seals and sea lions in the sea-scapes, where nature originally placed them" (Scheffer 1928: 11). Along with the potential to redevelop an industry based on sea lion hunting, Starks (1921: 252) writes of the sentimental reasons for conserving sea lions, as well as the fact that "[t]here is an intricate balance maintained between animals that seldom can be disturbed with impunity." In summary of the position of natural history societies, Abbot (1939: 265) writes, "For years sea lions have been subjected to relentless warfare by the fishing industry." The fact that a significant portion of the public in southern California found this practice offensive is evidenced by the local legislation for sea lion protection.

While some authors focused on the positive values associated with sea lion protection, fishermen and others involved with the fishing industry pointed to their negative impact to fisheries. Complaints against sea lions were registered as early as 1899 (Bonnot 1928b), as fishermen struggled to keep sea lions out of their gear and away from the fish. In 1899 a request to kill sea lions hauled out on federal lighthouse reservations

was granted, but was revoked before the culling could be carried out. After protection was granted to sea lions in southern California in 1909, complaints increased. Bonnot (1928b: 8) explains, "The fishing industries, in their complaints, set forth as their grievances that the seals and sea lions are very numerous; that they are on the increase, and that they take enormous quantities of fish and cause considerable damage to gear." The California Division of Fish and Game (1946: 20) reported requests to "reduce the size of the herds" by several different types of fishermen. They summarize the scope of the complaints in their 1946 California sea lion census:

> Purse seine fishermen find at times that the sea lions will frighten a school of fish before it can be surrounded by the net, or the sea lion will be caught in the circle with the fish, resulting in net damage. Set line and gill net fishermen find that a sea lion may take one bite out of a each fish caught in the gear, thus damaging many fish, although the amount eaten by the sea lion is small. Mackerel scoop fishermen frequently get a school of fish chummed up ready for dipping when a sea lion comes along and frightens the fish away (Bureau of Marine Fisheries 1946: 19).

These complaints are similar to those of modern fishermen regarding the overabundance and subsequent impact of sea lions on fisheries.

While arguments for and against sea lion protection raged in the early 1900s, the California Division of Fish and Game pointed out that both sets of arguments were inherently value based, and that the actually effect of sea lions on fisheries could not be extracted from the debate.

> The amount of harm done to the fish population by the sea lions is a moot question. People who are interested in these animals from an esthetic point of view claim that they eat almost no fish, and are harmless. Fishermen, on the other hand, claim that the sea lions eat enough fish to endanger the supply. The truth probably lies at some midpoint between these two extremes. Certainly sea lions eat some fish, but not enough to menace the

> marine fish off the California coast. They do, however, seriously interfere with fishing activities. (Bureau of Marine Fisheries 1946: 19)

In attempts to quantify the impact of sea lions on fisheries and fish populations, several biological studies were conducted, including those that examined the stomach contents of California sea lions. Merriam (1902) used stomach content analyses to argue that sea lions eat mostly squid, and therefore do not impact most fish populations. Jones (1981: 409) writes, "Marine biologists in California have questioned the impact of marine mammals on fisheries for at least the past 100 years." Like the 1901 study, most continued to find that as opportunistic predators, sea lions have minimal impacts on individual fish populations.

Nonetheless, culling continued to be considered in California and recommendations for the control of pinnipeds in California gained the support of many prominent biologists (Jones 1981). In 1929, a recommendation was made to cull sea lions along the California coast "based on biological information. Because sea lions and seals are polygamous, it was felt that 10 percent of the excess males could be killed, but for economic reasons, the cropping was not carried out" (Jones 1981: 411). Although culling never became official policy, the California Fish and Game Commission reserved the right to reduce the population (Jones 1981). In 1946, the California Department of Fish and Game issued two permits for private commercial exploitation of sea lions, each resulting in the deaths of 100 animals (Bureau of Marine Fisheries 1946).

In 1972, the Marine Mammal Protection Act was passed, bringing the entire California sea lion population under one management regime. Because sea lions are migratory animals whose range encompasses the entire West Coast, a consistent federal

management program makes more biological sense, but social difficulty results from implementing such a program when states approached sea lion management differently prior to 1972. Although it shares many characteristics with the current conflict in California, the modern debate over sea lion predation in Oregon is unique, both because Oregon has a history of actively culling sea lions and because California sea lions have been absent from Oregon in recent history.

Each individual or generation assesses the modern world against their own earliest memories, resulting in a shifting baseline, or an ever-changing idea of what constitutes "normal." The expansion of sea lions into formerly uninhabited areas triggers certain responses by those affected by the sea lions, especially if their memories encompass times when populations were lower. Residents of the Oregon coast who can remember a time in which sea lions were less abundant and could be hunted will view the current situation as compared with these memories. The final chapter will examine some of the perspectives on California sea lions in Oregon, taking into consideration the history of the populations and development of the debate in Oregon.

CHAPTER IV

PERSPECTIVES ON PREDATION

Natural resources conflicts cannot be understood except as an intersection of the ecology, the law, the social values, and the history of the issue in question. Previous chapters have summarized the current state of understanding of these elements with regard to the sea lion/salmon conflict in Oregon. This, the final chapter, will use results from interviews with stakeholders to analyze the fundamental roots of the conflict. I consider cultural views on biology, law, and history and outline similarities and differences among major stakeholder groups, focusing on fishers and environmentalists. I argue that although the conflict is grounded in the biological interaction of sea lions and salmon, the true debate has nothing to do with ecology. Instead, it revolves around different views of history and management, and is fundamentally based in a struggle for power, as well as incompatible views of the ideal relationship between humans and the natural environment.

Methods

I conducted in-depth interviews with members of stakeholder groups in Oregon from October to December 2001. The targeted groups were commercial fishers, recreational fishers, environmental activists, animal rights activists, fisheries managers, marine mammal managers, fisheries biologists, and marine mammal biologists. Interview subjects were identified and selected to provide a representative view of stakeholders and the range of perspectives on the conflict in Oregon. My goal was to interview subjects with a wide range of perspectives so as to be able to provide insights into fundamental differences and similarities between groups.

