Negotiating Nature: Expertise and Environment in the Klamath River Basin

by

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Abstract

"Negotiating Nature" explores resource management in action and the intertwined roles of law and science in environmental conflicts in the Upper Klamath River Basin in southern Oregon. I follow disputes over the management of water and endangered species. I develop several themes: first, how these disputes demonstrate the growing connections between scientific and legal authority in environmental matters. This occurs because environmental laws often limit participation in disputes to those who can offer "scientific data" in support of their claims. I call this situation "scientific legality" and suggest that increasingly, one's ability to make legal claims is closely tied to one's ability to muster scientific authority behind those claims. Second, how the growing importance of scientific expertise in environmental decision-making has affected the ways that groups frame environmental claims. Third, how negotiations over environmental rights, regulations, and policies shape not only management efforts, but also narratives of environmental relationships.

In Part One, I discuss the Endangered Species Act of 1973, which legally mandates that only scientific considerations can be taken into account in certain aspects of endangered species management. As a result, the Act has impacted the ways people frame claims about endangered species. I then discuss how the Klamath Tribes of American Indians have responded this situation, and the implications of this for presumed divisions between the environmental knowledge of scientists and native peoples. In Part Two, I examine a 1975 water rights case, *United States v. Adair et al.* I explore how the court drew on and reproduced prominent narratives of American Indian history, and the ways these narratives bounded the agency of the Klamath in relation to the environment and the colonial process. In Part Three, I examine a dispute in 2001 over endangered species. In this conflict, a dispute over policy quickly became a dispute over the scientific claims that legitimated the policy. Expert disagreement ensued. Although political explanations for expert disagreement were common, I suggest that a more underlying cause was the unavoidable uncertainties of ecological claims. These uncertainties were politically useful to those who wanted to stall management action and maintain the status quo.

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A Note on Citations

Because this dissertation relies on both unpublished documentary sources and interpersonal sources, such as field notes and interviews, I have chosen to combine two citation styles. I find that parenthetical citations, while well-suited to published documents listed in a bibliography, are less well suited to archival documents, since by convention, such unpublished documents are not individually listed in bibliographies. At the same time, full footnotes seem redundant for published sources that, by convention, are fully listed in the bibliography. I have therefore employed a hybrid system of citation. For unpublished documentary source, I have listed the archives and collections used in the bibliography, while providing full footnotes for individual documents from those collections. The collections' names are abbreviated in the notes, but full information about specific collections can be found in the bibliography. For published sources, I have included a full bibliographic reference, and I use a parenthetical citation in the text.

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Introduction

The legal theorist Robert Cover has described law as "the projection of an imagined future upon reality" (Cover 1986, p. 1604). Nowhere is this statement more true than with environmental law. The establishment of an environmental law is often motivated by cries against the current state of human-environmental relationships, whether the depletion of a natural resource or the increasing risk of artificial endangerment. In response, these laws explicitly imagine a different environmental future and a different relationship between humans and the natural world.

If environmental law and policy are the imagination and codification into law of an imagined future, environmental management is the implementation of that future on the ground. Environmental managers must deal with the nitty-gritty of implementing broad laws-in-the-books to specific on-the-ground cases, and they are the people ultimately faced with the task of integrating the expectations contained in environmental law and people's everyday lives. Environmental management, as a result, almost always involves struggle, often times a quite intense struggle. Such struggles over environmental management can become so heated because environmental management is not simply about managing matters vegetable, animal, and mineral. At heart, environmental law and management are about altering and directing people's relationship with their environments. Environmental management is, in short, people management. While the goal of an environmental law might be the preservation of a species of bird, such a law achieves its goal by regulating what people can and can't do in relation to that bird, for instance by preventing development on the bird's nesting territory or by making the

hunting of the bird a crime.

That environmental management is people management is on the one hand clearly suggested by the fact that one cannot regulate, through law and policy, the behavior of non-humans.[1] After all, try as one might, an attempt to regulate directly the distribution of trees, the migration of animals, or the deposition of soils is likely to be a foregone failure. Strictly speaking, one cannot regulate plants, animals, and geomorphic processes through law. One cannot directly regulate the environment. What can be regulated is the way people and organizations interact with the environment, what they can, cannot, or must do in particular places in nature at given moments in time. The United States Forest Service, for example, manages forests by regulating logging and replanting. The United States Fish and Wildlife Service manages endangered species populations by restricting people's hunting and trading of these species, or through restricting programs or projects that might impact their habitats. The United States Environmental Protection Agency regulates atmospheric green house gasses by regulating polluters. Through regulating these human activities, managers regulate the environment.

Yet on the other hand, the fact that environmental management is not the management of nature but in fact the management of people in nature is often and easily overlooked. Environmental management and law are often perceived to be the province of experts in the dynamics of the biophysical world, not the human one (Bocking 2004; Shrader-Frechette 1996). Understanding natural systems through the disciplines of ecology, biology, and the earth sciences is an indispensable component of effective and informed environmental management. Nevertheless, considerations of social aspects are often seen to be distractions in disputes about environmental management, if not outright inappropriate. Social considerations, in fact, are often considered to be a source of

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1 This is not to say that people have not tried. The idea that only humans are the subject of human laws is a relatively modern one, certainly post-Victorian, and there exists a long history of putting animals on trial—even executing them—for violating laws aimed at regulating their behavior directly (see, e.g., Ferry 1995; Ritvo 1987; Hampton 1917).

"bias," and some environmental laws, such as the Endangered Species Act of 1973 (ESA), expressly forbid the consideration of social factors in some aspects of decision-making. Science is framed as an external authority to which decision-makers can turn, a source of authority capable of "rationalizing politics" (Jasanoff 1990) by cutting through considerations of economics, culture, and history.

However, such environmental disputes can become so highly charged precisely because the questions at their hearts are not only scientific, but also economic, cultural, and historical. Far more than the environment is at stake in environmental law: peoples lives in their environments are ultimately at stake, as well. Examples of this abound in history. In the creation of national parks, for example, the United States Army forced American Indians to abandon time immemorial practices of hunting and gathering on their traditional grounds (Jacoby 2001; Keller and Turek 1998). New conservation laws in the late nineteenth century also had profound effects on subsistence hunting commonly practiced by non-native peoples in rural areas (Warren 1997; Jacoby 2001). The construction of Tennessee Valley Authority's dams and reservoirs submerged the landscapes and livelihoods of thousands of people in Appalachia, forcing many to move and reorient how they lived on and from the land (McDonald and Muldowny 1982). The legal establishment and management of people-less "wilderness" areas often involved the dispossession of those people, native and not, who previously called those areas home (Spence 1999). More recently, traditional subsistence hunting, fishing, and gathering has been highly curtailed by the creation of wildlife refuges and parks in Africa in the name of conservation (Walley 2004). In all of these cases, environmental management has resulted in the reorientation of previously existing environmental relationships: residing became squatting, hunting became poaching, and gathering became theft.[2]

Despite this, disputes over resource management increasingly center around intense disputes about science. Scientists have become an increasingly important part of

2 As Max Horkheimer has written, "The history of man's efforts to subjugate nature is also the history of man's subjugation to man" (Max Horkheimer, "Eclipse of Reason," p. 72, quoted in Espeland 1998, p. 1).

identifying, describing, and formulating solutions for environmental problems. This importance is evident in disputes over the causes and consequences of climate change, the safety of nuclear power, nuclear waste disposal, and environmental health hazards (Miller and Edwards 2001; Meehan 1984; Gusterson 2000; Macfarlane and Ewing 2006; Harr 1995). Expert knowledge plays a central role in these environmental debates as the scope and boundaries of environmental problems and the risks they pose are debated and defined; access to expert knowledge has become critical to all involved (Beck 1992).

Scientific expertise also offers the hope of precisely defining the causes of environmental change and precisely targeting management efforts:

> Whenever a problem or crisis is identified, those concerned tend to seek out and identify the origins of the problem. The logic behind the search for a root cause or causes is compelling. Adequate solutions to a problem cannot be derived or implemented unless those solutions address the problem at its source. Different analyses of the root causes of any specific problem necessarily lead to different policy proposals, which can have profoundly different political and social implications. Disagreements over what constitutes the origins of the problem are, understandably, often highly charged affairs (Ellis 1996, p. 257).

Efforts to precisely define environmental problems are double-edged swords, and they often lead to intense expert disagreement. This disagreement can draw attention away from underlying social inequities that both produce and result from environmental problems. Protracted expert disagreement can also paralyze the decision-making process, thus delaying management actions, even those that might be necessary in the immediate term. This inaction can result simply from the fact that environmental dynamics and causes of environmental change are not fully knowable to a desired degree of certainty, or because parties opposed to action can easily contests claims about complex causes or ecological dynamics, thus prolonging debates and postponing actual management. Ultimately, the search for and debate about causes and dynamics can serve to draw attention away from immediately available—albeit partial—solutions in favor of the hope

of more efficient future action.[3]

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"Negotiating Nature" explores the dynamics of expert disagreement in environmental disputes and focuses on intertwined roles of law and science in the ways people understand and communicate their environments and the human place in them. I focus on the Upper Klamath Basin, a high, dry basin on the east side of the Cascade Mountains in southern Oregon. In the dissertation, I consider environmental conflicts over the management and control of natural resources. In particular, I look at the struggles over the right to control water and struggles over the management of endangered species. The disputes I examine span a period of some forty years, from 1970 to the present, but at the same time call upon a much deeper span of natural and human history. The struggles themselves involve a varied group of people, including the Klamath Tribes of American Indians,[4] irrigators who ranch and farm, government natural resource managers, and scientists, both academic and professional.

Environmental conflicts play out on a number of different stages, the overt stage of demonstrations, angry speeches, Op-Eds, and acts of civil disobedience being only one. They also play out on less visible, but equally important, stages. One such stage is that of the politics of knowledge, and the struggle over who can be an authoritative

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3 The Forest Service has a term for this problem when it occurs internally: "analysis paralysis." Analysis paralysis is the tendency for the unending study of a problem to lead to ultimate inaction for fear that the problem itself is not well enough understood. Analysis paralysis is a self-fulfilling prophesy. In the pursuit of further analysis to settle an issue, more uncertainties and unknowns are inevitably discovered, each of which must be analyzed in turn in an effort to settle the issue. The list of unknowns grows as fast, if not faster, than the list of what is known.

4 The Klamath Tribes have referred to themselves, and have been referred to, in two different ways during the historical period covered in this dissertation. The singular Klamath Tribe was in use until the mid-nineteen-nineties, when Klamath tribal government began using the plural, the Klamath Tribes. The switch highlighted the fact that the Klamath Tribes, while a single federally recognized tribe, are actually composed of three distinct but historically interacting peoples, the Klamath, Modoc, and Yahooskin Paiute. My choice in the text reflects the particular historical period under consideration.

knower and speaker in an environmental dispute. These disputes over the authority of knowledge are so important because if someone is unable to speak in the authorized discourse, he or she may find him or herself unable to make a claim that is considered legitimate (Foucault 1981; Nadasdy 2003; Cruikshank 2005). Such a person might be pushed to the edges of the dispute, unable to participate in a meaningful way, even if his or her life is directly affected by the environmental policy in question. My focus in this dissertation is on this underlying aspect of environmental struggles.

The central theme of the dissertation is negotiation. By negotiations, I mean not only the processes in which the practical particulars of environmental law, policy, and management are hashed out—sometimes in the legislature, in a courtroom, in front of an advisory committee, or in front of angry crowds—but also a host of other negotiations, as well. These include negotiations over differing ideas of what constitutes science, what constitutes legitimate ways to make and communicate environmental knowledge, how that knowledge should be integrated into policy decisions, and who, in the first place, has a legitimate seat at the negotiating table. In the course of these engagements, people's tacit assumptions about knowledge, authority, entitlement, and the human place in nature come to the fore. At the same time new images and meanings of nature itself are created and acted upon.

I focus on negotiations and disputes because they offer not only a window into existing perceptions about the people's relationships with nature, but also a window into the formation of new ones. Such an understanding of disputes—as referring both forward and backward—reflects how disputes are understood in two fields of study that have influenced this dissertation. On the one hand, socio-legal scholars, since at least Karl Llewelyn and E. Adamson Hoebel, have examined disputes as a way to understand pre-existing norms in society (Llewelyn and Hoebel 1953). For these scholars, the ways in which disputes are resolved reveal the norms and rules adhered to (or violated) by different groups. Examining environmental disputes in the Klamath Basin, then, offers a window into the ways that different groups perceive their existing relationship with the

environments around them, as well as with each other. On the other hand, scholars of the social study of science have tended to focus on the study of disputes as a way to reveal how shaky claims solidify into future facts (Latour 1987; Fleck 1979). For these scholars, disputes reveal a time when the taken-for-granted was in the process of being formed. From this perspective, examining environmental disputes in the Klamath Basin offers a window into the way that new environmental relationships are forged. Taking these two approaches together, negotiations over environmental management offer a glimpse into both the existing notions of nature and the human relationship with it, as well as nature's future.

In the dissertation I argue that, in environmental law and management, science and law exist in a mutually constitutive relationship. In this relationship, law legitimates science, and science legitimates law. Legal decisions, often-times unpopular ones, are legitimated by their roots in scientific truth-claims. At the same time, the authorization of science within laws increases the legitimacy of scientific inquiry by giving it a prominent station within the rule of law. As a result, scientists are legal actors who play an important role in the processes that regulate state force in environmental matters. While this role is not new, it has intensified as the role of scientists in legal decision-making has become both mandated in environmental law and expected by the general public.

The role of scientists in the regulation of state force has reconfigured environmental conflicts and the way that groups seek to narrate their relationship to the environment. A condition of "scientific legality" has emerged, where one's legal authority is directly related to one's ability to produce, deploy, and counter scientific narratives of environmental change. As the discursive field of environmental negotiations has narrowed, groups involved in environmental disputes have learned that the most effective—and sometimes only—way to gain legal standing in an environmental dispute is to frame their claims as scientific claims. To not do so is to risk disenfranchisement from environmental decision-making. I argue that this situation has created tension for some groups, such as American Indians, for whom scientific inquiry

continues to carry colonial overtones and connotations of otherness.

THEMES

In addition to this main argument, four overarching themes run through the dissertation. The first major theme is the negotiation of boundaries that once seemed fairly stable. These include the boundaries between scientific inquiry and legal decision-making, between hypothetico-deductive methods and experiential knowledge making practices, between what makes someone, or disqualifies someone as, an "expert," between what is and is not "science," and between "natural" and "human" landscapes. In the Klamath Basin, boundaries between all of these things are regularly negotiated in the course of disputes over environmental management. The negotiating of these boundaries is so important because it is the boundaries that make the categories, not vice versa (Gieryn 1999; Latour 2005). As Thomas Gieryn has argued, "science," and "the epistemic authority of science" are not "always-already-there features of social life, like Mount Everest" (Gieryn 1999, p. 15). Rather, seemingly hard-and-fast categories such as "science" and "non-science" are created as groups of people establish, dispute, and move the boarders between them, based on varying and often disputed sets of criteria.[5] For example, if the controlled, repeatable experiment were to be taken as the defining metric of "science," then the boundary between science and non-science would put the environmental sciences—at least in the Klamath Basin, where they are a largely field-based, observational set of practices for describing natural dynamics—squarely on the "not science" side. If, however, the boundary criteria between science and non-science were to be taken as a "observational inquiry into the dynamics of the natural world using methods sanctioned by one's peers, an aim of which is the construction of a generalized knowledge about the environment," then ecology is undoubtedly a science. But then so too is tribal hunting and fishing.

5 More generally, Bruno Latour has noted in *Reassembling the Social,* that the social is not something pre-existing, but is rather created by the accumulated actions of people (Latour 2005).

Boundaries are disputed as a "strategic practical action" (Gieryn 1999, p. 23). The legal authority of scientific statements in environmental management, for instance, makes it clearly advantageous for one group to attempt to define a rival's claims as non-science. Similarly, it is clearly advantageous to dispute the boundary between the "expert" and "lay" in the interests of establishing one's epistemic authority over another in an environmental dispute. Additionally, boundaries can become diffused or confused if the terms of a dispute—outside the direct "strategic" control of the disputants themselves—change. For example, as environmental law mandates participation of scientific experts and prohibits other considerations, the boundary between scientific research and legal decision-making blurs.