I identified subjects primarily in Oregon because I wanted to focus on the issue on a local level. All of the interviews with fishers were conducted on the southern coast of Oregon, between Brookings and Winchester Bay. Specifically, I interviewed salmon trollers, charter boat operators, and recreational fishers in Brookings, Gold Beach, Charleston, and Winchester Bay. I interviewed state fisheries biologists, fisheries managers, and marine mammal biologists in Charleston, Newport, Corvallis, and Portland. Because of the federal management of marine mammals and centralized organization of many non-profit organizations, I had to conduct interviews with marine mammal managers and environmental and animal rights activists in northern California and Washington. I conducted in-person interviews with a total of 25 subjects. Interviews ranged in length from twenty to ninety minutes.

Interview questions were largely open-ended, focusing on perceptions of the impact of sea lions on salmon, opinions about current management, values of sea lions and salmon, and the proper relationship between humans and wildlife. (For a complete list of questions, see Appendix A.) Questions were designed to gauge the subject's familiarity and professional involvement with the issue, to record their opinions about sea lion predation and its management, and finally, to determine what the fundamental bases for these opinions were. I asked questions such as "What do you believe the proper relationship between humans and nature should be?" and "What are the humans uses and values of sea lions and salmon?" in order to establish the values associated with the opinions expressed. I recorded and transcribed all interviews.

Qualitative analysis of interview data revealed particular relationships existed between the different stakeholder groups. Although the focus of environmental and animal rights advocacy groups differs, representatives of these two groups had similar views on most aspects of the sea lion/salmon issue. For this reason, I group them together in my discussion. Unless otherwise noted, "environmentalist" refers to both environmental and animal rights advocates. Recreational fishers range from retired commercial fishers to vacationing urbanites; many recreational fishers were new to the area and unfamiliar with the issue. Because the category of recreational fisher lacked a critical defining element it proved to be sufficiently broad so as to be practically useless. Therefore, I discarded most of the data obtained from interviews with this stakeholder group and instead focus primarily on commercial fishers (trollers and those who operate

commercial charter fishing boats). Unless otherwise noted "fishers" refers to these commercial fishers.

While managers and biologist held interesting and varied opinions about the sea lion/salmon conflict, many of these subjects were less forthcoming with personal opinions than members of other groups. Individual managers often interact regularly with members of the various publics, including environmentalists and fishers, and are often charged with balancing the desires of disparate groups. For this reason, interviews with managers proved enlightening and I draw on them extensively. However, the conflict fundamentally revolves around disparate views on subjects that are best exemplified by representatives of the fishing industry and environmental organizations. Therefore, I focus on these two groups in my analysis.

Views of Biology

There is little disagreement among stakeholders about the interactions of sea lions and salmon. Fishers, environmentalists, biologists, and managers all agreed that sea lion predation is not the ultimate cause for declines in fish stocks, that the issue is more economic than ecological, that sea lions are important components of the marine system, and that the intelligence of sea lions allows them to exploit fish.

Perhaps surprisingly, and in contrast to previous research (Smith *et al.* 1997), all groups, including fishers, agreed that sea lions do not have a major impact on salmon

populations.[14] Although most fishers expressed frustration at losing fish and income to sea lions, they agreed that sea lion predation had more economic consequences than ecological. Most fishers agreed that while sea lion predation affected their operations and reduced their profits, they did not impact the salmon populations in any significant way. Expressing his frustration, Buck Adams,[15] a commercial fisher in Charleston, Oregon said, "If they get a big fish that's worth like $100, that can be upsetting....Yeah it can be really frustrating trying to get the fish sometimes if you've got a sea lion on you." Larry Jones, another Charleston fisher described the frustration at trying to troll for salmon troll in the presence of sea lions.

> [Salmon trollers] have paid for years. We're the only ones that have paid. Everyone else has this warm heart from knowing they're out there. And nobody else is suffering from sea lions' existence... Demoralizing... I've hit it every year that I've salmon trolled... Pretty soon they had filled in that whole coast with themselves and at that point it was hardly worth fishing. If you can stand to watch half of your fish go into the belly of a sea lion, fine. But I couldn't take it.

Although fishers described irritation and anger at sea lions, they questioned the actual impact on salmon populations. Some fishers, including Buck Adams, pointed to the belief that sea lions are not fast enough swimmers to catch salmon without the help of fishing boats. "So do sea lions impact the salmon populations? If the only ones they get are the ones that we've caught, and if we're catching them, then they're already caught, so maybe it's no." John Watts, a fisher from Brookings, Oregon said, "The problem is

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[14] Differences in techniques used in this research and that of Smith *et al.* likely account for much of the difference in results. While the 1997 study used a written survey to measure opinions, this research used an open ended in-person survey that allowed participants to qualify and explain their responses.

[15] Because several subjects indicated that they preferred not to have their identities revealed, all names in this chapter are pseudonyms.

interference with the fishery not impact on the populations. They learn to take the fish off the line." Although many fishers felt that they should have the ability to shoot sea lions that interfered with their operations, all groups agreed that the issue was one of sea lions competing with fishers for fish rather than endangering fish populations. Phillip Nearing, a commercial fisher from Charleston summed it up by saying, "I don't believe that marine mammals are a major impact. I don't think we need an open season on marine mammals."

Members of other groups agreed that the impact of sea lions on salmon was not significant. Daniel Ericson, a biologist in northern California pointed out that the high visibility of the feeding causes the predation to be overestimated within the general public.

> Sea lions are very visible when they're eating adult salmonids, flinging them around and all the birds come over and all that. People are seeing these fish being eaten every couple of minutes, so it's very visible.

Although the predation is easily observed, he did not think that it is significant. Environmentalists such as David Williams of the Audubon Society echoed this sentiment. "You see them eating them, you see it happening but I don't really consider it retarding recovery or preventing recovery, or causing decline. They're distractions... nature's going to find a way to key in on free food, free space, access to food." Others pointed out the fact that the issue is more one of competition for fish rather than impact on fish stocks. Rachel Rodgers of the Humane Society said:

> [T]hey've got their marinas, and they've got their boats and they've got their charter fishing ventures, and they've got their commercial fishing boats, and they've got their livelihoods, and they don't like sharing space with these extremely intelligent, extremely aggravating creatures who

> laugh at you ...It's competition. Competition for space, competition for fish.

None of the fishers interviewed took exception with the suggestion that the issue was one of economic burden and competition for the fish resource rather than an impact on salmon populations.

Similarly, all groups agreed that sea lions have a place in the natural system. The Humane Society's Rachel Rodgers said simply, "They belong there." Although frustrated with their feeding practices, fishers agreed. Buck Adams said, "And it's their ocean too. I mean it's more their ocean than it is mine. They're part of the deal ... They just like to eat salmon." Although he felt that he would be personally better off without sea lions in the picture, Larry Jones agreed that they play a role in the marine environment. "We could do just fine without California sea lions. ...It's impossible for me to say the uses for marine mammals. They have a function in the ocean."

All groups also agreed that sea lions are intelligent animals that have the ability to exploit an obvious feeding opportunity presented by humans. Larry Jones compared the intelligence of the sea lions to that of dogs, pointing to their ability to recognize different fishing boats and remember which of these presented the easiest feeding opportunities.

> Okay, my dog is like a sea lion in the brain, I think, and she can recognize my friends' boats at sea, like if they get within a half a mile, she can spot them. And she points and barks and stuff. And she doesn't always do that with another boat. Strange boats she barks a different bark. Friends' boats, she wags her tail at. So that's telling me, that if a sea lion is as smart as a dog, that he recognizes this boat from that boat over there. And if I've been shooting at him all day and that

> other guy hasn't, he's probably going to leave me alone and go bother the guy that doesn't shoot.[16] They've got to be that smart.

Christine Duncan a charter fisher in Charleston, said, "I mean you've got to give them credit. They're bright enough to know where to get a meal." Environmentalists agreed with statements about their intelligence. Rachel Rodgers questioned the frustration that many feel, indicating that it may be due to being outsmarted by sea lions. "Why are we always so angry when smart animals take advantage of absolutely stupid opportunities we offer them? We're so angry at them for figuring it out. We're so angry at them for being smart."

While all groups agreed that sea lions do not have a significant impact on salmon and are simply able to exploit human-generated feeding opportunities, environmentalists, biologists, and managers were more forceful than fishers in defending sea lions. Most pointed out that they have become scapegoats for human-related declines in fish stocks. David Williams said, "We created this opportunity and most of it is a result of us." Environmental lawyer Todd Schroeder delineated the causes for salmon declines.

> Some degree of overharvesting is always going to be a concern, but really the things that are degrading the habitat at this point are things that are affecting their spawning habitat. Any sort of barrier to migration, sedimentation in the river systems that can be caused by grazing along riparian areas. It can cause sedimentation and decreases in habitat areas also have problems from timber sales that can lead to erosion.

Further, he took exception with the using the word "impact" to describe predation.

> Calling it an impact somehow implies that there's something that they're doing that is inappropriate, or that it's changed over time. I think really the

[16] Jones brings up the subject of shooting at sea lions to deter them, which is an illegal but common practice.

> blame lies on us…We shouldn't be trying to force sea lions to somehow change their prey or killing them because they eat salmonids. I think that's an absurd way of walking around the true problem. The true problems are degradation of the terrestrial and riparian areas, the areas around watersheds that are causing the sedimentation, increased temperatures, etc.

No one interviewed pointed to mass culling sea lions as a means of restoring salmon, except as last ditch measures in certain situations. While some fishers did advocate selective culling—or "execution" as one fisher phrased it—they argued for it as a solution to an economic problem rather than an ecological one.

Members of all groups agreed that sea lion predation was not of ecological concern, as sea lions do not generally influence salmon populations significantly. Because there was little disagreement about the biology of the issue, clearly the conflict exists in another realm. Interview data suggest that the cause of the conflict has more to do with disparate views about the management and history of California sea lion populations.

The Human Role in the Marine Enviroment

Although members of all groups agreed on the biology of the issue, they differed with respect to the legal and management aspects of the conflict. Specifically they disagreed about the role management should play and what the goals of environmental regulation are. These disagreements are grounded in incompatible views of the effects of humans on the marine environment and the proper relationship between humans and the

natural environment, culminating in a struggle for power between fishers and environmentalists.

Two basic differences exist in the ways that environmentalists and fishers view the human relationship to nature. My interviews suggested that environmentalists see humans as able to drastically alter natural systems, while fishers do not, and environmentalist see the ideal role of humans as separate from the marine environment while fishers see humans as a natural part of this system. These fundamental differences shape the ways in which members of each group view the environmental legislation and management. I will explore each of these views of humans and the environment and then indicate links to the law and management.

The perception of the human ability to alter natural systems was perhaps the most consistent and divisive issue separating environmentalists and fishers. While it is perhaps obvious that environmentalism is based on the belief that destructive human actions should be minimized, it is worth noting that environmentalism operates under the fundamental assumption that humans have significant and unprecedented impacts on the natural environment. Environmental lawyer Todd Schroeder stated:

> I think our influences are so overwhelming and from a variety of sources on natural populations forcing them into extinction that we have to presume when we see species going extinct, that it's not because of some natural phenomenon. That it's caused by some anthropogenic effect. And when we see that, we have to take action to ensure that they aren't forced into extinction.