As more and more groups respond to the authorization of science in law, groups who might have been considered "non-expert" are increasingly showing an adeptness with expertise that can unsettle taken-for-granted hierarchies of "scientists" and the "lay" (Gusterson 2000; Nelkin 1984). In other words, even if categories are not pre-existing, they are nonetheless pre-received wisdom. Categories, and the boundaries that make them, easily take on a taken-for-granted permanence and solidness.[6] When boundaries are blurred or reconfigured, actors within those categories find themselves in new, sometimes unexpected and unaccustomed roles.

The experts with whom I'm concerned are a varied group of people. In Parts One and Three, these experts are scientists who share an interest in characterizing the dynamics of natural processes. These include ecologists, wildlife biologists, fisheries biologists, hydrologists, geomorphologists, geologists, silvaculturalists, and limnologists. This is not an exhaustive list. Finding a general name for this group of people and this general area of scientific inquiry—simply for ease of reading and writing—is desirable but difficult. These scientists, for the most part, subscribe to a systemic view of nature, in

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6 Social structures and forms of social organizations that appear transcendent are simply the accumulation of the quotidian over the *longue durée.* (Thank you to Susan Silbey for this wonderful formulation of the idea that the longer we act as if something were real, the more solidly real it becomes.)

which the living and non-living natural world interact with each other continuously and in complex and multiple ways. A hydrologist, for instance, would not be concerned with the dynamics of water flow in the isolation of a laboratory, but rather as a component of a system that interacts with biology and with geology. A fisheries biologist, at the same time, would be interested in how fish, his or her primary area of study, are influenced by fluvial geomorphology. Broadly speaking, such scientists might all be called "ecological scientists," although this runs the risk of conflating them with "ecologists," the people who study ecology specifically, i.e., with a focus primarily on the systems themselves. An additional risk is that the science of ecology and the politics of environmentalism are often, although inaccurately, conflated (Hays 1987). Although the environmental movement drew heavily on the tenants of ecology as a science, the two are not the same, and academic ecologists have struggled to establish the autonomy of their discipline (Bocking 1997). Still, ecologists are often assumed to be necessarily environmentalist, and therefore potentially biased.[7] Another possibility would be to call these scientists "environmental scientists," as all of these people have as their object of study some aspect of the environment. However, calling them environmental scientists runs a similar risk of associating these scientists with a political and social movement to which they do not necessarily belong. Despite these dangers, I have chosen to nevertheless use these terms, and in the dissertation, I refer to this group of scientists as ecological scientists or as environmental scientists. I simply note here that I am specifically differentiating an ecological perspective or an interest in the environment from a political orientation towards environmentalism. In Part Two, the experts I discuss include the ecological scientists discussed above, but in addition expert witnesses in anthropology and ethnohistory.

The second, related theme is the increasing hybridity of roles in the Klamath Basin. The reconfiguring of boundaries discussed above takes place in the lived

7 Kristin Shrader-Frechette reminded us, however, that scientific objectivity and the presence of values in conservation biology research are not mutually exclusive (Shrader-Frechette 1996).

experience of individuals and the roles that they play. Well-defined in theory, professional roles such as lawyer, biologist, and regulator are becoming ill-defined in practice. It is not unusual in the Klamath Basin, for example, for a biologist to be a regulator. As professional roles overlap, clearly defined divisions of expert labor become hard to maintain. Andrew Abbot's zero-sum model of professional interaction, in which one profession expands its domain of expertise at the direct expense of another's, does not apply well in the Klamath Basin (Abbott 1988). In the Basin, professional roles that were once distinct overlap and become tightly linked to one another in configurations that are far more fluid and hybrid than allowed for in Abbot's model.

In some instances, the hybridity of roles results in individuals acting outside of their accustomed domains. Many scientists in the Upper Klamath Basin, for instance, hope to maintain a boundary between research and policy, but doing so is difficult. Scientists who work for American Indian tribes run the risk of having their work portrayed as being necessarily pro-tribal, since this work often becomes integrated into tribal policy. Similarly, scientists at work for government regulatory agencies, who are perhaps regulators themselves, run the risk of being accused of practicing "science for management." For all scientists in the Basin, the refrain "I just do research" is increasingly difficult to maintain, given the centrality of scientific expertise in environmental management and legal decision-making.

The third theme that spans the chapters of the dissertation is that of the multiple images of science. Patricia Ewick and Susan Silbey have described the numerous ways that people perceive and understand law and their relationships to law, and have called this concept "legal consciousness" (Ewick and Silbey 1998). The idea of legal consciousness suggests that individuals perceive law and their relationship to it simultaneously in multiple ways. Individuals, when narrating their interactions with law, discuss it as a tool for achieving a goal, as a remote source of external authority, and as an obstacle that can hinder what they are trying to do. Rather than undermining, or fragmenting, the authority of law, Ewick and Silbey have suggested that the simultaneous

and overlapping images of law help endow the legal system with incredible durability. While jurisprudential scholars tend to assume that the durability and authority of law comes from its singularity and distance (Cotterrell 1992; Silbey 1991), the concept of legal consciousness suggests that it is actually law's multiple character and presence in every day life that undergirds the rule of law.

In the Klamath Basin, one sees similarly varied yet overlapping perceptions of science, suggesting that "scientific consciousness" may operate in a way analogous to legal consciousness. In the Klamath Basin, the ecological sciences, like environmental law, are a part of everyday life. Scientific conceptions of nature, derived primarily from ecological sciences, pervade the way people conceive of and communicate the environment. But science is not a singular thing in people's minds; they understand and talk about science in many ways. Science is often described in a positivist fashion, as offering unfettered access to reality. As a positivist endeavor, science allows access to what is already there, it is a source of authority that is external to biases from political affiliation. When coupled with processes for legal decision-making, positivist science promises an external source of objective authority, on which one can rely to adjudicate environmental debates. At the same time, science is often described as a highly uncertain and contingent endeavor. People understand that the scientific perspective is not universal, and that the claims of scientists are limited by many factors. Here, I am not referring to bias, but rather to limitations imposed by a lack of funding, a limitation in human resources necessary to conduct a study, or the practical difficulties of scientific field research in open, natural systems. Finally, people sometimes perceive science as merely a convenient tool for forwarding a political agenda. This is the most jaded of understandings of what science is, but given the ongoing expert disagreement in the Klamath Basin over politically charged questions of environmental policy, it is a common one.

For people in the Klamath Basin, science is not one of these things at different given times, but rather all of them simultaneously. It is a way to portray reality,

unfiltered; but it also allows for only a partial, imperfect understanding of the world; it is also a political tool. Far from seeing these things as contradictions that weaken the authority of science, these multiple sciences allow people to explain their varied and sometimes conflicting experiences with scientific research in their lives. Together, they seem to strengthen the durability of scientific professions and institutions, just as overlapping understandings of law strengthen the rule of law. It allows for one person to identify certain expert claims as partisan, while steadfastly calling for further research to settle the issue objectively, while simultaneously conceding that such research will likely not result in certainty about its object of study.

The forth recurring theme is the relationship between expertise and inclusiveness of decision-making processes. Undoubtedly, the ecological sciences are incredibly important and useful in making well-informed decisions across the broad spectrum of complex issues that environmental law seeks to address. At the same time, a reliance on scientific expertise raises questions about decision-making in democratic societies (Jasanoff 2005; Jasanoff 1990; Shrader-Frechette 1996). As Sheila Jasanoff has suggested, the centrality of expert knowledge in the formation of the modern democratic state is rife with tensions (Jasanoff 2004). Democracies are by definition open to participation, but the centrality of techno-scientific enterprises in the modern state create a continual pull towards more closed and exclusive decision-making processes (Nelkin 1977; Lash, Szerszynski, and Wynne 1996; Wynne 1992). This raises the question: as the processes of governance in certain aspects of life have come to be dominated by experts, how does the general public participate meaningfully? Given the increasing level of technological risks (Perrow 1999; Petryna 2002; Fortun 2001), as well as the number of technical decisions required in modern life, how can one balance the need for expert interpretation with a process that allows democratic participation? As discussed in this dissertation, the reliance on expertise, whether legally mandated or simply desired, can lead some to the perception that they are being disenfranchised from the decision-making process. And ironically, those who feel the most disenfranchised are often those who

perceive themselves as being most impacted by the decision being made. The result is a considerable amount of resistance to environmental management practices.

A BRIEF INTRODUCTION TO THE UPPER KLAMATH BASIN

The disputes discussed in this dissertation take place in the Klamath Basin, a region that has become a focal point for some of the most well-publicized environmental conflicts in recent American history. From disputes over American Indian hunting, fishing, and gathering, American Indian water rights, the boom and decline of logging in the Pacific Northwest, the spotted owl, the place of agriculture in an increasingly urban society, and the future of the ESA, the Klamath Basin has served as both a stage and an actor in all of these.

The Pacific coast of the United States is characterized by variability and change (McPhee 1993). Below the surface, from a geological perspective, the land occasionally rips itself apart or slams itself together. The coastline was formed through collisions with island arcs that slowly crashed into the continental landmass over the course of millennia. The mountains grow and crumble. They occasionally explode. The land is constantly in motion—up, down, north, south, east, west—thanks both to dramatic earthquakes, as well as the incremental slip of tectonic plates. On the surface, the Pacific coast is equally dynamic. From the dry, warm climate in the south, to a moist, cool climate in the north, the coastal vegetation and wildlife varies greatly. Temperatures remain relatively constant over the course of the year. But travel inland, and the summers are hot while the winters are cold.

The Klamath Basin sits halfway along the Pacific coast of the United States, and extends several hundred miles inland from the ocean. In approximately 250 miles from source to sea, the Klamath River falls nearly 4,500 feet through the dense forests, marshes, and scrublands of the Upper Basin in southern Oregon, and through the dry mountains of inland northern California, and the damp, forested California Coast Range in the Lower Basin. The Upper Klamath Basin is a volcanic landscape. To the southwest

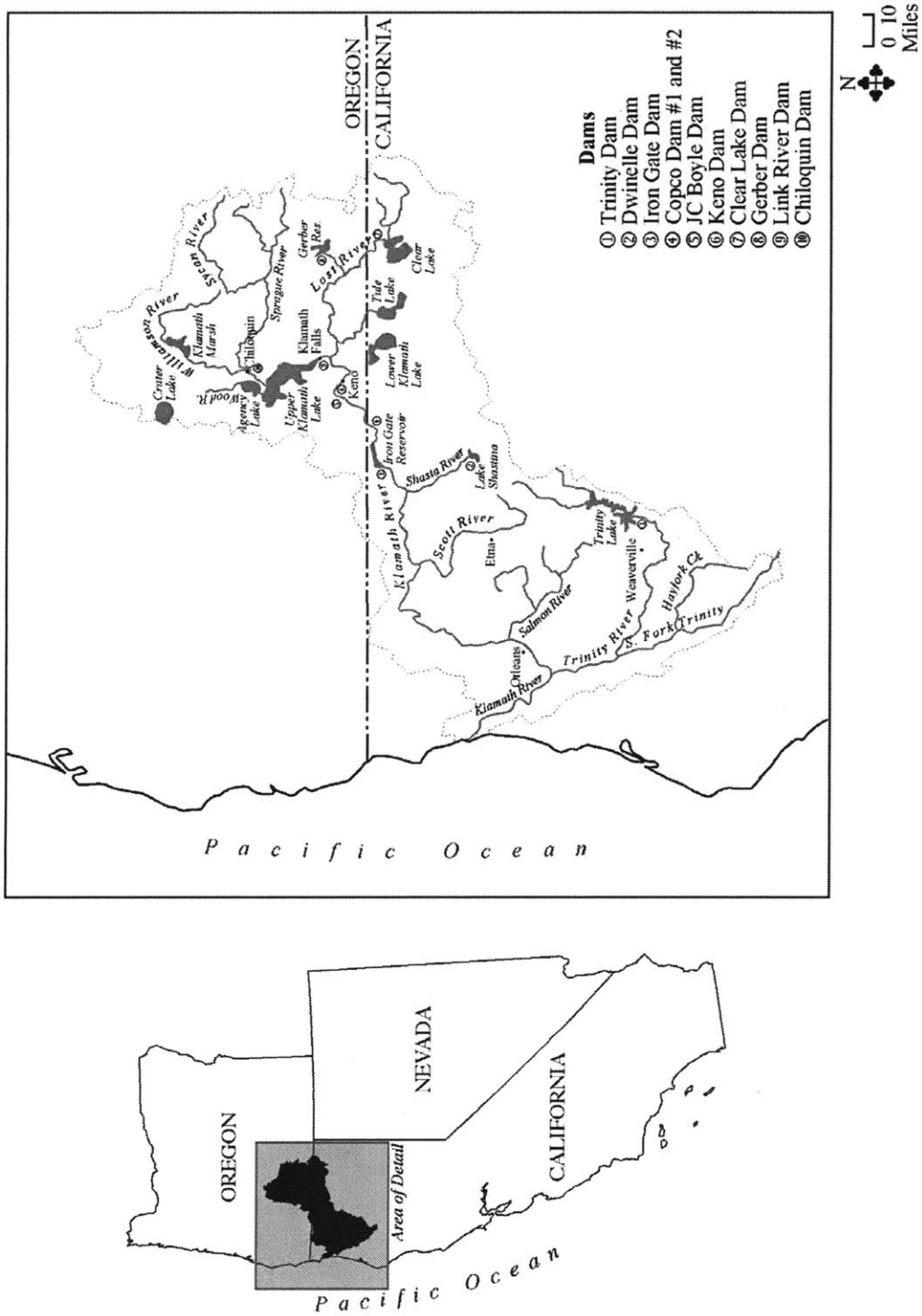

Illustration 1. The Klamath River Basin (Based on U.S. Bureau of Reclamation (1999)).

is the 14,179 foot tall volcanic cone of Mount Shasta, and to the north is the caldera of Crater Lake (U.S. Geological Survey 2007). The lake is the remains of Mount Mazama, a volcano that once stood as tall as Shasta (U.S. Geological Survey 2008). Some 7,700 years ago, Mount Mazama erupted and collapsed in on itself, creating the deepest lake in the United States. Crater Lake is also one of the snowiest spots in the United States (with an average of 533 inches per year), forcing upward as it does the moist air blowing off the Pacific Ocean, and wringing the moisture from it in the process.

But in a landscape of contrasts, one need not travel far from the depths and snow of Crater Lake to find a very different place: the shallow expanse of Upper Klamath Lake, the largest lake in Oregon by surface area, at approximately ninety square miles. The lake sits in a graben valley between the Cascade Mountains on the west and the first ridges of the Basin and Range physiographic province to the east (Anne Hiller Clark 1999). It is an old, shallow lake, filling over the course of time with sediments washed down from the surrounding, higher terrain. The lake itself is a meeting place of three very different landscapes. To the north and northeast are vast expanses of pine forests. To the southeast is the Basin and Range of the Nevada desert. And to the southwest and west, the Cascades and then coastal ranges of California and Oregon.

The Upper Klamath Basin is dry, with just thirteen inches of rain per year in the city of Klamath Falls (Gannett et al. 2010; Taylor, Hale, and Joos 2005). Today (2010), its economy is predominantly agricultural, including both farming and ranching, although it also includes some logging. Without irrigation, industrial agriculture in the Basin would not be profitable, and perhaps not even possible. With irrigation, agriculture is possible, and sometimes profitable. The land is often better suited to ranching. However, even ranchers must irrigate their fields to provide sufficient grass for their herds, and cattle are often trucked south to warmer California during the Upper Basin's long winters. The extensive forests of the area once supported extensive logging industries (Most 2006). In the 1980s, however, a general downturn in the northwest logging industry coincided with the addition of the Northern Spotted Owl to the list of federally protected

endangered species (Proctor 1996). New, tighter regulation of the timber industry aimed at conserving owl habitat greatly impacted timber production in the Upper Basin and surrounding areas, although smaller scale operations continue today.

Prior to the arrival of white settlers, the Klamath, Modoc, and Yahooskin Paiute hunted, fished, and gathered in the Upper Klamath Basin (Most 2006). The tribes witnessed the eruption of Mount Mazama, and can still identify where their ancestors took refuge from the event. In 1820, the first non-native hunters and trappers traveled from the north into the Upper Klamath Basin (Mark Clark and Miller 1999). Twenty years later, in the early 1840s, the United States military officer and explorer John C. Frémont arrived in the Upper Basin (Frémont 1880). He described a landscape that was both desert and marshland, thick forest and open sagebrush. Settlers both preceded and followed Frémont and established farms and ranches on the aboriginal lands of the Klamath, Modoc, and Yahooskin Paiute, sparking several decades of clashes between the native residents of the Upper Klamath Basin and the non-native newcomers (Limerick 2000a). In the Lower Klamath Basin, tribes fought settlers throughout the eighteen-fifties and -sixties, and were eventually confined to reservations (McEvoy 1986).