This belief in the pervasive influence of humans is augmented by a notion of the potential for irreversible loss if human impacts are not controlled. David Williams of the Audubon Society said:

> And I think that society has the potential, if we're not careful, to lose these things and not even be aware of this loss. We would still go on. And we could go on on the landscape with no eagles, no orcas, no gray whales, no salmon, sure with crows and starlings. But what kind of life would that be? Concrete, parking lots, starlings and crows. Yeah, it's possible, we could still live. And of course we would have this huge void in our spirit and ecologically there'd be a huge void, but is it possible for us to go on? Yeah. But it's a choice that society has to make. ....We would just be more and more impoverished and not know why we're impoverished if they're not there.

The notion that this loss would be of a moral, spiritual, and ecological nature consistently found its way into conversations. Williams said, "The salmon's a keystone species and this whole web is wrapped around it," suggesting that human impacts on one element of the system will have unintended ecological consequences. Although environmentalists did not dispute the fact that sea lion populations are increasing, the potential for society to lose these animals came up as well. Speaking of the potential consequences of changing policy toward sea lions, Rachel Rodgers said, "Eventually they're going to have a turn of the century kind of situation where they're going to be severely reduced and potentially endangered." The idea of losses looming large on the horizon if impacts are not minimized provided the backdrop for conversations with members of environmental groups.

In contrast to the commonly held environmentalist view that human impacts on nature are pervasive and potentially irreversible, the most common view among fishers was that humans do not have a significant impact on the natural world, at least in terms of their influences on populations of marine animals. Harold Green, a charter fisher, said, "It's like taking a fly swatter to a huge bunch of flies. You might get a few but there's

more out there that you'll never get." Christine Duncan echoed this sentiment with the statement, "It's awfully big out there." John Watts, a commercial fisher, pointed to the minimal impacts of humans in relation to the bigger role of climatic events. "Man has very little control," he said.

Just as disagreements about the degree to which humans impact nature were apparent, a fundamental difference in the ways that fishers and environmentalists viewed the role that humans should play in the natural world emerged. While environmentalists advocated a relationship with nature based on respect and distance, fishers tended to believe that humans played a role in the natural system and should not be excluded from interacting with parts of the system.

Consistent with the opinion that humans detrimentally impact the natural environment, environmentalists, as well as a few managers, explained the ideal relationship of humans and the marine environment as one of separation. Speaking of the "natural" levels of sea lion populations, environmental activist Joel Manning, said, "Trying to understand what the levels where like in terms of nature—and I naturally want to think about things in terms of how they would be without people—that's an interesting question." Advocating a greater degree of separation between humans and wildlife, Terry Fulton, of the National Marine Fisheries Service, said:

> People have such a skewed view of what wildlife is all about. It's a tremendous problem. People much more today view wildlife as playthings rather than different species trying to make a living on the planet. ...Wildlife should be in the wild... And I think that's the ethic that we should have.... [Y]ou have to make space for a certain amount of wildlife, and once it leaves that space, then we can't allow that to happen. And you have to make a certain amount of space for people, and when they leave that space, that's not supposed to happen.

While this view also looked down on the idea that marine mammals should exist for entertainment, a view also disregarded by fishers, it also relegates humans and wildlife to different spaces. Consistent with this ideal of separation between humans and the wild animal populations, several environmentalists explained human exploitation of marine animals as unnecessary and unsustainable. Barry Harding of the Marine Mammal Center said, " For the most part, our food resources can be accomplished without going into wild populations." And Rachel Rodgers said, "Pretty much any wildlife exploitation at this point is probably not sustainable." These opinions are clearly incompatible with that of many fishers, who make a living interacting with and exploiting wildlife.

In contrast to the environmentalist view, fishers embraced the notion that humans are part of the marine system, both because of the basic need to consume resources and because of the notion that interaction with the system should be consistent and holistic. A common idea was that humans are part of the natural system and their interactions with sea lions are a natural check on their populations. Christine Duncan stated, "[M]an is a predator," demonstrating the view that humans do and should exploit marine resources. In her view, and in the view of most of the fishers interviewed, the human role in the marine system was no different than the role of any other top predator. The fact that people are excluded from interacting with one part of the system (sea lions) while still being allowed to fish, presented them with an inconsistency in logic. Duncan said, "You're protecting one thing, which, in the course of things, would either naturally expire, or a predator: man, would take care of it." The view that human interaction with the natural system should be holistic—that is, humans should interact with all elements of

the natural system—was reflected in many interviews. Speaking of the increases in California sea lion populations, Larry Jones said, "It's an unnatural growth that's occurred. …because man has been restrained from shooting them when they're bothering him." In this view, humans naturally "exert [their] influence on the world for [their] own benefit" similar to other species in the system, and the fact that they are kept from interacting with sea lions makes very little sense.

Environmentalists took exception to the idea that humans play a role in the natural system similar to other species. Todd Schroeder said:

> First of all to somehow say us not killing sea lions or managing them for their death is an artificial increase in the population is just an absurd comment. That presumes that our killing of sea lions is some sort of balancing act out in the ecosystem and I think that there's no evidence that that's the case.

In this perspective, it is illogical to think that humans have any role in the system that is not negative. As Rachel Rodgers said, "We are not necessary to this system."

The "Common Sense" View of Management and Law

> *All problems are a result of too much regulation and environmentalist brainwashing. We need to get back to the industry mindset. The industry will back off if there aren't enough fish. It's just common sense… Just let common people do common sense things, and it will all settle out.* —Harold Green, Charleston fisher

These differences in perception have important consequences on views of environmental law and management. Consistent with the beliefs that humans should not

be restricted from interacting with wildlife and that the human impacts are neither pervasive nor irreversible, many fishers had a negative view of the Marine Mammal Protection Act. Most saw it as unnecessary and overly restrictive, prohibiting their full interaction with the natural world and artificially inflating populations of sea lions. In contrast, environmentalists viewed legislation as necessary and important to control human impacts and maintain a distance between humans and the natural world. A struggle for power emerged, as both groups viewed the ultimate control in the hands of the other group.

The view of environmental legislation as overly restrictive and illogical was reflected in many of the interviews with fishers. "Common sense" was frequently pointed out as the opposite of government actions, as the government was seen as imposing laws that made little sense and that were constructed without foresight. John Watts said, "Every time Congress passes a law, they create outlaws," indicating that government actions made no sense to the people whose actions that they were aimed at regulating. He summarized the view of government as shortsighted and inflexible.

> The problem with the federal government is that they start a program, they don't have a plan for if it doesn't work. They just continue on hiring more researchers to look at it and pretty soon they've got a big hot air balloon. And they puff more and more air into it until it collapses.

Christine Duncan echoed this anti-regulation sentiment, "I think all the regulations go to extremes at times. And I think that sea lions and salmon are overprotected. But it's job security for some people. The management people."

Alongside the view that legislation is short-sighted job security, many fishers viewed the regulations as taking a very narrow approach, favoring one species at the expense of the whole system. Christine Duncan summarized the position that the protection of sea lions is an unbalanced policy that results in an unbalanced ecosystem.

> Sometimes they'll pick a population of some kind of creature and they'll let that overpopulate and it throws the whole system off. Whereas I think if you kept out of the whole thing it would manage itself a lot better.

Paul Harvey, a commercial fisher from Charleston, further explained this view that government action narrow in focuses on favored species, ignoring the needs of those affected by the policy.

> Natural resources policy is often pushed through by single-issue zealots who don't look at the big-picture consequences of their actions. Each person has their own "favorite species" and if the guy that wants sea lions protected gets to have his way without input from the guy who likes salmon, then the policy is going to be unbalanced. You need to bring in all the groups that are affected by an action, so the pendulum doesn't swing too far in one direction and there are well thought out plans in place.

Protecting sea lions while exploiting fish represents not only an inconsistency in logic, but also an imbalance of power. The apparent mistrust of government was backed up with a mistrust that the laws sufficiently represent their interests.

Many fishers viewed the government as unbalanced and unable to deal with issues as they arise, particularly with regards to managing sea lions. Larry Jones said:

> Keep your hand off the whole damn thing or… You can't because you're harvesting species out of the ocean and then others we're not. Like sea lions, we're not. If you're gonna extract, you've got to manage it at some point. It can't be a complete free for all. That's why we're in trouble right now. …We've been monkeying around with everything else. We can monkey around with them too.

The idea that "If you're gonna extract, you've got to manage it at some point" warrants further exploration. In this view, management means the ability to reduce pinniped populations, just as the population of fish are "managed" or reduced by fishing. Paul Harvey explains:

> If we're going to be stewards of the resource, that's what we've got to be. We can't just protect one species forever and not look at the consequences on other species. If you are going to protect the sea lions, you need to manage them. It's fine to protect them to allow the population to recuperate, but you need to have a second and third step after protection. You need to monitor their populations, and when they reach a level that isn't sustainable based on their impact on the other parts of the ecosystem, then you need to cull them. You need to maintain populations at a level that they're not having a negative impact. ... The MMPA was good for the endangered species, but it didn't take into consideration what happens after a species rebounds. It wasn't well thought through, and now we have to deal with the consequences. It's going to get much worse if nothing is done about it.

In this view, the government's inability to deal with the issue resides in the fact that consequences of the legislation were not fully thought through.

Although the anti-government, common sense management sentiment was prevolant, not all fishers shared this view. Indicating that he would rather see nature take its course than actively manage sea lions, fisher Phillip Nearing said:

> If we're going to have hands off management for California sea lions, hands off management means hands off management. You don't intrude on the populations. It's easy to say don't shoot them, but it's hard for people to watch them starve. But starving on the beach is part of their life history.

The idea of "hands off" is one that came up often during interviews, often in very different contexts. While it is clear that in the previous quote, "hands off" means that sea lions should be left alone, several fishers used the term to signify the opposite. One fisher

said, "We need a hands-off policy," meaning that regulations should be relaxed and "nature" (including humans) be allowed to find a more balanced state. Explaining this view, Christine Duncan said:

> I think if we got our hands out of it somewhat that nature would take care of itself... I think we need to leave wildlife alone a little more. And then take some personal responsibility.

In this perspective, keeping "our hands out of it" and "leaving wildlife alone a little more" means not trying to manipulate the natural system through environmental management. This view echoes fisher Harold Green's assertion that common people know best and should be able to care for the resource with simple common sense and personal responsibility.

Both fishers and environmentalists want to "leave wildlife alone a little more." While environmentalists want wildlife left alone in the sense that it should not be disturbed or impacted by humans, in the view of the fishers, "leaving wildlife alone" means imposing fewer restrictions and allowing people to exert their "natural" influence over their environment. This disagreement over the role of people in their environment—and the subsequent disagreement over the role and function of management—can be seen as a struggle for power between the two groups. In the environmentalist view, fishers have the ultimate control over nature, as fishing alters the composition of ecological communities in potentially irreversible ways. Because environmentalists see the power in the hands of fishers, they see the laws as necessary to keep people from impacting nature. As Barry Harding said, "there would be over-utilization from the commercial fishermen if there wasn't that regulation." In contrast, fishers see the power in the hands of the

environmentalists as the environmental regulations control their actions, which they believe are both natural and not significant. Instead, they see environmental laws as a way for outsiders to assert power over their lives. These views of management and what is "natural" are grounded in different views of history.

Views of History

> I said, "Look, I'm looking at the past. This is how it would have looked. It would have been like a park." If you take down the fences and let the animals loose, that would be the best of all… The way it is now isn't natural…. Nature's a balance. A vision of the past. —Joel Manning, environmental activist

Both environmentalists and fishers ground their beliefs about what goals of management should be in different views about people's natural place in the environment. These views are based in different ideas of history. Both groups see what existed in the past as natural and desirable, but rely on different time scales, different views on abundance, and different views on the roles that humans played. Both groups are nostalgic for a better time and believe that policy goals should reflect their own perceptions of history.