In 1864, the Klamath, Modoc, and Yahooskin Paiute signed a treaty with the United States government (Kappler 1904). In the treaty, three groups relinquished title to a vast extent of aboriginal territory, and retained a reservation on part of the Klamath's aboriginal homeland. The three groups were confined to their reservation, and they were prohibited to leave. A United States Army fort was established nearby, and the tribe's former territory was opened to settlement. The population of white settlers in the area grew. In 1908, agriculture, until then a marginal pursuit in the Upper Basin in the best of years, received a boost from the United States government with the construction by the Bureau of Reclamation of the Klamath Irrigation Project (Stene 1999). With the commencement of the Klamath Project, the agricultural character of the Upper Basin began to take hold. Following World War I, the United States government offered homesteads in the Basin to returning veterans. During World War II, the Upper Basin

was the site of the Tule Lake Japanese internment camp, and following the war, the United States government made more irrigable homesteads available to veterans (Donnelly 2003).

The Klamath Tribe, meanwhile, operated a successful timber business on their reservation, which despite having been reduced in size by the General Allotment Act of 1887, contained large areas of forest. The timber operation was successful enough to bring them to the attention of Congressional advocates of the tribal termination (Prucha 1995). The final incarnation of the aggressively assimilationist policies towards American Indians that characterized the nineteenth and first half of the twentieth centuries, the termination policy sought to end federal status of recognized tribes (Prucha 1995; Nagel 1996). The tribes singled out for termination were those deemed in one way or another to have reached self-sufficiency, and therefore no longer in need of government support. Under Public Law 587, the federal recognition of the Klamath Tribe was ended in 1954, and their reservation was transferred to the Fish and Wildlife Service, the Forest Service, and other landowners, both public and private (Hood 1972). Far from encouraging further economic success, the Klamath Termination Act plunged the Klamath Tribe into decades of social turmoil (Ball 1998; Haynal 1986). In the nineteen-seventies and -eighties the tribe began to reaffirm its treaty rights, and in 1986 the tribe won restoration of their federal status. But they did not regain their reservation.

Klamath County, in which the Upper Klamath Basin is predominantly located, is one of the poorest in Oregon (U.S. Census Bureau 2010a). In 2006, 18.4 percent of residents lived in poverty, compared to 13.4 percent in the state as a whole. Only Malheur County, located just to the east of Klamath County, reported lower numbers, with the percentage of residence living in poverty at 20.4 percent. Median household income in Klamath County was $37,045, compared to $46,228 for the state of Oregon as a whole (in 2008, the median household income was $41,093 and $50,165, respectively) (U.S. Census Bureau 2010b). The county is not densely populated, with 10.7 persons per square mile, compared to a state average of 35.6, and a population density of 1,518.4 in

Multnohma County, the location of Portland, Oregon (U.S. Census Bureau 2010b; U.S. Census Bureau 2010c). The largest city in the Upper Basin, Klamath Falls, had 21,040 residents in 2007, and the overall county population was 65,815. Population is growing, but has slowed since the early nineteen-nineties (Klamath County Planning Department 2009).

THE PARTS

The dissertation is divided into three parts. In Part One, "Scientific Legality and Environmental Management," I develop the idea of scientific legality, which I suggest frames environmental disputes and participation in environmental decision-making in the Klamath Basin. Scientific legality describes a situation in which one's legal authority is directly related to one's ability to produce, deploy, and counter scientific knowledge used to make environmental decisions. In addition, I suggest that the legitimacy of many environmental laws is built upon the authority of scientific claims, while the authority of scientific claims is bolstered by the legal legitimacy endowed in them.

I begin with a discussion of the role of science and scientists in the regulation of state force in environmental law. I understand the term "state force" broadly to mean the ability of state to intervene in the lives of people to achieve its policy goals. This intervention can take obvious forms, for example the authority to incarcerate or execute in the name of the policy goal of punishing crime. But it also includes other interventions, such as the ability to halt the construction of a house or prohibit an economic activity, whether subsistence hunting or agriculture, in the name of the policy goal of conservation. I focus on the ESA, which mandates the use of scientific information, and therefore the involvement of scientists, in the conservation of endangered and threatened species. The ESA can authorize the extensive application of state force in the name of conservation. Because scientists play a particularly large and legally mandated role in the ESA, both in the way the Act conceives of the natural world and in the Act's implementation, I suggest that these scientists are closely involved in the

processes that determine how state force is applied.

I then discuss the emergence of the Klamath Tribes as important producers of scientific knowledge about the Upper Klamath Basin's environment. The Klamath Tribes demonstrate an acute awareness of the legal authority granted to scientific discourse by environmental laws. They are aware that the ability to produce scientific knowledge about the environment is a powerful way to gain access to decision-making processes from which they have historically, as an American Indian tribe, been marginalized. Based on this understanding, the Klamath Tribes have turned heavily towards scientific knowledge production as a way to gain increased legitimacy in environmental management in the Upper Klamath Basin. Toady, the Klamath Tribes have a well-developed research program in water quality, fisheries, and terrestrial wildlife biology.

This new role as scientific knowledge producers has not come without challenges, however. I examine a long existing, although problematic, dichotomy between "scientific" and "indigenous" knowledge and between the scientists and native peoples. I suggest that these divisions both essentialize scientific and native cultures and practices, while also ignoring the fact that the social worlds of scientists and native people are today becoming very blurred. Perhaps most importantly, such dichotomies problematically compare a set of professions (i.e., scientific professions) with ethnicities (i.e., native peoples).

However, the idea that "scientific" and "indigenous" environmental knowledge are distinct is pervasive, both among non-native and native peoples, who justifiably associate scientific research and the colonial project (Smith 1999; Whitt 2009; Cruikshank 2001; Garroutte 2003). I examine the ways that the Klamath Tribes conceive of the relationships among scientific discourses, legal discourses, and the knowledge of tribal hunters, fishers, and elders. I also examine knowledge-making practices in an attempt to highlight how essentializations of these practices lead to the overemphasizing of differences. In the Upper Klamath Basin, dichotomies between presumed "types" of knowledge do not easily hold, suggesting that a more fluid and less structural

understanding of knowledge is necessary.

The situation in the Klamath Basin also suggests that tight and deterministic linkages between identity and knowledge are problematic. When talking about the environment, people draw on eclectic knowledge claims. The Klamath Tribes, for example, draw on the knowledge of tribal elders, hunters, fishers, and gatherers, as well as the knowledge of scientists and the knowledge of legal actors. At the same time, not all people draw equally on all environmental knowledge, revealing pervasive hierarchies of authority. I suggest that despite the fluidity of relationships among knowledge claims, scientific legality has promoted a narrowing of discourses that are considered legitimate, a process that has had the effect of reducing the potential of certain speakers to participate in environmental decision-making.

Part One provides a theoretical framing for the two case-studies of scientific legality that follow. In the first case, in the nineteen-seventies, the importance of scientific expertise in environmental struggles was clear, but the Klamath Tribe had yet to gain as much access to the authorized discourses. In the second case study, in 2001, expertise continued to be central, and more groups, including the Klamath Tribes, had gained access to the expert discourses necessary for participation, largely through a recognition of scientific legality. However, even if more groups had gained access, the language of participation remained narrow.

Part Two, "Environmental Agency in *United States v. Adair et al.*" explores the unfolding of *United States v. Adair*, a federal court case over disputed water rights in the Upper Klamath Basin, filed in 1975. In the case the United States government sued approximately one hundred forty landowners along the Williamson River and Klamath Marsh in an attempt to establish the government's senior water rights in these areas.[8] The case had extremely important outcomes for the Klamath Tribe and irrigators throughout

8 The number of defendants eventually increased to six hundred as the area of litigation expanded from the Williamson River and Klamath Marsh upstream of Kirk, Oregon to the entire former reservation (Braunworth, Welch, and Hathaway 2002, p. 83).

the Upper Basin. In particular, the case ultimately established the Klamath Tribe's senior right to water for enough water to maintain an environment suitable for hunting, fishing and gathering.

My focus in this part, however, is not the outcome of the case. I instead explore the ways in which the judicial process drew upon—and in the process reshaped—narratives of Klamath tribal history and the relationship between the Klamath and their environments. Because the plaintiff United States government and plaintiff-intervenor Klamath Tribe made their claims based on a very particular reading of the tribe's historical and environmental roles, it opened up a theater in which those narratives became actively contested by the landowner defendants and defendant-intervenor state of Oregon. I concentrate on two things: the role of experts in creating and contesting these historical narratives, and on the shifting agencies of the Klamath themselves in relation to these narratives. The narratives constructed in court each portrayed the agency of the Klamath in radically different ways *vis-à-vis* settler colonialism and the environment. Additionally, the judicial process produced a hierarchy of "expert" and "non-expert" knowledge, which had the effect of constraining the ability of the Klamath Tribe to define their own relationship to their environment. Far from a purely academic debate, I suggest that the processes by which narratives of Klamath history were solidified within *Adair* produced an official, legalized account of the tribe's environmental role. In this history, Klamath tribal members were "ecological Indians" (Krech 1999), and as such were portrayed as being external to mainstream, technocratic American society. While in some ways an empowering narrative, I suggest that it ultimately constrained the ability of the Klamath Tribe to define its own relationship to the environment.

Part Three, "Uncertainty, Expert Disagreement, and the Status Quo," follows another environmental conflict in the Klamath Basin, this time surrounding the implementation of the ESA. In 2001, the Fish and Wildlife Service and National Marine Fisheries Service ordered the Bureau of Reclamation to stop the flow of irrigation water —known as irrigation deliveries—from Upper Klamath Lake and Klamath River to the

Klamath Irrigation Project. The Klamath Project, which today covers some 220,000 acres, draws irrigation water from Upper Klamath Lake, among other sources. Upper Klamath Lake is also home to two endangered species of suckers, both long-lived, bottom-feeding, species of fish. In official reports known as Biological Opinions, the Fish and Wildlife Service identified the Klamath Project as a jeopardy to the suckers continued existence. At the same time, the Marine Fisheries Service reported the operation of the Klamath Project as a danger to a threatened population of coho salmon living downriver. In the part, I focus on the conflict around the suckers in the Upper Basin.

Immediately, a sensational confrontation began between those in support of the shut-off and those who opposed it. The struggle played out on a number of levels, ranging from the lived experience of Klamath Basin residents, to the office of Vice President Dick Cheney in Washington, DC, to Congressional hearings over the efficacy and equity of the ESA. I focus on the conflict over the veracity of the scientific claims made in the Biological Opinions that had led to the shut-off. The ESA mandates that enforcement decisions such as the shut-off be made using "the best scientific and commercial data available" (16 USC § 1536 (7)(a)(2)). Using this metric as a potential wedge, critics of the shut-off began to critique the science in the Biological Opinions as a means of over-turning the policy legitimated by those claims. The venue for these debates was a National Research Council committee established to review the scientific claims in the Biological Opinions.

I suggest the groups both for and against the shut-off employed two broad strategies in regards to scientific expertise. The first strategy involved attempts to construct scientific truth-claims about the ecology of the Klamath Basin and anthropogenic impacts on that ecology. The second, closely related, strategy was the construction of uncertainty about ecology and human impacts. Each strategy invoked a very different conception of what scientific inquiry is and what it is capable of doing, ranging from idealized notions of positivist science to constructivist notion of situated

knowledge production. I suggest that the strategy each group chose to employ at a given moment was based on its position in relationship to the operational truth-claim at a particular moment in the conflict. The operational truth-claim is the claim on which policy is currently based. When a group was trying to undermine this claim, it attempted to construct uncertainty. When the group was attempting to support this claim, it emphasized certainty. However, the positivist image of scientific inquiry written into many environmental laws, such as the ESA, gives the upper hand to those who wish to construct uncertainties. The unavoidable presence of uncertainty in all scientific claims clashed with wide-spread positivist imaginaries of science, and thus made it easy for critics of the policy to falsely equate scientific uncertainty and "junk" science. Uncertainty thereby became a powerful tool for impeaching potentially correct but still uncertain claims, which, in turn, allowed groups to undo policies legitimated by those claims. In general, uncertainties are the friends of those who hope to maintain the status quo.

Part One

Scientific Legality and Environmental Management

In the following chapters, I discuss how the centrality of scientific expertise in environmental management has affected groups who wish to participate in the environmental decision-making process. In particular, I focus on the Endangered Species Act of 1973 (ESA) and on the Klamath Tribes of American Indians. I develop the idea of "scientific legality:" the related ideas that scientists are legal actors endowed with considerable authority in environmental decision-making, and that a group's legal legitimacy as a participant in an environmental dispute has become directly related to that group's ability to produce, deploy, and contests scientific claims.

In Chapter One, I explore in detail the authorization of science and scientists in environmental law, in particular the ESA.

In Chapter Two, I discuss the Klamath Tribes' response to this situation and the tensions that this has caused—within and outside the tribes—in regards to the idea that "indigenous" and "scientific" knowledge are different and distinct.

Chapter One

Authorizing Science, Legitimating Law

A farmer wearing jeans and a snap-up western-style shirt took the microphone. He was old and wore a cowboy hat. Holding the microphone in one hand, he spoke.

"Can't you see?" he said, "Our local communities are being destroyed by your models and graphs?"

The man stood in the pastel conference room of the Shilo Inn in Klamath Falls, Oregon. The room was filled with people seated on rows of chairs. In front of the room was a long table, and behind that stood a projector screen. Sitting at the table and facing the audience were the members of the National Research Council Committee on Hydrology, Ecology, and Fishes of the Klamath River. The farmer addressed this committee during the public comment period that followed several hours of presentations on the Klamath Basin's hydrology, the Klamath River's ecology, the impact of climate change on the river's flow, and ecological restoration projects intended to mitigate some of the environmental problems in the Basin.

These presentations had been scientific and often quite technical. Given the topics discussed, the composition of the audience may have been a bit of a surprise. The audience was a mixed bunch. The man in front of me wore a large black felt cowboy hat that occasionally obscured my view of the screen. Western-style boots seemed to be the footwear of choice for about a third of the people in the room, another third wore work shoes of some sort. Wrangler jeans outnumbered khakis or slacks, and button-down shirts were more likely made of flannel plaid than oxford cloth. Many members of the audience seemed somewhat out of place in a scientific meeting, the farmer at the microphone among them. But even if they looked out of place, many of them held

themselves in a way that showed they were familiar with their surroundings, familiar with this sort of meeting. Then there were people who were obviously in their element in a conference on scientific issues. They had listened to the presentations with the slightly bent necks of concentrating academics, occasionally looking quizzically at a slide or nodding or shaking their heads.

The Committee on Hydrology, Ecology, and Fishes of the Klamath River had met that day to hear presentations as part of its evaluation of two numeric models of water flows in the Klamath River. One model attempted to predict the river's "natural flow." By natural flow, the authors of the study—scientists at the United States Bureau of Reclamation—meant the river's former water level, volume, and speed before a century of reclamation efforts (largely by the Bureau of Reclamation itself but also the United States Army Corps of Engineers and private concerns) had erected dams, drained thousands of acres of wetlands, and rerouted creeks, streams, and rivers. Natural flow, for the Bureau of Reclamation, in other words, was the hydrologic regime before the Bureau of Reclamation and the arrival of large numbers of white settlers to the Basin changed the hydrology of the Klamath River dramatically. The second study, the Hardy Phase II, or In-Stream Flow Study Phase II, attempted to predict the effects of water levels in the lower Klamath River on habitats for coho salmon and other anadromous fish.

Both models attempted to computationally recreate an environment that had not existed in the Klamath Basin for over a hundred years. In both the studies, the underlying policy motivation for modeling river flow and its ecological consequences was the establishment of baselines by which the Klamath River could be managed to balance environmental and economic needs. Of particular interest was how to conserve several endangered and threatened species of fish as required by the Endangered Species Act of 1973 (ESA) without crippling the region's irrigation-based, agricultural economy, and in particular the farmers in the Bureau of Reclamation's Klamath Irrigation Project.

Not surprisingly, the accuracy and precision of both models were controversial.

The task of the Committee on Hydrology, Ecology, and Fishes of the Klamath River, given to it by the Department of the Interior's Bureau of Reclamation,[9] was as follows:

> 1. Review and evaluate the methods and approach used in the Natural Flow Study to create a representative estimate of historical flows and the Hardy Phase II studies, to predict flow needs for coho and other anadromous fishes.
>
> 2. Review and evaluate the implications of those studies' conclusions within the historical and current hydrology of the upper basin; for the biology of the listed species; and separately for other anadromous fishes.
>
> 3. Identify gaps in the knowledge and in the available scientific information (National Research Council 2008, pp. 5-6).

For the people in the conference room—irrigators (both farmers and ranchers), federal, tribal, and state resource managers, university scientists, members of non-governmental conservation organizations—a great deal was at stake in the evaluation of these models. A positive review would mean that both models would be used to estimate the human impact on the river and the fish that lived in it. And both would have the potential to affect decisions about whether more water should be left in the river and less should be diverted for agriculture. Because these irrigators' livelihoods depended so directly on the availability of water, the question on many of their minds seemed to be whether their economies and ways of life would survive should these models be favorably reviewed, and should they be forced to give up some of the irrigation water on which their farms and ranches depended.

I sat several rows behind the farmer with the microphone, and his question raised several of my own. Clearly, scientific claims were central in environmental decision-making. But what were the particular legal sources of this role? In addition, the farmer at the microphone—and numerous other irrigators signaled their agreement by nodding their heads—clearly felt that the scientists sitting behind the table and those who had created the models were endowed with considerable authority over his life and

9 See the final report's copyright information page.

livelihood. Why did this farmer believe that scientists—through their models and graphs—had the ability to so dramatically alter his life?

The farmers question implied that science—in this particular case ecology, hydrology, biology, and the environmental sciences more generally—had some sort of force in the world, and this force derived from the connections between these scientific fields and environmental law. For the farmer, models did not exist merely as lines of computer code, nor graphs as Powerpoint slides. Models and graphs created by scientists did work in the world through law, the farmer implied.

In this chapter, I explore the connections hinted at by this farmer, connections between science, law, and state force in environmental management. I take the farmer's question as a starting point *not* because I believe that scientists destroy communities.[10] Instead, it is a starting point for exploring the idea of scientific legality. Scientific legality is the mutual constitution of scientific and legal authority in environmental management. It is the idea that the legal legitimacy of one's claims is directly related to one's scientific authority. Environmental regulations in the United States increasingly rely on scientific assessments and the interpretations of scientists as central components in the decision-making process. They do so, in part, because of a widespread cultural faith in a positivist science that can provide objective and impartial information about the world to help make politically charged decisions. In addition, some environmental laws, such as the ESA, explicitly ratify these ideas by requiring scientific claims while excluding others. Such regulations both endow science with further epistemic authority by legally mandating its centrality in the rule of law, while they also rely on the epistemic

10 To be clear: scientists do not desire to "destroy" rural communities, as suggested by the farmer. Scientists with whom I spoke and worked during my research did not have it in for farmers. Some were farmers. Most sincerely enjoyed the rural character of their communities, a character largely attributable to the presence of agriculture. Still others understood that, given rising rates of suburban and exurban development, the presence of agriculture was one of the few things that could ensure open space and slow the creep of new subdivisions. Most were convinced that the best approach to solving environmental issues in agricultural areas was working with farmers and ranchers, not against them.

authority of science to legitimate often controversial decisions. These decisions, in turn, are part of the legal mechanisms that regulate the force of the state to change the way people interact with the environment.

As a result, scientists play a role in the procedures that help direct the lawful force of the state to intervene in the lives of people and the activities of organizations. A related development, discussed in the next chapter, is that scientific legality has narrowed the discourses that can be legitimately utilized in environmental debates. Because scientific discourses are at times the only authorized ones, groups engaged in ESA-related debates must establish their authority to speak about the environment as scientists. Without doing so, they cannot gain legitimate access to the debate. This has the consequence of either forcing people to speak in the authorized discourse, or marginalizing them in the debate.

This chapter examines the role of science in environmental regulation, with a focus on United States endangered species regulations, and especially the ESA. The ESA is a cornerstone of United States environmental law and endows the United States Fish and Wildlife Service and National Marine Fisheries Service with broad regulatory authority to halt or modify private (individual and organizational) and governmental actions.[11] The ESA relies heavily, both in its text and in its implementation, on scientists and their interpretation and evaluation of the natural world. Through its text, the ESA sets the boundaries between legitimate and illegitimate ways to make environmental claims, and endows those with the ability to produce, deploy, and contest scientific claims with a central role in authorizing state intervention in the name of conservation. In the

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11 The two agencies charged with enforcing the ESA are the Fish and Wildlife Service and Marine Fisheries Service. The division of labor between the two agencies falls roughly at the seashore, with the Fish and Wildlife Service responsible for terrestrial species, including birds and freshwater fish, while the Marine Fisheries Service is responsible for marine species, including marine mammals and saltwater fish. Additionally, the Marine Fisheries Service holds jurisdiction over anadromous fish (i.e., fish that spend portions of their lives in both fresh and salt water).

discussion of the ESA that follows, I not only hope to provide specifics about how one environmental law establishes scientific legality, but also to suggest that what occurs within the ESA is applicable more generally in other environmental laws, as well.

LAW AND FORCE

In making this argument, I draw on an understanding of law as the regulation of state force (Bobbio 1965). Scholars have long linked law and force closely together (Austin 1995; Weber 1954; Cover 1986). The relationship has more often than not been framed as force being an instrument of law. For Max Weber, for instance,

> An order will be called convention where its validity is externally guaranteed by the probability that a violation will meet with the (relatively) general and practically significant disapproval of a determinable group of people.
>
> An order will be called law if it is externally guaranteed by the probability that coercion (physical or psychological), to bring about conformity or avenge violation, will be applied by a staff of people holding themselves specially ready for that purpose (Weber 1954, p. 5).

In this understanding, force is the state's instrument for bringing about conformity to law. In contrast, the idea that law is the regulation of force frames the relationship in reverse. Force is not simply a state instrument by which conformity to law is achieved. Instead, law is an instrument by which the force of the state is restrained or, alternatively, brought to bear.

The idea of law as the regulation of force was best articulated by Noberto Bobbio. Law, Bobbio has suggested, no matter what its specific topic—crime, commerce, health, or the environment—has as its general purpose the regulation and administration of the force of the state to intervene in these matters (Bobbio 1965). The particular topic of the law is far less relevant than the common denominator of all law, the force of the state. This shift is dramatic:

> The only sure way of distinguishing legal rules from customary rules,

> apart from coercion, would be to distinguish them on the basis of the diversity of their content. But notwithstanding the various attempts that have been made to define legal rules through their content, the effort to specify the content distinctive of legal rules is an undertaking which seems until now to have been hopeless. . . . [instead, I propose] To determine legal rules, no longer in terms of form, or ends . . . but exclusively in terms of their object. If law is the body of rules which regulate coercion, or the exercise of force, this means that coercion or force is the specific object of legal rules, in the same way as language is the specific object of grammar. . . . The rules which regulate them are a class of rules which can be distinguished from other classes of rules in terms of their object. This class of rules is "law." As grammar is the rule of language and fashion is the rule of dressing, so is law the rule of force (Bobbio 1965, p. 328).

This interpretation is grounded in the idea that force is integral to the existence of the state. Weber has suggested that a state's existence was defined largely by its ability to maintain a "monopoly on the legitimate use of physical force in the enforcement of order" (Weber 1964, p. 154). Similarly, for Cover, the force of the modern state is a given (Cover 1986). In fact, for Cover, the ability of the state to deploy force on its own behalf is self-evident, perhaps even more foundational to the idea of what a state is than an idea such as representative democracy.

> The violence of judges and officials of a posited constitutional order is generally understood to be implicit in the practice of law and government. Violence is so intrinsic to this activity, so taken for granted, that it need not be mentioned. For instance, read the Constitution. Nowhere does it state, as a general principle, the obvious—that the government thereby ordained and established has the power to practice violence over its people. That, as a general proposition, need not be stated, for it is understood in the very idea of government (Cover 1986, footnote 22).

Force—or violence, as Cover termed it—is not only integral to the work law does. In fact, state force is integral to the very idea of a functioning state.

Similarly, for Bobbio, force is perhaps the defining aspect of the modern state. That states intervene, coerce, and apply force on their people was, for Bobbio, given. But Bobbio differed in placing the emphasis not on how this coercion is employed, the types of transgressions the coercion is meant to address, or the form that the coercion takes.

Instead, Bobbio focused on a more fundamental interaction. For Bobbio, law serves a much more important purpose than simply ensuring the conformity of individuals or organizations to law. *Instead, law ensures the conformity of the state to particular rules for dispensing its force.* The object of a law is not the person or organization who is out of conformity. Instead, law's primary object is the state; law's primary goal is regulating how the state can apply its power to address a wide variety of situations, be they theft, the endangerment of species of plants and animals, or political dissent. In fact, in a democracy, law does not primarily protect individuals from each other but rather protects individuals from the arbitrary force of the state to oppress the individual. By regulating state force, law serves to legitimate the force of the state. If state force is applied in a lawful manner—i.e., in a way that is regulated and allowed by law—that force becomes legitimate. If applied in a way that is not allowed by law, that force becomes arbitrary, capricious, and illegitimate. Overly simplified, while Weber argued that bureaucracy might coerce to enforce law, Bobbio has suggested that law works by governing how the bureaucracy coerces.

As this relates to environmental law, the state has a long history of intervening in the countryside and forcing people to change the ways in which they interact with the environment. Environmental laws outline the specific procedures by which the state can intervene in the environmental relationships of its citizens. By following these procedures, a state's intervention into these environmental relationships becomes *lawful*, not arbitrary. The particulars of these procedures are important, since they are the particular mechanisms of the rule of law. These procedures are not fixed in stone, and can be changed—for example by the legislature amending a law. As will be discussed below, the specific procedures authorizing the intervention of the state in regards to endangered species have changed through numerous revisions. But at any given time, these laws regulate how and when the state can intervene to achieve the particular policy goal of environmental conservation. They also regulate who can participate in this process.

In sum, law can be understood as both a means of legitimizing and regulating the state's intervention in the behavior of people and organizations. This is a potent understanding of law that can offer important insight into the dynamics of social control. If law is the body of rules that regulate state force, then studying who participates in legal decision-making helps understand who participates in directing state force. In the next section, I discuss the relationship between science and law and suggest that Bobbio's concept of law provides a useful framework for understanding how scientists have become increasingly important in directing the lawful intervention of the state.

SCIENCE AND THE REGULATION OF FORCE

Law and science are long-connected institutions, and the prominence of scientific inquiry and discourses in environmental law today is not so much a new phenomenon as a reincarnation of an old one. The institutions of law and science as we recognize them today emerged together in Enlightenment Europe. Carol Jones has tied the rise of positive law to that of positivist science in the eighteenth century.

> Science and law are often seen as qualitatively different kinds of activities . . . . They are separate but parallel modes of truth finding, each employing empirical methods and distinctive modes of reasoning. I take issue with this account, arguing that law and science are in many respects rather similar social processes (Jones 1994, p. 14).

As the two institutions of positive law and positivist science emerged as primary authorities in the modern Europe, both made a common claim to their abilities to "separate fact from value" (p. 6). Both law and science made a radical claim: they could, through particular methods, separate truth from opinion. For science, these methods included the controlled, witnessed experiment (Shapin and Schaffer 1989). Similarly, the law claimed that "special legal tools make the separation of fact from opinion possible" (Jones 1994, p. 9). These included the adversarial trial by jury. Through these claims, both "Men of science and men of law [sic] have thus come to enjoy an unrivaled position as diviners of the facts" (p. 9). Through the expert witness, these claims began to merge

into a single hybrid claim: together, the institutions of law and science had jurisdiction over both the human and natural worlds.

According to Jones, the close relationship between science and law is important for questions about mechanisms of social control. Drawing on Weber, Jones has suggested that both science and law are formal-rational institutions. As a result, Weber's warning that the rational bureaucratic institutions of the western world, if left unchecked, could entrap individuals in an "iron cage" of modernity is redoubled as the institutions of law and science lend their authority to each other. Jones has suggested that with the merging of law and science, we risk taking a further step towards a highly potent form of political domination (Jones 1994, p. 10). I suggest that Bobbio's understanding of law as the regulation of state force offers a useful way of focusing Jones' observation (Bobbio 1965). As scientists are called on in law to play an central role in legal decision-making —as expert witnesses, expert advisors, or even as regulators themselves—those same scientists are becoming more integral to the legal processes which direct and legitimate the state's application of force. The authority of scientists now extends beyond its classically imagined boundaries of describing the natural world to law's realm of social control.

When scientists become involved in legal decision-making, it is not as ancillary actors on the sidelines of the legal process. The opinion of an expert witness, if ratified by a judge as true, can become the core of a ruling that could contribute to the legitimation of a prison sentence. If a DNA expert testifies to a match, and the judge is convinced, this match becomes the justification for the imprisonment of a defendant. Through legal procedures, expert opinions can become enforceable truths that quite literally form the grounds that legitimate the state to reshape social relations and physical environments. In some areas of law, the participation of scientists is a requirement of the law itself. In these instances, such participation is particularly important to understand, as the role of scientific experts is an express component of the law itself. One such area of law that is quite explicit about the participation of scientists is environmental law. In

the remainder of this chapter, I discuss one such environmental law, the ESA, and focus on the particulars of how scientific legality is established within it.

SCIENCE IN ENVIRONMENTAL REGULATION

Scientific understandings of nature based on the species and the ecosystem play a central role in the ESA. Codewords for science pervade the text. The word "scientific" appears eighteen times, while "biological" appears eight, "data" appears fifteen, "ecological" appears once, and "ecosystem" appears twice. In addition, the text of the Act continually makes implicit and explicit distinctions between scientific and other ways of knowing and communicating the environment. The central place of biological and ecological understandings of nature in the Act means that scientists play a key role in its administration. In numerous places within the law, scientists are identified directly and indirectly as the sole legitimate spokespeople for the natural world, as the sole producers of knowledge and analysis that are permitted in decision-making. From the determination of whether a plant or animal should be listed as endangered or threatened, to the process by which federal programs are reviewed to ensure that they do not harm endangered species, to the creation of plans for recovery and eventual delisting, scientists are at the center of every stage of the decision-making process. Yet far from being a given, the central role of scientists cannot be taken-for-granted. In fact, comparing the ESA of 1973 with former endangered species regulation and later amendments to the 1973 Act reveals that their expertise was not always considered as central as it is today. Thus, the legislative history of the Act provides an example of the emergence of scientific legality.

This state force regulated by the ESA is no small matter. Once a plant or animal has been listed as endangered or threatened, the federal government, through the Department of the Interior's Fish and Wildlife Service and the Department of Commerce's National Marine Fisheries Service, has considerable authority to intervene in public and private activity in the name of conserving the species and its habitat. In the

Klamath Basin, the ESA has had a highly visible presence, and state interventions authorized by the ESA have been a continual source of controversy. In the four counties comprising the Klamath Basin (Klamath and Lake Counties in Oregon and Modoc and Siskiyou Counties in California), there are twenty-three species in total that are either endangered, threatened, or candidate species (U.S. Fish and Wildlife Service 2010a; 2010b; 2010c; 2010d).

The ESA followed closely on several other pieces of wildlife conservation regulation specifically concerned with anthropogenic extinction (Congressional Research Service 1982). The first of these regulations, the Endangered Species Preservation Act, passed by Congress in 1966, established a list of species native to the United States that were faced with possible extinction. The 1966 Act authorized the Departments of the Interior, Agriculture, and Defense to protect these animals in limited ways, including through the purchase of habitat. The 1966 Act was revised three years later, and renamed the Endangered Species Conservation Act of 1969. Important changes included a more "worldwide" view of artificial extinction. To that end, the 1969 Act limited the importation of species into the United States that were endangered elsewhere in the world (Congressional Research Service 1982, p. 1). The 1969 Act also called for an international effort to address the risk of extinction. That effort materialized in 1973, in the form of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Endangered Species Act of 1973 was passed later that year, incorporating CITES into United States domestic regulation, as well as establishing far more specific guidelines for determinations and administration than had existed in previous United States endangered species regulations (Congressional Research Service 1982).