The most basic difference between fishers and environmentalists was the time scale that they used when talking about the past. Environmentalists pointed to a time scale of thousands or millions of years, based on scientific data, while fishers pointed to a shorter time scale, backed up by family and personal memories. John Watts, a long-time commercial fisher, had perhaps the longest personal memory. Speaking of the need to

back up and look at the big picture, he pointed to the El Niño events in the early 1980s and scientists' inability to address climactic events. "I can go out there and see what's happening in the ocean and I can see the rains coming…and I can predict what's going to happen better than any scientific model." Addressing his personal experience watching populations of California sea lions increase, Larry Jones said:

> Up until the first year or two of the 70s, it was common for groups to go out on killing sprees. Local people would go down around river mouths, Gold Beach, Klamath, Eureka, Brookings. Probably every river mouth on the coast people were doing it. Since they've been protected, [sea lions have] been increasing… It's like what we see here. When they reach the point where they're sprawled everywhere.

Like most of the fishers' perspectives this opinion was based on personal experience and observation of events over the past several decades.

In contrast, environmentalists pointed to a time scale that stretched beyond their own personal memory or that of their ancestors. Describing this time scale, Robert Bollins, a state biologist said, "You've got to step back and look at it. These systems have been in balance for many, many thousands of years." Environmentalist Joel Manning echoed this perspective, "See it doesn't work to point the finger at one piece of the web that's had a relationship for 2 million years. It's absurd, because it's magic." Rachel Rodgers pointed to the short time frame that fishers relied on. "Nobody who's currently alive remembers a time when there were historic levels of sea lions. Because they've been depressed since at least the turn of the century... So anybody who's alive today, their living memory is of a depressed sea lion population."

The role that humans should play is based on perceptions of our historic role. While fishers advocated more proactive management based on the belief that humans had a hand in controlling sea lions in the recent past, environmentalists pointed further back in time when humans had less of an impact on their environment. Rachel Rodgers said:

> We are very late entrants into this system. The "natural" system was when there were no people here. Or we could say the natural system persisted up until about the 18th century. What you had was a very small human population with very primitive hunting methods that had very minimal impact on the population. No way on God's green earth were the natives controlling populations of pinnipeds…We are not necessary to this system. The hunting that we used to do, that's not part of it.

Joel Manning echoed these sentiments, advocating a retreat into a less destructive role.

> It would be nice if we could retreat backwards into the role that we played, into the omnivorous station that we had a million years ago where we weren't so destructive... And it would be nice if we could limit our take of all species to some small fraction, and maintain populations at an abundance, which I think is perfectly possible. People can do all kinds of incredible things, just if they put their minds to it. And just strive to be back in that position where there's lots of everything… So I'd like a win-win attitude.

These views contrasted with those of fishers who pointed to the recent history of culling and other human control of sea lion populations.

Finally, views on abundance and history separated environmentalists and fishers. While environmentalists saw abundance as a desirable and achievable goal based on views of the past, fishers spoke of a current, undetected state of abundance. Speaking of the desired goal of universal abundance of marine animals, Joel Manning said, "I think that what you want to do is return to a state of abundance… Just increase everything, rather than try to get in there and decrease something." Barry Harding agreed. "So the

answer is not to decrease the number of marine mammals, but to increase the number of fish."

In contrast, fishers pointed to the belief that those who manage wildlife have no idea how abundant it actually is. Christine Duncan said:

> Actually I think there is not a shortage, it is just they count them at the wrong time of year. They find a way to find a shortage. A lot of times they're wrong about the fish and the sea lions. I think just generally the people that make the decisions find the numbers they want to find, versus the actual numbers that are there. If the bureaucrats say there's 10, there's probably 100. There's a lot more fish out there than the people who make the decisions say. And so I think that life goes on cycles. Just like there's warmer years and cooler years. There's certain wildlife that's more abundant. And I think a lot of times they're there. I don't think there's a big die off or anything. I think they've just found other places to go. We just don't know where they are.

The idea that wildlife is abundant but elusive is common among fishers. There is a "long standing contention by fishers that scientist' measures of abundance must be incorrect " (St. Martin 2001: 128-129). The fact that fishers spend their days on the water, while government managers and biologists spend more time in remote offices give support to their belief that they know the state of the wildlife better than those who hold control over its management. These views are further separated by disagreements over biological sampling methods. St. Martin (2001: 129) asserts that "different spatial languages of fish populations" exist and result in disagreements about management. Results from my interviews support the idea that fishers view scientifically and environmentally accepted abundance estimates as faulty. Therefore, to fishers, the environmentalist opinion that abundance existed at some time in the past, and should be a management goal, is illogical and based on misinformation about the current state of animal populations.

Both fishers and environmentalists have a vision for the future based on views of the past. For many fishers, environmental legislation is relatively new and many are nostalgic for an ability to interact with the natural world. In contrast, environmentalists would like to achieve a state of natural abundance with less human influence. For them, people are relatively new entrants to the system and should be managed so they have a minimal impact. This tension points to a fundamental difference in what fishers and environmentalists see as "natural."

Both groups want to protect their vision of the natural relationship between humans and the environment. Environmentalists see their role as protecting natural" ecological communities from people, specifically those who exploit and consume natural resources. This view is grounded in the notion that people have a significant impact on their environment and that wildlife should be kept in a separate sphere. In contrast, fishers do not see humans as having a major impact marine animal populations, and therefore see environmental legislation as unnaturally separating humans from nature. They want to protect their "natural" role in the system from regulation.

As long as the debate over the sea lion/salmon conflict remains one of the impacts of sea lions on salmon, it will stagnate. The true conflict revolves around different views of history and law, which are based on fundamentally different perspectives on the interactions of humans and nature. The result is a struggle for power revolving around—but not based on—sea lion predation on salmon.