The ESA set out to slow or stop the problem of artificial extinction by giving the government the right to intervene in the activities of the state, individuals, and organizations in the name of species conservation. In the words of the current ESA (2010),

> The purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth [above] (16 USC § 1531 (2)(b)).

It does so through the listing of animals and plants in danger of extinction, through the systematized review of federal and private activities that might jeopardize such species, and through the establishment of civil and criminal penalties against those who transgress the ESA by "taking" a listed species. "Take," a broad category of deleterious actions prohibited by the ESA, includes to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC § 1532 (3) (19)). The Department of the Interior, in later administrative rule making, has defined "harm" to include

> an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, such as breeding, feeding, or sheltering (U.S. Fish and Wildlife Service 2001a, p. 2).

The Species

The ESA's first two goals, the conservation of ecosystems on which endangered and threatened species depend, and the conservation of the species themselves, appear at first glance simple enough. But what, exactly, is an endangered species, and its close but different relative, a threatened species? And what, exactly, is the ecosystem on which they depend?

Endangered and threatened species are an example of what Susan Silbey calls "legalfacts." The idea of the legalfact highlights "the procedures of law that are the grounds for constructing facts. In other words, jurisprudence recognizes at its core that its truths are created only through its particular processes, and that the relationship

between legalfacts and empirical facts is approximate at best" (Silbey 2007, p. 656). In the case of the ESA, these "procedures of law" distinguish the material reality of species near extinction from the legal status of endangered species. Despite the fact that "endangered species" has entered the vernacular as equivalent to "species in danger of extinction," the two are not the same. One could go so far as to claim that *endangered species* do not actually exist in the wild (Delaney 2003). Rather, in the wild, there certainly are species on the verge of ceasing to exist, but this set of living things on the edge of extinction does not necessarily overlap with the legal set of endangered species protected under the ESA.

Numerous legal processes determine whether a living thing is or is not, or can or cannot, be an endangered or threatened species. The legal contingency of these categories—in contrast to the stability of the category of the material extinction—is well illustrated by tracing how the categories of endangered and threatened species have changed over time. In successive versions of endangered species regulation in the United States, which living things could or could not be endangered or threatened species has changed considerably. In the 1966 Act, for example, endangered species were limited to "native fish and wildlife, including game and non-game migratory birds" (80 Stat. 926 (1)(a)). The 1966 Act was, in other words, limited to animals—fish and wildlife (including birds)—that were native to the United States. The 1966 category was as much geopolitical as biogeographical. In addition, "threatened species" did not exist in the 1966 Act. In 1969, the definition of the legal status of endangerment was amended to include certain invertebrates, such that "'fish or wildlife' meant any wild mammal, fish, wild bird, amphibian, reptile, mollusk, or crustacean . . ." (83 Stat. 275 (1)(2)). In addition, the definition of "species," which was not elaborated upon in 1966 was defined to include "any species or subspecies of fish or wildlife" (83 Stat. 275 (3)(a)). This revision, in other words, expanded the legal category of endangered species to include animals that might not traditionally be thought of as wildlife (i.e. shell fish in contrast to bears or big game in general), as well as subspecies of those living things.

The 1973 Act represented a major expansion in terms of the level of detail in endangered species regulation in the United States. In 1973, the category of endangered, as well as the definition of "species" were again updated. According to the ESA, all "fish or wildlife or plants" were eligible for listing (87 Stat. 886 (3)(11)). The ESA defined fish, wildlife, and plant in classically taxonomical ways. The term "fish or wildlife," for instance, was defined as:

> any member of the animal kingdom, including without limitation any mammal, fish, bird (including any migratory, nonmigratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof (87 Stat. 885 (3)(5)).

The term plant "means any member of the plant kingdom, including seeds, roots and other parts thereof" (87 Stat. 886 (3)(9)). Further, the definition of species became far more broad:

> The term "species" includes any subspecies of fish or wildlife or plant and any other group of fish or wildlife of the same species or smaller taxa in common spatial arrangement that interbreed when mature (87 Stat. 886 (3) (11)).

But while for the first time plants were designated as things that could be endangered, the law allowed for a much finer subdivision of animal life than plant life. Additionally, other living things were also implicitly excluded (because they were not mentioned—fungi, for example) or explicitly barred:

> The term "endangered species" means any species which is in danger of extinction throughout all or a significant portion of its range *other than a species of the Class Insecta* determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man (87 Stat. 885 (3)(4), emphasis added).

Being an endangered species is never a possibility for species of insects deemed to be pests, even if they are on the verge of a pesticide induced extinction. Here, the ESA

makes an ethical judgement about the relative value of different living things. Anthropogenic extinction of some species, in other words, is explicitly permitted by the Act. Insect judged to be pests are not afforded the protections given to plants and other animals. This boundary further reinforces the idea that endangered species and species on the verge of extinction are not necessarily the same things.

In addition to expanding the definition of what constituted a species, the 1973 Act also introduced a new category of endangerment. The threatened species, or "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (87 Stat. 886 (3)(15)), was added as a way to allow the ESA to take a more proactive stance. Threatened species were afforded some, but not all, of the protections granted to endangered species. The 1973 Act therefore greatly expanded the reach of the ESA both in terms of the kinds of living things that could be listed as well as the level of threat to the species' existence that had to be present in order to justify a listing.

In 1978, the ESA underwent a substantial revision, primarily to the rules governing the review of federal projects (discussed below) (Congressional Research Service 1982, p. 643). However, the limits of what could, and could not, be endangered were also revised. Primarily, these revisions dealt with what precisely constituted a "species" under the law. Replacing the reference to "smaller taxa" in the 1973 bill, the 1978 revisions declared that:

> The term "species" includes any subspecies of fish or wildlife or plants, and any distinct population segments of any species of vertebrate fish or wildlife which interbreeds when mature" (92. Stat. 3752 (2)(5)).

Still, however, "distinct population segments" of plants were excluded from the possibility of protection.

Despite all the changes throughout endangered species regulations in the United States, one thing has remained constant throughout the redrawing of the boundaries of endangerment. Even as the category of endangered species has changed, what has

remained fairly constant is the basic unit of conservation and the basic unit of natural organization in the ESA's text: *the species*. In every iteration of the legislation, the ESA and its predecessor acts reflected the influence of taxonomy, as well as evolutionary and population biology, on the legal ordering of the natural world. The legal definition of species has changed over time, including increasingly smaller categories, reflecting not only changing legal characterization of biological organization, but also what groups of living things are deemed the appropriate unit of biodiversity conservation. Far from trivial, this focus on the species has become important in considerations of how hybrid organisms, which do not easily fit into the clean taxonomic base model of the ESA, should be handled under the law (Tranah and May 2006; Adkins Giese 2005).

The ESA and its predecessor laws treated the concept of species as a natural reality. The species, however, is less a biological fact than it is a biologist's convention, and the naturalness of the species is a topic of debate:

> For example, although the term "species" has a commonly accepted meaning, and although evolutionary theory gives a precise technical sense to the term, there is general agreement in biology neither on what counts as causally sufficient or necessary condition for a set of organisms to be a species nor on whether species are individuals (Shrader-Frechette and McCoy 1994, p. 229).

In 1995, the issue of whether the species was a relevant unit for regulation was addressed by a National Research Council committee. The Committee on Scientific Issues in the Endangered Species Act was called by a senator and two representatives from western states (including Oregon) to examine the scientific basis for the ESA. Among other things, the committee set out to examine whether the species concept still held relevancy as the basic organizational unit within the ESA. The report claimed that the concept of the species was debated but, in its view, relatively stable and universal.

> After centuries of debate, no one doubts that natural groups of organisms exist. Scientists now are concerned with methods of classification and circumscription of [these] taxonomic boundaries (National Research Council 1995a, p. 44).

It approached the issue, then, as a problem of a struggle to better describe pre-existing natural categories. However, the report acknowledged that this "concern" about the boundary is rather fundamental in some areas of biology, and that the species may in fact not be a natural unit. Living things do not group themselves and are instead grouped:

> some systematic biologists have declared that there is no single unit that can be called species, and, for example, the concept of species used in classifying mosses might be quite different from that used for classifying species of birds. . . (p. 40).

The biological world, in other words, does not dictate a single, natural system of division. Rather, the biological world is fragmented and diverse, perhaps requiring numerous specific classificatory schemas.[12]

Nevertheless, the report concluded that the species as a scientific concept generally held, thus bolstering the ESA's image of natural divisions. But at the same time, the report noted that the implementation of the term—in distinguishing one species from another for listing—was necessarily uneven and would always be up to some debate. In determining whether a living thing was really a species or not, regulators would have to "rely on the judgement" of competent scientists (p. 44).

The Ecosystem

If the living things the ESA is designed to protect are understood in terms of species, then the nature as a whole that the ESA is concerned with is understood in terms of ecology. The ESA's image of nature is highly influenced by the science of ecology, and the ESA does not see species as being unrelated to the surrounding environment. In fact, ecology is so prominent and underlying that it precedes mention of the species as the object of conservation in the current (2010) version of the ESA:

> The purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be

12 Classification schemas are human tools for ordering. See, for example, Jorge Luis Borge's "wonderment of taxonomy," discussed by Michel Foucault in the Preface to *The Order of Things* (Foucault 2002).

> conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth [above] (16 USC § 1531 (2)(b)).

The ESA, in other words, conceives of nature with an ecological metaphor, in terms of interrelated species and ecosystems. The ESA is intended not only to protect the single species, but also the habitat in which these species exist and depend.

The prominence of the ecosystemic understanding of the environment owes itself to the fact that the ESA emerged as a central piece of environmental law in the United States at a specific moment in the history of science, namely as the discipline of ecology was becoming established as the primary lens through which scientists, regulators, and the general public conceived of nature (Bocking 1997; Hays 1987). Outside the regulatory arena, as well, the words ecology, environment, and nature became synonymous, belying the highly scientized understanding of nature in everyday life (see, e.g., McKibben 1999). As David Delaney has argued, "The ecological framing is, in some respects, the official ideology of American law with regards to artificial extinction" (Delaney 2003, p. 199). From the species to its habitat, the ESA's nature is nature as it is conceived of by ecologists (Rohlf 1989) as a "webs of material connections" (Delaney 2003, p. 193). However, the idea that nature is systemic, that species depend on habitats, and that flows of material and energy connect living things to their habitats and each other, cannot be taken for granted. Despite the common conflation of the words ecology and nature, the two are not the same thing. As Bruno Latour pointed out, "Ecology, as its name indicates, has no direct access to nature as such; it is a '-logy' like all other scientific disciplines" (Latour 2004a, p. 4).

The ecosystemic concept of nature in endangered species regulation has grown more explicit over time. Initially, the ecosystemic concept was articulated through the inclusion of "ecologists" as relevant experts to consult in making determinations of endangerment, as well as by the linking of species and habitat. In the 1966 Act, the importance of habitat was acknowledged indirectly by the recognition that habitat loss

could cause endangerment, and by the authorization for the Secretary of the Interior to purchase land and regulate its use as a way to protect listed species found there (80 Stat. 927 (2)(a-b)). However, the word "ecology" itself did not appear in the 1966 Act. In 1969, the relationship between habitat and species was recognized again through the stipulation that habitat curtailment could cause endangerment, although again without mentioning the word "ecology" (83 Stat. 275 (3)(a)). In 1973, the ESA formally articulated the ecological metaphor to describe the relationship between habitat and species. Ecological value was articulated as a reason to prevent endangerment, as was the importance of conserving the "ecosystems upon which endangered species and threatened species depend" (87 Stat. 884 (2)(a)(3) and 885 (2)(b)). In addition, the ESA recognized that the ecological function of an endangered species—its function in relationship to other species and to its habitat—was in itself a value. Should a species be lost, it could, in other words, cause cascading damage through ecological networks. The Act stated that "these species of fish, wildlife, and plants are of esthetic, ecological, educational, historical, recreational, and scientific value . . ." (87 Stat. 884 (2)(a)(3)). In contrast, the 1966 Act mentioned only the "educational, historical, recreational, and scientific value" of imperiled species (80 Stat. 926 (1)).

In the 1978 amendments, the concept of "critical habitat" was introduced, in essence operationalizing the ecological understanding of nature into a regulatory device for protecting both living things and the systems of which they are a part. According to the ESA following its 1978 revision,

> The term "critical habitat" for a threatened or endangered species means —
>
> (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
>
> (ii) specific areas outside the geographical area occupied by the species at

> the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species (92 Stat. 3751 (2)(2)).

Critical habitat is highly controversial because of the broad repercussions that designations of critical habitat can have. Designations directly affect which activities can be performed on sometimes extensive geographical areas, even if the endangered species that prompted the designation is not present at a particular moment. Furthermore, "take" applies to habitat (U.S. Fish and Wildlife Service 2001a, p. 2). For example, a breeding ground for a migratory endangered bird may be off limits to any activities, even if the bird is only present for four weeks out of the year, if those activities might detrimentally alter that habitat for the bird.

In sum, while extinctions might be caused by climate change, suburban development, or over-hunting, endangered species are exist at the nexus of science and law. The living things ESA is designed to protect are legalfacts—chimeras of legal and scientific considerations. Animals and plants with endangered status exist at an intersection of evolutionary and population biology, ecology, and a complex system of legal and political guidelines for assessing risk, mediating interests, and assigning value.

Scientific and Other Considerations—Determinations and Consultations

Just as scientific understandings of nature figure into the ESA's definition and ordering of the environment, scientific data and scientists also play a central role in the implementation of the ESA. This is particularly true in the determination of endangerment and in review of federal projects that may impact endangered species, a process known as consultation, covered in sections 4 and 7 of the Act, respectively. Throughout both determination and consultation, the ESA makes strict distinctions among the types of knowledge, information, and expertise that can or cannot be considered in particular situations. In doing so, the boundaries that the ESA constructs serve to legitimate particular actors (Gieryn 1999).

Changes in endangered species regulations since 1966: What can be listed and what considerations may go into the determination to list?

Date	What can be listed?	How are they listed?
1966	". . .native fish and wildlife, including game and nongame migratory birds . . ." (80 Stat. 926 (1)(a)).	"A species of native fish and wildlife shall be regarded as threatened with extinction whenever the Secretary of the Interior finds, after consultation with the affected States, that its existence is endangered because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of over exploitation, disease, predation, or because of other factors, and that its survival requires assistance. In addition to consulting with the States, the Secretary shall, from time to time, seek the advice and recommendations of interested persons and organizations including, but not limited to ornithologists, ichthyologists, ecologists, herpetologists, and mammalogists" (80 Stat. 926 (1)(c)).
1969	". . . 'fish or wildlife' means any wild mammal, fish, wild bird, amphibian, reptile, mollusk, or crustacean . . ." (83 Stat. 275 (1)(2)) ". . . any species or subspecies of fish or wildlife . . . threatened with worldwide extinction . . ." (83 Stat. 275 (3)(a)).	"A species or subspecies of fish or wildlife shall be deemed to be threatened with worldwide extinction whenever the Secretary determines, based on the best scientific and commercial data available to him and after consultation, in cooperation with the Secretary of State, with the foreign country or countries in which such fish or wildlife are normally found, and to the extent practicable, with interested persons and organizations and other interested Federal agencies" (87 Stat. 275 (3)(a)).
1973	". . .species of fish, wildlife, and plants . . ." (87 Stat. 884 (2)(a)(1) "The term 'fish or wildlife' means any member of the animal kingdom, including without	"The Secretary shall make determinations . . . solely on the basis of the best scientific and commercial data available to him and after consultation, as appropriate with the affected States, interested persons and organizations,

	limitation any mammal, fish, bird (including any migratory, nonmigratory, or endangered bird for which protection is afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate . . ." (87 Stat. 885 (3)(a)(5)). "The term 'plant' means any member of the plant kingdom . . ." (87 Stat. 885 (3)(a)(9)). "The term 'species' includes any subspecies of fish or wildlife or plant and any other group of fish or wildlife of the same species or smaller taxa in common spatial arrangement that interbreed when mature" (87 Stat. 885 (3)(a)(11)).	other interested Federal agencies, and in cooperation with the Secretary of State, with the country or countries in which the species concerned is normally found . . ." (87 Stat. 887 (4)(b)(1)).
1978	Amended: "The term 'species' includes any subspecies of fish or wildlife or plants, and any distinct population segments of any species of vertebrate fish or wildlife which interbreeds when mature" (92 Stat. 3752 (2)(a)(5)).	No change.
1982	No change.	The Secretary shall make determinations . . . solely on the basis of the best scientific and commercial data available to him after conducting a review of the status of the species and after taking into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation . . ." (96 Stat. 1411 (2)(b)).
1988	No change.	No change.

In the current version of the ESA (2010), in order for a living thing to be an endangered or threatened species, it must first match the criteria for what groups of living things are actually eligible for listing, as discussed above. But equally important, a species must pass through a determination process. Becoming a listed species is a lengthy process that often begins with a petition to the Fish and Wildlife Service or Marine Fisheries Service by a non-governmental organization. If the petition is accepted, the species becomes known as a candidate species, and the process of determination begins. Petitions are accepted based on:

> a finding by the Secretary as to whether the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted. If such a petition is found to present such information, the Secretary shall promptly commence a review of the status of the species concerned (16 USC § 1533 (4)(b)(3)(A)).

Even at this early stage, boundaries are drawn between legally permissible and non-permissible knowledge. When a petition is received, the first test it must pass is the decision of whether it is based on a particular type of information, in this case "substantial scientific or commercial information." "Commercial information," in the parlance of the ESA, is understood to mean scientific information generated by commercial companies, and not information regarding commerce. As the basis for acceptance or rejection of a petition, this test essentially places a petition either in the category of those petitions containing legitimate information, or into the category of those that do not.

If a petition is accepted, the Fish and Wildlife Service or Marine Fisheries Service designates the organism as a "candidate species" and initiates a study to determine whether it meets the criteria for endangerment. Limits on the sorts of knowledge that are considered legally legitimate continue at this point. According to the ESA, "The Secretary shall make determinations solely on the basis of the best scientific and commercial data available to him . . ." (16 USC § 1533 (3)(b)(1)(A)). The ESA draws a rhetorical boundary between knowledge that is "scientific" and knowledge that is not,

and this boundary corresponds to the kinds of knowledge that are or are not legally legitimate. These boundaries, however, were not always as starkly phrased or closely related as they are today in 2010. What constitutes legitimate information to consider in listings has changed greatly since the 1966 Act. These changes demonstrate a process of drawing ever tightening boundaries around legitimate knowledge—and by extension, those who can participate in the process of listing and the administration of the ESA more generally.

In describing how a living thing (at the time only native fish and wildlife) was to be determined to be endangered, the 1966 Act sets out a fairly flexible process that could legally take into account numerous considerations in making a determination to list an organism.

> A species of native fish and wildlife shall be regarded as threatened with extinction whenever the Secretary of the Interior finds, after consultation with the affected States, that its existence is endangered because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of over exploitation, disease, predation, or because of other factors, and that its survival requires assistance. In addition to consulting with the states, the Secretary shall, from time to time, seek the advice and recommendations of interested persons and organizations including, but not limited to, ornithologists, ichthyologists, ecologists, herpetologists, and mammalogists (80 Stat. 926 (1)(c)).

Clearly, scientists played a role in determinations, but only in so far as the Secretary was required to consult with them "from time to time." Additionally, the Secretary was not limited to consulting with scientists, as they are but one group of "interested persons and organizations" with whom the Secretary can consult. These other groups could have been businesses that might be affected by listings. Apart from the "time to time" consultations, there were no restrictions on what the Secretary could consider while determining if a species "survival requires assistance."

The 1969 Act began the process of circumscribing the sort of information that could legitimately be considered:

> A species or subspecies of fish or wildlife shall be deemed to be

> threatened with worldwide extinction whenever the Secretary determines, based on the best scientific and commercial data available to him and after consultation, in cooperation with the Secretary of State, with the foreign country or countries in which such fish or wildlife are normally found, and to the extent practicable, with interested persons and organizations and other interested Federal agencies (83 Stat. 275 (3)(a)).

Here, the "best scientific and commercial data" benchmark entered the legislation. Additionally, the emphasis switched from scientists as people ("ornithologists, ichthyologists, ecologists, herpetologists, and mammalogists" in 1966) to the data they produce. This rhetorical move disassociated data from the data collector and data interpreter, thereby obscuring the embodied origins of scientific data production and interpretation. Scientific data became rhetorically autonomous and free standing, and it moved to the front of the process of determination, not the end. However, at the same time, the 1969 Act still permitted consultation with "interested persons and organizations," including possibly-affected organizations, as well as the incorporation of considerations, such as commerce, that would not have fallen under the rubric of scientific data. Additionally, the 1969 Act, "in order to minimize undue economic hardship to any person importing" an endangered species, allowed for a one year waiver of restrictions on importation (83 Stat. 275 (3)(b)).

In 1973, the ESA's text further contracted the pool of legitimate information that could be used in the process of determination. The phrase "and to the extent practicable, with interested persons and organizations . . ." was changed to "as appropriate with . . . interested persons and organizations . . ." (87 Stat. 887 (4)(b)(1)). This language suggests a shift from an affirmative commitment to consult with non-scientific groups to a skeptical approach in which such consultations are deemed suspect by default. Such consultations must pass a bar of appropriateness (although this bar was left undefined). But nevertheless, the Act's language still permitted determinations to include information in addition to "the best scientific . . . data" (87 Stat. 887 (4)(b)(1)).

Amendments in 1978 made no change to this boundary. In 1982, however, the current language of the determination process became law (U.S. Fish and Wildlife

Service n.d.). By far, this was the most restrictive of any version to date.

> The Secretary shall make determinations . . . solely on the basis of the best scientific and commercial data available to him after conducting a review of the status of the species and after taking into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation . . . (96 Stat. 1411 (2)(b)).

With this amendment, two important changes had occurred since 1973. First, the legality of consulting with "interested persons and organizations" has been completely stricken. If the text were to be interpreted literally, the legality of *interacting* with *anybody* during determination no longer existed. Continuing the process of data-disembodiment that had begun in 1969, the 1982 amendments to the ESA stated that only "data" could be "reviewed." The *exchange* implied in the word "consultation" was been replaced with a far more isolated and one-way process of "review." Second, the word "solely" was added to emphasize that only the "best scientific . . . data" could be reviewed. These shifts furthered the rhetorical dissociation of scientific data from people, and further rarified the process of determination by requiring a particular format of knowledge: data, as opposed to, say, the professional judgement of a consulted wildlife biologist. Of course, while scientists as people were rhetorically dissociated from scientific data, in practice this dissociation was impossible. Scientific data and scientists are inextricably linked to each other (both in the gathering and interpretation of that data), and as such, the amendment located the determination of endangerment in the realm of scientists.

Along with the listing of endangered and threatened species, the ESA of 1973 provided for the listing of critical habitat. In an interesting contrast with the processes for determining endangerment, the legitimate considerations for determining critical habitat remain somewhat more open. Determinations of critical habitat are allowed to be made while considering the economic impact of the designation.

> The Secretary shall designate critical habitat, and make revisions thereto . . . on the basis of the best scientific data available and after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Secretary may

> exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned (16 USC § 1533 (3)(b)(2)).

The contrast between the legitimate information for determinations of endangerment and critical habitat underscores that the ESA was written with a clear boundary in mind between things considered to be scientific and things considered to be economic. The explicit inclusion of economic considerations in critical habitat designations, in comparison to its explicit exclusion from determinations of endangerment, makes is clear that, in the minds of the ESA's authors, knowledge considered scientific was clearly delineated from knowledge that has its basis elsewhere. The contrast to the requirements for determinations of endangerment are sharp, reinforcing that the omission of "economic impact" from the listing review is intentional.

The boundary drawing between "scientific" and "other considerations" continues in the process known as consultation. Consultation, outlined in section 7, is the process by which federal projects are reviewed for their possible impact on endangered and threatened species and their critical habitats. Consultation begins with the federal agency that wishes to undertake a project (known as the "action agency") asking the Fish and Wildlife Service or Marine Fisheries Service whether or not any listed species might occur within the area of the proposed action. "If the Secretary advises, based on the best scientific and commercial data available, that such species may be present" the action agency is required to begin consultation with the Service over the effects of the proposed action (16 USC § 1536 (7)(c)(1)). In the ideal case, consultation begins informally, with the action agency and the local Fish and Wildlife Service or Marine Fisheries Service office working together to review the action to define its impact and modify it as necessary to reduce that impact. Such informal consultation, seen as an opportunity for reducing conflicts between action agencies and the reviewing agency, does not always occur. In either case, the action agency produces a Biological Assessment "for the

purpose of identifying any endangered species or threatened species which is likely to be affected by such action" (16 USC § 1536 (7)(c)(1)).

Once a Biological Assessment has been completed, it is reviewed by the Fish and Wildlife Service or Marine Fisheries Service. Several things may then occur. The reviewing agency could decide that the Biological Assessment shows that little to no impact will occur as a result of the project. The project's impact could be low either because of changes made during informal consultation or because the original project design had a low impact. In this case, consultation ends with a finding of "no jeopardy" and the project is approved. At this point, the action agency has fulfilled its legal obligation under the ESA to submit its projects for review, and the Fish and Wildlife Service or Marine Fisheries Service has fulfilled its legal obligation to enforce the ESA.

On the other hand, when presented with a Biological Assessment, the Fish and Wildlife Service or Marine Fisheries Service may make what is known as a "jeopardy finding." At this point, formal consultation begins, with the reviewing agency conducting a full review of the status of listed species and their habitats in the area of the proposed project, as well as the possible impacts of the proposal itself. This review is to be carried out, according to the ESA, based on the "the best scientific and commercial data available" (16 USC § 1536 (7)(a)(2)). The product of this consultation is a Biological Opinion, in which the Fish and Wildlife Service or Marine Fisheries Service outlines "reasonable and prudent alternatives" to the proposed action. These alternatives are designed to not jeopardize the listed species or adversely modify its critical habitat. It is entirely possible that the only alternative that does not jeopardize a listed species is the cancellation of the project, and the review agency has the regulatory authority to do just this. The action agency must comply with the Biological Opinion by altering its action based on the reasonable and prudent alternatives. If it does so, the action agency is immunized from what is known as "incidental take," or take that may occur secondary to the proposed action as it is carried out (16 USC § 1536 (7)(b)(4)). The reviewing agency has, in essence, signed off on the risk that *some* damage *may* occur, but that this risk is

deemed acceptable.

In sum, the ESA attempts to strictly circumscribe legally legitimate from illegitimate knowledge in determining endangerment and during consultation. What precisely has constituted legitimate and illegitimate considerations has changed throughout the history of endangered species regulation, and in general has moved in the direction of privileging "scientific" information above other considerations. In the process, scientists, as the producers and interpreters of such information, have gained more important roles in determining endangerment and reviewing federal projects for risks to listed species.

Through the processes of listing and consultation, the ESA regulates a substantial amount of legal force against both the actions of government agencies and private organizations and individuals (16 USC § 1540 (11)). Against other government agencies, the ESA gives the Fish and Wildlife Service or Marine Fisheries Service the right to stop programs and projects that might jeopardize endangered or threatened species. The ESA authorizes the Fish and Wildlife Service and Marine Fisheries Service to buy habitat, curtail development, or bar people from land entirely. Against individuals, any person who knowingly violates any provision of the ESA can be fined a civil penalty of $25,000 per violation. Each act of importing or exporting carries a civil fine of $12,000. Criminal penalties for violating the ESA extend as high as $50,000 and one year in prison. Through consultation and penalties against take, the ESA is able to manage the way that the government, organizations, and people interact with the environment.

Constructing the Legitimacy of ESA Actions

Because law is the regulation of state force (Bobbio 1965), an ESA enforcement action—in other words, the application of state force regulated by the ESA—is made lawful and legitimate when the particular procedures of the ESA are followed. Adhering to the particular procedures of ESA decision-making means strictly bounding particular discourses and the speakers that construct and deploy them. These "technical procedures

and rules of law . . . define the boundaries of legal agents' legitimate action. . . . Those same rules . . . create a division of labor and relay of authority that enables action without that action being reducible to any single actor" or to an exercise of discretion (Ewick and Silbey 1998, p. 76). For a legal standpoint, the boundary work within the ESA is part of the process by which ESA decisions gain legitimacy.

In addition to procedural legitimacy, the boundary work conducted within the ESA—delineating scientific data from other considerations—serves to bolster the legitimacy of the ESA by conferring on its decisions the authoritative mantel of science. Ecological conceptions of nature, and evolutionary conceptions of species, are not simply written into the ESA, in other words. Rather, the epistemic authority of ecological and biological narratives is a central component of how the legal legitimacy of the ESA is established and maintained. With the ESA's demand for particular types of information comes the ability for the Fish and Wildlife Service or Marine Fisheries Service to defend its enforcement actions—which can cause economic hardship and can be unpopular—by pointing to the scientific pedigree of the information used to make these decisions. Through this language, the ESA "seeks to legitimate their claims about natural reality"—that a particular species is endangered, and is jeopardized by a proposed action—"as scientifically made and vetted inside the authoritative cultural space" of scientific knowledge production (Gieryn 1999, p. 16). The ESA's text goes even farther by rhetorically sequestering the scientific data from the people who produce this data, in effect making the claim that the data can—and did—make the decision self-evident.

Choosing this particular path to legitimacy, however, is not without risks. It immediately opens a number of obvious paths for contesting an ESA decision. Legitimation through procedure is not straightforward, since the procedure is not straightforward. Despite attempting to "rationalize politics" though the use of scientific expertise, the ESA achieves no such thing (Jasanoff 1990, ch. 1). Interpretations of whether procedure was followed can vary greatly (see Part Three). This is in part because the question of what actually constitutes scientific information is left

unanswered. Throughout the ESA and its predecessor acts, "scientific data" is presented as an easily identifiable thing. At the same time, the ESA implies that there are different qualities of scientific data, only the "best" of which is legally legitimate. In doing so, the structure of the ESA practically begs for conflicts over whether information taken into account meets these benchmarks—as "science" or not, as "best" or not (Carden 2006). However, no process was ever established by the Act—or for that matter is necessarily possible—for determining what these benchmarks are or if they have been met. As discussed in more detail in Part Three, the ESA's mandate for science can be a double-edged sword, both offering a way to legitimate, and delegitimate decisions.

THE REIFICATION OF SCIENCE AND LAW

Scientists play a central role in the regulation of legal force thanks to their place, sometimes mandated, in legal decision-making processes. In the ESA, in particular, boundaries are drawn to create categories of legal and illegal knowledge claims, and that these boundaries explicitly allow scientific claims while excluding other considerations. This mandated role increases their authority in ESA decision-making, and correspondingly circumscribes the authority of other groups of people. However, this argument has important limitations, namely the tendency to reify both the institutions of law and of science. Law and science lay claim to the possession of epistemologies and methodologies that purport to produce objective results (Jones 1994). Few other institutions can make such durable claims. As a result, there exists a strong tendency to reify both institutions, and both are often accorded more direct influence and certitude than they might actually posses.

There is a risk in my argument that such reification is perpetuated on both fronts. First, I do not want to reify the ability of law to decisively regulate state force. As anyone who has watched a case crawl up from the lower courts towards the Supreme Court,[13] or for anyone who has watched a regulation go unenforced, or noted how discretion shapes

13 For an example of how appeals can change law, see, e.g., Anthony Lewis (1964).

legal decision-making (Black 1971), the application of state force via law is far from immediate, irreversable, or absolute. Court rulings are appealed, altered, and overturned. The focus of legal force can be redirected or minimized through the payment of fines in lieu of incarceration, through plea bargains, or through settlements (Galanter 1974). Legal decisions provide, at best, frameworks for future courses of action. In each of these cases, the state force regulated by law is reduced or redirected, suggesting that the link between law and force is, at the very least, a highly mediated one.

Second, I should not reify the directness of scientists' influence on legal decisions.[14] As prior endangered species legislation shows, the authority of scientists in the law was not always present, but was instead added over time. The prominence of science and scientists in the ESA, in other words, cannot be taken for granted. It could, just as easily, be reduced; and in fact, it has been. While they may play a central role in the rhetoric of environmental law, including the ESA, scientists are rarely the final decision-makers in environmental regulations. Take, for example, the God Squad, as it is informally known, which was created as part of the ESA as an amendment in 1978, in part as a way to curb the authority of scientists in ESA decisions. The Endangered Species Committee, as it is officially known, is a cabinet-level committee that can "grant an exemption from the requirements" of consultation under the ESA—in essence playing god over the future of an endangered species—by permitting an action agency to carry out a project without involving the Fish and Wildlife Service or Marine Fisheries Service (16 USC § 1535 (7)(e)(2)). In addition, in 2004, the Department of Defense was granted exemption from the ESA in matters of national security, further suggesting that the level of scientists' authority in endangered species conservation can, through legislative change, be altered (Defense Authorization Act of 2004; U.S. Fish and Wildlife Service 2008).