Conclusion

My research set out to answer the following questions: 1) What are the historical and social roots of the sea lion/salmon conflict? 2) How are sea lions and salmon valued differently within different social groups and how do these values influence the conflict? and 3) What is the potential for resolution? I will conclude by summarizing my evidence in relation to topics discussed in Chapter One. The remainder of this chapter addresses the sea lion/salmon conflict in terms of the politics and science of overabundance, demographic differences in perspectives on the issue, and marine mammal/fisheries interactions.

The first chapter began by comparing the sea lion/salmon conflict in Oregon to several other natural resources conflicts in which blame was placed on particular species for their abundance and their impacts on other species in their environment. Clearly, it is not the sea lions' fault that salmon populations are depressed, and no one I talked to in the course of my research made this claim. Where blame existed within the fishing community, it was directed at regulations that prohibited their traditional interactions with the environment. The abundance of sea lions—and fishers' inability to mitigate their growing impacts on the salmon fishery—was seen as symbolic of the loss of control that fishers have over their industry and environment.

Overabundance of an animal population is an issue that has both social and biological roots. Those who consider California sea lions to be overabundant in Oregon base their belief on comparisons to population levels in the recent past. They point to

overabundance within the historical context of culling, and with a desire to protect an economic interest in salmon fisheries. Like the example of the sea otter and shellfish fishery described in Chapter One, many fishers began their careers when marine mammals were less abundant and were not fully protected. Because sea lion populations are growing rapidly and are expanding into new areas, and because fishers have been able to kill and deter sea lions within their lifetimes, fishers view the current populations as overabundant. The California sea lion population is expanding into an environment that has been drastically altered by humans, and the sea lions are able to adapt to it well. Like terrestrial generalists such as raccoons and deer, sea lions are not sensitive to human development and easily exploit opportunities presented by human actions such as fishing and anthropogenic structures such as dams. Consequently, they come into contact with humans frequently, providing people with more personal evidence that sea lions are overabundant.

The social dimension of overabundance—and of wildlife management in general—necessitate that the issue is addressed on a political as well as a biological level. Both fishers and environmentalists indicated that they would prefer if the conflict remained outside the political realm and was managed biologically. Commercial fisher, John Watts said, "Therein lies the problem with seals and sea lion. Its management is determined by politics when it should be determined by biology." Similarly, environmentalist Rachel Rodgers said:

> Everybody's talking about basing decisions on best science. Half of it, there's no science involved in the decision, It's all politics… There's a disconnect. I see most of the decisions being made as purely driven by

> politics 99.9% of the time. Whether there's any claim to science of not, it's politics.

In this case, as in most natural resources management issues, the decision-making process is a political one.

Chapter One discussed theories about the influence of demographic differences on perceptions of environmental management. These theories offer important insights into the sea lion/salmon conflict. Particularly important is the idea that interest in environmental management is driven by economic dependence on the resource. As evidenced in my interviews, fishers who wanted to see sea lions managed were interested in seeing their industry remain viable and protecting their ability to maintain some of the control they historically had. Several interviewees had reduced their time spent in the salmon fishery, as restrictions increased and profits decreased. In a Sea Grant publication designed for members of fishing communities, Gildin (1999: 8) writes, "Oregon's fishing communities are experiencing a difficult transition." Many historically viable fisheries are no longer profitable in part due to record Alaskan salmon catches in the early 1990s and competition from pen-reared salmon keeping prices down (Gilden 1999). Economic issues are exacerbated by a changing regulatory environment.

> On a long scale, the fishing industry has changed dramatically from an open profession with few regulations and abundant freedom to a highly regulated industry. People who were drawn to fishing's independent lifestyle—where hard work, skill knowledge, and luck determined personal success—are having a hard time adapting to the "new" fishing industry, which is strongly influenced by regulations, politics, scarcity, economic stress, and gear conflicts. Successful professional fishers have substantial knowledge of fisheries issues, accumulated through informal experience and formal education. However, many feel their knowledge is ignored in the increasingly bureaucratic atmosphere of fisheries management. (Gildin 1999: 8)

Fishery declines and additional regulations in the late 1990s have increased pressure on fishers and many have been forced out of the industry (Gilden 1999). The combination of economic and regulatory pressure add up to what Peluso *et al.* (1994: 31) called "internal colonialism" in which residents of natural resource dependent areas feel that they are stripped of control over their livelihoods and the future of the resource on which they depend.

Hard times in the fisheries are coupled with dramatic declines in the timber industry along Oregon's coast (Robbins 1988) resulting in communities that have lost much of their economic base. Robbins (1988: 166) writes, "These are not happy times for resource dependent communities like those in southwestern Oregon." Further, "there has been no social or resource planning for the future, and in few areas has the absence of a broadly based social strategy been more harmful than on Oregon's southern coast" (Robbins 1988: 154). In the absence of such programs, and in light of economic depression, the fact that fishers do not have the ability to manage the sea lion problem is seen as a further reduction in their power over their environment and the future of their industry.

Because the sea lion/salmon issue is a marine mammal/fisheries interaction, it is further complicated by the different values that stakeholders associate with each group. As discussed in Chapter Two, different views of marine mammals and fish have led to unequal levels of protections for sea lions and salmon, an issue to which many fishers pointed during interviews. The fact that sea lions are protected under the MMPA while

their numbers continue to increase is perhaps the most fundamental problem in the minds of fishers. In their view, this law is problematic both because it was conceived so broadly as to prohibit actions that seem logical in specific situations and because it values marine mammals differently than other species in the marine environment. This difference represents a larger philosophical rift between fishers and environmentalists. While most fishers saw sea lions as just another part of the system that can be "monkeyed around with" in the same way that fish populations are, environmentalists saw marine mammals as deserving of the special protection the MMPA provides them.