The God Squad and the national security exemption are quite dramatic examples

14 In fact, some scientists would suggest that their influence on decision-making in certain areas is not direct enough, and that administrators simply ignore what they have to say (see, e.g., Barringer 2007).

of the balancing of multiple considerations in the determination of whether a potentially jeopardizing project can continue or not. There is, however, a more fundamental counterargument to the direct influence of scientists in the ESA's decision-making apparatus despite the prominent rhetorical position. The authority of scientists in the ESA becomes acutely limited when controversies over scientific claims arise. The ESA is written as if the "best available scientific and commercial data" were easily identifiable as "best," or that "scientific . . . data" were clearly distinct from non-scientific data. As discussed in detail in Part Three, such identification is rarely easy in practice. In addition, in many cases, it is less a question of "best available scientific" data regarding an endangered species, and instead simply a question of *what scientific data is available at all.* Furthermore, the rhetoric of the ESA assumes incorrectly that data is relatively consistent and is not contested; again, this is rarely the case.

In sum, it is not as if what a scientist says suddenly becomes Fish and Wildlife Service or Marine Fisheries Service policy, which in turn authorizes the state to intervene in the countryside in the name of the ESA. As shown in Part Three, far from it, in fact. At the same time, scientists find themselves at the center of the decision-making apparatus because the rhetoric of laws such as the ESA has tightly linked scientific and legal authority. These laws have explicitly created a situation in which the legal legitimacy of a claim is directly dependent on scientific authority. As the available discourses for participating in ESA decisions have narrowed, so too have the speakers who can employ them. In the following chapter, I explore how scientific legality has impacted the ways that groups make legal claims.

Chapter Two

Indigeneity and Scientific Legality

Following the first snow in March, the Klamath Tribes[15] of southeastern Oregon hold a ceremony to honor the return of the *c'waam* to the Sprague River, a tributary of Upper Klamath Lake. The *c'waam*—a fish known colloquially in English as the Lost River sucker—migrate annually up the river to spawn. On a bitingly cold and deeply muddy Saturday morning in 2007, not long after the Shilo Inn conference, I attended this ceremony at the invitation of the director of the tribal Culture and Heritage Department.

I looked around as I stood shivering on the river's bank, just down river of Chiloquin Dam. A large group of people were gathered around an open fire. On one side sat a group of tribal elders, whose role in the ceremony it was to bless the fish. To their right was a drum circle singing in the distinctive and intensely articulated Klamath style. And in front of them was a large container filled with about eight inches of water and two suckers, each a little less than two feet long. The *c'waam,* along with the *qapdo* (or shortnose sucker), are large, brown-gray, long-lived, bottom-dwelling fish. Both fish are at the epicenter of environmental controversies over the Endangered Species Act of 1973 (ESA) and tribal resource management in the Klamath Basin.

In this chapter, I explore the ways that scientific legality impacts the discourse that people employ to make environmental claims, and I explore the implications of this for the Klamath Tribes of American Indians. I focus in this chapter on a struggle that

15 As noted in the Introduction, the Klamath Tribes have referred to themselves, and been referred to, in two different ways during the historical period covered in this dissertation. In this chapter, I use the plural version throughout, as the chapter is largely focused on the present. References in this chapter to "the tribes" should not be read as a reference to all American Indian tribes, but rather as a reference to the Klamath Tribes.

underlies most environmental conflicts in the Upper Klamath Basin: that between knowledge and authority. I argue that, understanding the legal authority of scientific knowledge, and seeking a more central role in the management of their treaty rights area, the Klamath Tribes have turned toward ecological research in their natural resource management program. In the process, the Klamath Tribes have become major producers of scientific knowledge in the Upper Klamath Basin. The tribes have deployed the legal authority of science as a way to subvert their historically subordinate position in relation to the state and non-tribal individuals and organizations. In doing so, they have upended taken-for-granted power relations among these actors and gained more complete access to environmental decision-making in the Upper Basin.

At the same time, this response has produced tensions derived from the widely held ideas environmental knowledge of scientists and that of American Indians and other native peoples are separate and distinct things. Indeed, the Klamath Tribes' relatively new role as producers of scientific information sometimes sits uneasily with their understandings of themselves as American Indians. Far from being evidence of a distinct divide between environmental knowledge, however, I argue that deterministic relationships between identity and knowledge oversimplifies the numerous and overlapping ways that tribal members conceive of the relationship. Furthermore, examination of knowledge making practices reveals more similarities. Indeed, people produce and draw on multiple knowledge claims when discussing the sucker and other aspects of the environment in the Upper Klamath Basin.

KNOWING FISH

I begin at the *c'waam* ceremony because it reveals the numerous ways that people know a single aspect of the environment, in this case the *c'waam*, in the Upper Klamath Basin. The audience at the ceremony included people belonging to numerous different social worlds in the Upper Basin. These included tribal members, ecological scientists, regulators and legal professionals, the press, non-tribal residents, and the odd social

scientist. The diversity of those in attendance reflected the diversity in the ways people know the fish at the ceremony's center.

As the ceremony commenced, one of the tribes' cultural leaders told of the *c'waam*'s creation and meaning of the fish for the tribes. Long ago, a giant serpent, far larger than a man, had terrorized a Klamath village on the shores of Upper Klamath Lake. The inhabitants could not stop the creature, so the creator *g'mok'am'c* came to their assistance. He slew the serpent atop a prominent ridge overlooking the lake, cut it into pieces, and threw the pieces into the water below. Hitting the water, the pieces transformed into *c'waam*.

These fish were embodied spirits of ancestors, and *g'mok'am'c* advised the villagers to honor them with a ceremony each year. If they did, he said, the fish would be the first to return to the rivers in spring, and would become the first available fresh meat following the Upper Klamath Basin's long winters. The *c'waam* and *qapdo* have long been tribal food sources, and tribal members today recount the distinct, delicious taste of the meat and the ease with which they could catch the fish three decades ago. But since 1986, they have been unable to catch the fish.

That year, the Klamath tribal government placed a moratorium on the tribal subsistence fishery. The reason for the moratorium lay in a second way in which people know the fish at the center of the *c'waam* ceremony. At the time of the ceremony, both the Lost River and shortnose suckers were particular kinds of legal creatures: endangered species.[16] Since 1988, they have been deemed by the United States Fish and Wildlife Service to be a "species which is in danger of extinction throughout all or a significant portion of its range . . ." (16 USC § 1532 (2)(6)) and therefore eligible for protection under the ESA. In the Federal Register entry listing the fish as endangered, the Fish and Wildlife Service wrote:

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16 The Lost River sucker was recommended for down-listing to threatened later in 2007 (U.S. Fish and Wildlife Service 2007a). As with most down-listing proposals, this one stirred substantial controversy. The status of the shortnose was recommended to remain endangered (U.S. Fish and Wildlife Service 2007b).

> Dams, draining of marshes, diversions of rivers and dredging of lakes have reduced the range and numbers of both species by more than 95 percent. Remaining populations are composed of older individuals with little or no successful recruitment for many years. Both species are jeopardized by continued loss of habitat, hybridization with more common closely related species, competition and predation by exotic species, and insularization of remaining habitats (Fish and Wildlife Service 1988, p. 27130).

As listed species, the fish gained protection from "take" (16 USC § 1532 (2)(19)). The protections afforded the suckers as a result of their legal status have thrust the fish into the center of intense conflicts over environmental management in the Klamath Basin. In the Basin, irrigated agriculture draws its water from the suckers' habitat. Such activities have had effects on fish populations, although the scope of these effects are contested. For the Klamath Tribes, the importance of the sucker—spiritually and as part of their historical economy—has made the decline in fish populations especially troubling, and has made efforts to restore them a central goal of tribal natural resource policy.

But the ways of knowing the sucker do not end there.

How was the Fish and the Wildlife Service able to legally determine that *Chasmistes brevirostris* (shortnose sucker, *qapdo*) and *Deltistes luxatus* (Lost River sucker, *c'waam*) were "in danger of extinction?" They could do so based on research conducted by fisheries biologists in the late nineteen-seventies and nineteen-eighties after the tribal fishers reported declines in the populations of fish at historically productive fishing grounds. These observations the tribal government to pursue avenues to protect the fish. In other words, in addition to a gift from *g'mok'am'c*, a prized food, and a legalfact, the suckers are also scientific objects (Silbey 2007, p. 656). As if to emphasize this additional way of knowing the fish, both fish in the ceremony had spent the night before at the Klamath Tribes' research station and hatchery. At the hatchery, scientists employed by the tribal Natural Resources Department hatched, raised, and studied suckers over the last decades. In addition to conducting some of the first research into the basic life histories of the fish, they also conducted research on breeding the fish in

captivity, should the fish's wild populations dwindle to the point of needing to be boosted by domestically bred stock. They also conducted research on the environmental tolerances of the fish, in an effort to better understand the impacts of declining water quality changes on the fish.

In stark contrast to the nineteen-eighties, when there was a paucity of data on the fish (U.S. Fish and Wildlife Service 1988, p. 27130), in 2007, research on the sucker was conducted by the Klamath Tribes, non-governmental organizations, universities, and several federal agencies, including the Fish and Wildlife Service, the United States Bureau of Reclamation, and the United States Geological Survey. These two particular fish in the ceremony had been caught at one of the many United States Geological Survey tagging stations in Upper Klamath Basin, and then transferred to the hatchery. Since 1995, the United States Geological Survey has operated an extensive sucker tagging program in the Klamath Basin, in which scientists have assigned unique "social security numbers"—to use the words of one United States Geological Survey biologist—to tens of thousands of fish. These identification numbers are either written on the tags themselves or encoded in radio frequency identification chips implanted inside the fish (see, e.g., Benson 2008). Periodically, these individuated fish are recaptured by researchers or sensed by underwater antennas. When they are, their identification numbers are recorded, and the fish are translated from living animal into immutable, mobile data (Latour 1987). Scientists use these data to build numeric models designed to describe population dynamics. Results from these models become available to policy makers to help decide whether the fish continue to merit "endangered" status under the ESA, whether they should be down-listed to "threatened," or de-listed entirely.

The ceremony illustrated some of the tightly interlinked and overlapping ways that people know the sucker in the Klamath Basin. At once, the Klamath Tribes' spiritual traditions knew the *c'waam* as the spirits of ancestors. The fish were also known by tribal fishers who once exercised a tribal treaty-right to catch the fish for subsistence. These fishers knew where the fish tended to gather, and they knew that over time, their

populations were declining. In response, the tribes turned to another way to know the fish: a legal way. Without loosing what they were before, the *c'waam* also became legalfacts created by the rhetoric and enforcement of the ESA. But because the ESA stipulates that determinations of endangerment must be made based on "solely the best scientific and commercial data available" (16 USC § 1536 (7)(a)(2)), the fish could not be endangered species if they were not also known by scientists as objects of research.

The fish were boundary objects. As they floated there, the fish in the ceremony existed simultaneously in the physical world of the Upper Klamath Basin, as well as numerous different but overlapping social worlds, including the worlds of tribal fishermen, tribal elders and leaders, ecological scientists, lawyers, and regulators. The *c'waam* and *qapdo* have, in other words, "different meanings in different social worlds but [with a] structure [that] is common enough to more than one world to make them recognizable in several . . ." (Star and Griesemer 1989, p. 393). As boundary objects, the *c'waam* make a good starting point to examine relationships between social worlds and the knowledge they produce and use. As identifiable creatures that are known in multiple ways, the fish invite consideration of the relationship between indigeneity, law, and science.

The social worlds and knowledge of native peoples, scientists, and legal actors are often thought of as being distinct and bounded from one another. However, the multiple character of the *c'waam*, and the fact that people from different social worlds discuss the fish in a variety of ways, suggests otherwise. Knowledge about such boundary objects necessarily transcends divisions between social worlds because the objects exist simultaneously in a variety of social worlds (Mol 2002). One fish is literally many fish, each characterized by different people—fishers, elders, scientists, regulators, and anthropologists. To all of these people, the same physical fish was a different, but related thing. Moreover, people in different groups tended to draw on many ways of knowing the fish when they talked about them, suggesting that the link between a person's group identity—as an American Indian, a scientist, a federal regulator—and the knowledge a

person posses and deploys are not exclusive or deterministic. Allen Foreman, the Klamath tribal Chairman, for example, had prefaced the ceremony with a speech that drew on understandings of the fish as scientific research objects, as components of a subsistence economy that had existed since time immemorial, as spiritual creatures, and as a legal category. Foreman, a prominent figure in tribal government, knew the *c'waam* in multiple, overlapping ways, and drew on these ways to make particular points about the fish.

The fish and the ceremony, then, offer an opportunity to engage two themes in discussions about relationship between "indigenous" and "scientific" knowledge: first, that there exist "types" of knowledge that are fully distinct from each other, and second, that a person from a particular social world necessarily or primarily knows the environment in a single way. First, despite the fluidity evidenced in the ceremony, discussions about knowledge often create a sharp divide between presumed "types" of knowledge. Often, these contrasts are based on essentializations of what constitutes a presumed type of knowledge. As Christine Walley has noted, discussions of "indigenous" and "scientific" knowledge tend to "contrast a monolithic 'science' with an equally essentialized depiction of 'indigenous knowledge'" (Walley 2002, p. 267). Take, for example, several authors' understanding of the differences between "scientific" and "indigenous" (or, in the authors' words, "pre-scientific") knowledge-making practices:

> Before the elaboration of the modern hypothetico-deductive methods of systematically accumulating understanding to the functioning of the natural world, pre-scientific societies accumulated knowledge at a rather slow pace. Much of this knowledge was qualitative and based on observations on a rather restricted geographic scale (Gadgil, Berkes, and Folke 1993, p. 151).

Gadgil *et al.* further noted that: "pre-scientific" people's "'diachronic' observations can be of great value and complement the 'synchronic' observations on which western science is based" (p. 151). Gadgil *et al.* essentialized knowledge-making practices in all directions. They then used these essentializations to formulate a clearly problematic

hierarchy in which science is more evolved than other ways of producing environmental knowledge. Their characterization of what science is, however, is highly narrow. Numerous characteristics that they use to distinguish scientific from indigenous knowledge-making practices do not hold up upon close examination. Indeed, Gadgil *et al.* may have never participated in a long-term (i.e., "slow pace") monitoring project of chemical and biological constituents (i.e., "western science") of a single lake (i.e., "restricted geographic scale") designed to characterize dynamics of environmental change through time-series (i.e., "diachronic") field data obtained from samples (i.e., "observations"). These essentializations and the hierarchies that emerge from them reveal that the authors place scientific knowledge in a clearly superior position to other forms of knowledge. Yet this essentialization is constructed around an image of science that has little to do with actual environmental scientific practice, which is largely non-experimental, observational, and diachronic.[17]

Similarly, the relationships of American Indians, and other native peoples, with the environment are essentialized in the popular imagination. Mythologies such as the "ecological Indian" figure heavily into these essentializations (Krech 1999). Additionally, the idea of indigeneity implies an autochthany to native cultures that is misleading (Walley 2002, p. 267). Such presumptions portray native cultures as highly static and unchanging. They overlook the numerous historical interactions between American Indian tribes, as well as long-term interactions with non-native peoples. They also overlook the fact that native traditions are continually changing, just as any group's culture continually changes. American Indian tribal culture is not only diverse between tribes and over time, but diverse within tribes, as well. The presumed homogeneity of the tribe overlooks the heterogeneity of any cultural group. The Klamath Tribes, for example, who are recognized as a tribe (singular) by the United States, are in fact a

17 Part Three contains a more detailed discussion of tensions between essentializations of scientific practice (especially in the laboratory) and the realities of field practices in ecological sciences.

grouping of three culturally distinct, but historically connected peoples.[18]

Second, the *c'waam* ceremony suggests that strict divisions between groups of people based on the knowledge they possess are problematic. A group and "its" knowledge should not be assumed to be *a priori* and inseparably bound together. Rather, a group and the knowledge associated with it tend to emerge in tandem with each other (Gieryn 1999; Espeland 1998; Abbott 1988). Tribal members, for instance, do not solely draw on "indigenous" knowledge about fish, but also draw upon legal knowledge of the fish as a treaty-protected animal and an endangered species, and scientific knowledge of the fish as a data point on a population graph heading disconcertingly towards zero. Additionally, regulators do not draw solely on legal knowledge of the fish, but instead are steeped deeply in scientific reports. And the intense scientific interest in the fish would likely not be as intense were it not for the legal status of the fish. The fish and the ceremony were "zones of exchange" of knowledge between social worlds (Galison 1997, p. 804).