Perhaps surprisingly, few philosophical differences existed with regards to the value of salmon. Both groups pointed to the value of salmon as not only economically important, but also spiritually and culturally so. Environmentalists acknowledged the value of salmon as a food resource as well as a keystone species and fishers pointed to the spiritual and cultural value of salmon, alongside their benefits to the fishing industry. Speaking of the value of salmon, one fisher said, "To me it's all money with salmon. Actually, I live on a salmon creek and it's more than that I suppose. I want to see salmon in my creek. Just to know they're swimming in there and going through their annual spawn."

While salmon garner respect both as a food resource and as living beings, contemporary American society is unclear about the value of sea lions. From an animal rights perspective, they are intelligent creatures that deserve to exist without harassment. Similarly, from an environmental perspective, their expansion into historic habitat is positive. As a species, however, California sea lions have a nebulous symbolic and

material value. They are seen as intelligent but lazy, and unaffected by human development. Unlike many other marine mammals, such as the great whales, sea lions do not symbolize the values of nobility, fragility, and wildness. The value of sea lions is also undefined in a more tangible sense. As one marine mammal manager stated:

> Down here you either have the groups of people who don't utilize them materially, but want to do everything they can to protect them and you have the people who view them as problems or difficulties or conflicts or competitors for some of the resources that they want.

Because sea lions are no longer a game species on this part of the coast, their value is not associated with human use, and the idea of consuming marine mammals triggers negative responses from many Americans. In comparison to salmon whose value is cultural, spiritual, ecological, economic, and consumptive, the sea lions' value is more narrowly but less specifically defined. They are valued less holistically than are salmon, and in a way that emphasizes our separation from the marine environment.

An understanding of the historical and social roots of the conflict and the different views of marine mammals provides insight into my final research question, "What is the potential for resolution?" The roots of the sea lion/salmon conflict include the history of culling and the modern state of economic downturn in coastal communities in southern Oregon. Both factors contribute to an overall feeling of loss of control over a traditionally independent industry and self-sufficient communities. Different values of sea lions and salmon contribute to the conflict as well, as these have led to unequal legal protections. Further, contrasting perspectives between fishers and environmentalists about the value of marine mammals is representative of a larger difference over what the ideal

relationship is to wildlife and to what extent humans should interact with and actively manage marine animal populations.

While the deep-rooted nature of the differences in perspective points to difficulties in conflict resolution, an understanding of the differences can inform attempts to communicate between environmentalists and fishers. It is not possible to manage wildlife without politicizing the process, but it is important to focus on what stakeholders hold in common, in this case, an agreement over actual impact of sea lions on salmon. Neither fishers nor environmentalists disputed the idea that the impacts of sea lion predation are more economic than ecological and that sea lions take advantage of opportunities presented by humans. Resolution is possible if the issue is framed in a way that incorporates economic and social issues while addressing environmentalists' concerns about the fundamental causes for the impacts. Specifically, more direct links between wildlife regulations and economic conditions need to be made, and the pressures that fishers feel must be legitimized. Moreover, the fact that sea lion predation would not be an issue if salmon stocks were not already depressed must be clearly acknowledged and addressed.

Perhaps more importantly, this issue demonstrates how future conflicts can be prevented. Resolving this natural resources conflict and preventing others means recognizing that even the best intentioned human actions can have unintended consequences. The precautionary principle must be applied to these cases, both in terms of minimizing human impact on natural systems and providing better mechanisms for applying broadly conceived conservation regulations to specific situations through

ecologically sophisticated legislation. Fishers feel that the MMPA was not well thought through, in part because their interests and worldviews were not represented, but more importantly because it did not consider the needs of particular species in relationship to their specific ecosystems. The MMPA is an important piece of legislation with some laudable consequences for a group of species whose members are often slow to recover from human impacts, but fishers are justified in their complaint that it did not consider situations such as that of the California sea lions and deals with them poorly. In an age when multi-species management is a common goal, single species legislation is outdated. Future environmental regulations need to focus not only on the well being of the most charismatic groups of animals, but of the entire ecosystem. Further, the human role in the marine environment must be acknowledged. While it is important to minimize our negative impacts, it is also critical to realize that we do interact with the natural world and a complete separation is impossible.

The MMPA is not the only piece of legislation that deals with marine animals. As described in Chapter Two, the ESA and the MFCMA also affect our relationships with these populations. Taken together, the three different laws represent three separate goals. It could be argued that this approach allows for the representation of different stakeholders, but a more effective approach would be to directly address and reconcile the philosophical differences represented in each. The commodity-oriented MFCMA is focused on the economic benefits of marine fish, while the conservation-oriented ESA focuses on the maintenance of biological diversity, and the MMPA is based in both conservation and animal rights ethics. As Francis (2002: 19) writes:

> The problem is that policy making proceeds on an ideological and theoretical foundation that posits fundamental dichotomies between [ecosystems, working economies, and a legal system of social control]—it ignores the ecological character of human experience.

Humans are predators in the marine environment, as fishers emphasized, but the environmental view that our technologies allow us to drastically alter the composition of marine communities is also important. In the words of Wendell Berry (1987: 139), "Our problem, exactly, is that the human and the natural are indivisible, and yet are different." Our challenge is to forge alliances between those who exploit marine resources and those who seek to protect them, creating environmental legislation that draws on the experiences of both groups while considering the complexity of ecological systems.

APPENDIX A: INTERVIEW QUESTIONS

What is your profession?

How long have you been in this profession?

Where is your primary residence?

How long have you lived here?

How do you view the current populations of sea lions in Oregon?

How do you view the current populations of salmon in Oregon?

What has been your personal or professional experience with California sea lion predation on salmon?

In your opinion, how significant is this predation?

What do you think are the impacts of California sea lion predation on salmon?

What is your opinion of the current management of California sea lions?

What is your opinion of the current management of salmon?

What are the major human uses and values of sea lions?

What are the major human uses and values of sea lions?

What do you believe the ideal relationship between humans and wildlife should be?

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