People draw variously on knowledge that emerges from many different epistemic traditions, rather than being limited to a single one. In the Klamath Basin, it is clear that boundaries between roles and knowledge are becoming increasingly blurred. Tribal members are scientists, scientists are regulators, and regulators are tribal members. In the Upper Klamath Basin, one cannot be surprised when an American Indian talks science, or when a scientist talks law. Part of the reason why this sometimes seems surprising is that comparisons of "types" of knowledge, for example "scientific" and "indigenous" knowledge, falsely compare a set of professions (scientific professions) with a diverse set of ethnic groups (the diversity of native peoples). These comparisons problematically suggest that native peoples are limited in the knowledge they can legitimately posses based entirely on their ethnicity.

However, while people draw on eclectic knowledge claims to make communicate

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18 Kroeber (1955) has offered an interesting, although dated, discussion of the "tribe" as a unit in the context of the Indian Claims Commission.

their environments, not all people draw equally on all sorts of knowledge. Scientists, for example, tend to draw less on fishers' knowledge of the sucker than do tribal fishers on scientists' knowledge. Regulators, similarly, tend to favor scientific knowledge over that of tribal fishers. These asymmetries reveal hierarchies of epistemology and authority. Such hierarchies are expressed in a number of ways. Often times, knowledge of tribal elders, fishers, hunters, or gathers are framed as not being knowledge, and instead as being anecdotes. Scientific claims are often portrayed as knowledge, while other claims are portrayed as stories, and therefore less authoritative as a way to talk about the world (Agrawal 1995; Cruikshank 2005; Corburn 2005). In this chapter, I hope to unbalance the idea that certain people produce knowledge—disembodied, un-situated abstractions—while others tell "stories"—embodied, situated tales. Ultimately, we all produce knowledge which we communicate through stories. These stories might be communicated orally or by graph, but they are narratives none the less. Ultimately, we are all tellers of tales as we communicate our knowledge and understanding about the world and our place in it (Hayden White 1987).

In the Upper Klamath Basin, certain narrative forms are privileged above others because of the legal requirements of environmental disputing. In the previous chapter, I explored how the ESA legitimates certain types of discourses in environmental claims—in particular, ecological scientific one. As environmental law increasingly relies, explicitly and implicitly, on scientific claims, the epistemic authority of these claims is translated into legal authority in environmental disputing. Thus, to be considered legitimate participants in such negotiations, claimants must speak about the environment in ways understood to be scientific. This situation, in various forms, has been observed in other settings as well, from Canada to Africa (Cruikshank 2005; Nadasdy 2003; Walley 2004). As Cruikshank (2005) and Nadasdy (2003) have argued, the authorization of scientific discourse in environmental disputes has occurred in tandem with the de-authorization of knowledge that is considered not scientific, and a narrowing of the

discourses available with which to make a claim.[19] Native peoples "may be forced to speak in uncharacteristic ways" about their world if they wish to be heard (Cruikshank 2000, p. xv). The power dynamics that result between legal authority, environmental knowledge, and the people who tell them form the core of my discussion.

SOVEREIGNTY WITHOUT LAND

To a large extent, the legal pressure to speak about the environment in particular ways would not be as acute an issue if the Klamath Tribes possessed a reservation on which they could fully exercise their sovereign authority (Nesper forthcoming). Certainly, the tribes would have to interact with their neighbors and federal and state environmental management agencies. However, the tribes, at least within the boundary of a reservation, would be able to make decisions on their own, based on criteria of their choosing. But such is not the case.

For the Klamath Tribes, negotiation over the environment has become a fact of life. Today, resource management authority within the tribes' treaty rights area is distributed among the tribes, numerous federal and state agencies, and private landowners, each with their own priorities and mandates. No single party has full jurisdiction over the entire area, and jurisdictions also overlap. This interlacing frames the negotiations over the meanings and management of the sucker, treaty rights land, and other tribal trust resources.[20] The importance of this situation—sovereignty without land

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19 The de-authorization of non-scientific narratives affects not only the Klamath Tribes, but also others in the Klamath Basin as well. Non-tribal landowners (primarily ranchers and farmers) repeatedly related their frustration to me about the lack of credence given by federal agencies to their lived experiences on land. These environmental understandings are often classified as being "anecdotes" or "experiences," thus establishing landowner "narratives" in a subordinate position to governmental "knowledge."

20 The concept of "tribal trust" embodies the legal responsibilities of the United States, as trustee, towards American Indian tribes, as sovereign nations. At its most narrow interpretation, the trust doctrine outlines the responsibility of the United States to carry out treaty and statute provisions. At its broadest interpretation, it states that the federal government has the responsibility to

—for framing the discussion that follows, merits a brief review of the Klamath Tribes history in the Klamath Basin.

In their treaty, the Klamath Tribes ceded approximately twenty-two million acres and retained a reservation of approximately ten percent that size on a portion of the Klamath's aboriginal territory. The treaty guaranteed the tribes "the exclusive right of taking fish in the streams and lakes, included in said reservation, and of gathering edible roots, seeds, and berries within its limits . . ." (Kappler 1904, p. 866). Over the subsequent ninety years, approximately fifteen percent of the original reservation transferred out of tribal hands through allotment, sale and default, post-treaty federal acquisitions, and repeated re-surveys of the reservations border (Stern 1965). In 1954, after a bitter debate over termination, the Klamath Tribes lost their federal status (Prucha 1995). In an example of the "dispossess[tion of] the wilderness," the federal government transferred the vast majority of the former reservation to the Fish and Wildlife Service's National Refuge system and the Forest Service (Spence 1999; Jacoby 2001; Catton 1997; Walley 2004; Warren 1997). Termination threw the status of the tribes' environmental treaty rights into uncertainty. As is often the case, it was the state government that staged the most concerted effort against treaty-conferred hunting and fishing rights (see, e.g., Nesper 2002; Cohen 1986). The state of Oregon maintained that the tribal hunting, fishing, and gathering rights no longer existed, and began to enforce state game laws against tribal hunters.

In a series of lawsuits in the nineteen-seventies and -eighties, however, the courts ruled that the tribes' environmental treaty rights had survived termination. In 1974 the federal courts concluded in *Kimball v. Callahan I* and *II* that a nonexclusive tribal hunting, fishing, and gathering right remained, and established the tribes' right to

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promote tribal self-governance and self sufficiency, above and beyond specific treaty obligations. In any case, it is a fiduciary responsibility, and it includes the responsibility to consult the tribe when the federal government manages a tribal resource, such as animals which a tribe has a treaty right to hunt and fish (Pevar 1992; see, e.g., U.S. Office of the Special Trustee for American Indians 2001).

participate in the management of tribal trust species through a consent decree with the Oregon Department of Fish and Wildlife. In 1983, in *United States v. Adair et al.* the Ninth Circuit Court of Appeals affirmed a water right with a priority date of time immemorial for sufficient in-stream flows to maintain an environment necessary to support tribal trust species. These rights applied within the *former* reservation as it stood in 1954 at termination. Efforts to establish similar hunting, fishing, and gathering rights outside of the 1954 boundary were unsuccessful. In *Oregon Department of Fish and Wildlife v. Klamath Indian Tribe*, the Supreme Court reversed the Ninth Circuit Court of Appeals' decisions upholding off-reservation rights on ceded lands. The Supreme Court found that hunting and fishing rights were appurtenant to the lands ceded, and were therefore lost when this land left the tribal land base.

In 1986, the tribes achieved restoration of their federal status. They did not, however, regain their former reservation lands. Restoration without land recovery crystallized the complex layering of post-termination tribal sovereignty, property ownership, and environmental management jurisdiction. Today, while the tribes exercise environmental rights—including the right to hunt, fish, and gather, and the most senior water right—on the public lands within the 1954 boundary of their former reservation, they do not posses an absolute authority in regards to environmental management within their treaty rights area. This is in contrast to tribes that possess reservations, and who are able to set, for example, water quality minimums on their reservation under the Clean Water Act and the "treatment as state" doctrine.[21] In practical terms, the tribes cannot simply implement their management priorities within this area, as they might be able to do within the bounds of an existing reservation. Instead, in the name of protecting and exercising their treaty rights, they must negotiate management with the agencies, organizations, and individuals that actually own or administer the land. These organizations and persons who can easily have divergent perspectives and priorities.

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21 For example, see Nesper (forthcoming). The "treatment as state" doctrine is outlined at 33 USC § 1377.

A brief example will help illustrate the issue. The mule deer is an important tribal subsistence species, and the tribal hunt is a treaty right. Tribal members are allowed to purchase tags from the tribes at nominal rates to take two male deer a month (excluding some winter months) without being bound by the state of Oregon's hunting laws and quotas.[22] For example, tribal members can hunt at night using a technique known as "spotlighting"—the use of a powerful light to find deer at night. This practice is illegal for non-tribal members participating in the public hunt. Many tribal members avail themselves of this right, since hunting is a central part of their culture, the meat is prized for its flavor, and because the availability of deer meat reduces the amount of domesticated meet that a tribal member would otherwise have to buy in the super market. The role of hunter is a highly respected one, and hunters are seen as carrying on an important cultural activity. In addition, tribal hunters provision elders and family members with meat, an important form of social security.

Managing deer populations is therefore a high priority for the tribes, and they have a treaty right to participate in deer management. However, the deer themselves are technically the jurisdiction of the Oregon Department of Fish and Wildlife, even within the former reservation, where a public deer hunt also takes place. The Oregon Department of Fish and Wildlife sets limits for the public hunt, and so the Klamath Tribes must negotiate the size of this hunt to ensure enough deer for the tribal hunt, while also leaving a suitable base population for reproduction. This base population requires suitable habitat, so the management of deer habitat is also a tribal priority. The habitat of the mule deer within the former reservation is largely under the jurisdiction of the United States Forest Service, which manages the former reservation for multiple uses, including logging, game cover, and recreation. The tribes must therefore negotiate the management of these forests in the interests of habitat over logging. However, not all the former reservation is controlled by the Forest Service, nor do deer remain the entire year on the former reservation. Should a deer run far enough, it could easily find itself on land

22 The Klamath Tribes, [Tribal hunting regulations,] n.d., (DAP).

owned by the Oregon Department of Forestry or the Fish and Wildlife Service, thus introducing another group to the negotiation. In the winter, deer often are found on land controlled by the United States Bureau of Land Management. Or, the deer could migrate across land owned by private individuals or organizations, thus introducing yet another management partner. And finally, Highway 97 is the leading cause of mule deer fatalities in southeastern Oregon, and as a result the Oregon Department of Transportation also becomes involved in deer management. In sum, jurisdiction is fractured and overlapping, and any management effort necessarily involves numerous parties. As a result, while Klamath tribal members have a treaty-right to hunt within the boundaries of their former reservation, in order to exercise this right, the Klamath Tribes must negotiate the management of the mule deer population with numerous other governmental agencies, individuals, and non-governmental organizations.

CONTENDING WITH SCIENTIFIC LEGALITY

The situation is similar with the sucker, and along with disputes over forestry, hunting, land recovery, and water allocation, the restoration of the endangered *c'waam* and *qapdo* has become one of the most important and volatile natural resource management issues for the tribes. As endangered species, the fish are under the jurisdiction of the Fish and Wildlife Service, although they live in water that is under the jurisdiction of the state of Oregon and the Bureau of Reclamation. Listed just two years after the tribes' restoration to federally recognized status, the fish's recovery parallels the tribes' own return from termination in symbolic as well as material ways. In my conversations with tribal members and tribal government members, I have heard the word "restoration" used to describe the legal process of federal re-recognition, the reinvigoration of tribal social and cultural institutions that languished during termination, and the recovery of fish and wildlife populations and their habitats. The word has acquired a potent plural meaning that ties tribal culture, politics, and environmental management tightly together.

In this section, I discuss the response of the Klamath Tribes to the authorization of

scientific discourses in endangered species management. Scientific legality has had two, somewhat divergent, effects. To an extent, scientific legality has had a democratizing effect on environmental decision-making. The central role of scientific claims in environmental laws such as the National Environmental Policy Act (NEPA) and the ESA has created a point of entry for groups who were historically less able to participate in the past. Utilizing the requirements for detailed scientific studies of environmental impacts under NEPA, for example, groups previously not a part of policy discussions have been given a powerful tool to intervene. Environmental movements, both large and small, often base their legal challenges on the veracity of scientific claims used in evaluating the impacts of possible policy choices (see, e.g., Stine 1993). Failures of federal agencies to follow the scientific environmental review procedures to assess environmental impact have historically opened a fairly consistent window of opportunity for the environmental movement to critique projects. Similarly, the central role played by scientific expertise—both natural and social scientific—has also offered a new way for American Indian tribes, the Klamath included, to gain increasing influence in decision-making (Espeland 1998).

Scientific legality has, at the same time, served to narrow the field of legitimate participants. As the range of discourses considered legitimate in disputes have narrowed around scientific ones, so too has the field of speakers narrowed to those who can authoritatively produce, deploy, and contest scientific narratives of environmental change. There has been, in the words of Michel Foucault, a "rarefaction of the speaking subject" (Foucault 1981). The image of a rarefaction, a thinning or increasing sparseness, vividly describes the limited number of people who can speak authoritatively in a given discourse. One, quite literally, has to gain access to discourses, and this can be a difficult process.

One of these difficulties faced is that certain areas of discourse have historically been unavailable to certain speakers. As a result, those trying to gain access to these discourses may face the perception that they are acting outside of their customary social role. These two related problems are particularly relevant to American Indians. The

relationship between speaking as scientists and speaking as American Indians about nature is a highly complex one for the Klamath Tribes, and the tribes constantly deal with how their identities as American Indians and scientists relate to each other.

At the *c'waam* ceremony on that cold morning in March, I approached Foreman, at the time the tribal Chairman, and asked if he would be willing to talk with me about the fish, their significance for the tribes, and the conflicts surrounding them. A week later, at his office in the Tribal Administration building, he offered me a cup of coffee and we sat down to talk. As Chairman, Foreman had direct experience interacting with scientific experts, regulators, the media, and the tribal and non-tribal publics during years of intense environmental conflicts.[23] I told him I was interested in environmental conflicts in the Klamath Basin, and he began to tell me about the suckers' decline, which tribal fishermen had begun to observe in the nineteen-seventies. Before I even had a chance to say anything about my interest in the relationship between science and law, he said:

> But when the tribes first started complaining [about the decline], people would come back and say, "where's your science?" We brought in people like [our fisheries biologist], and others before him . . . They confirmed with science what we knew forever. We changed the method of confirming what we already knew. We had to convert to science because mainstream society said, "Where's your science?" They had us over a barrel until we could produce it.

Science, he continued, became "a bridge of communication between tribal historical knowledge and the contemporary world." He continued: "Science can capture and translate our tribal historical knowledge to the non-tribal world."

Foreman's description elaborated on and intensified something that had long been recognized in the Klamath Tribes: that scientific authority and legal legitimacy went hand in hand. In a series of articles written in 1989 and 1990 for the *Klamath Newsletter*, the official tribal newspaper, the Natural Resources Department (at the time called the Klamath Tribe Fish and Game Department), wrote about its ongoing scientific studies of

23 See Part Three.

mule deer. The studies were designed to assess mule deer populations and the effects of anthropogenic habitat change on those populations. The data were part of an effort to effect changes in game and habitat management involving several other government agencies, including Oregon Department of Fish and Wildlife, Oregon Department of Forestry, and the United States Forest Service. The goal of the project was an increase in deer population and to protect the treaty guaranteed tribal hunt. The article summarized these goals while also stated a more general reason for the collection of scientific information on the deer:

> Evaluation of habitat requirements for wildlife species is important to determine the extent of specific influences on a population by various factors. It is also important because of the continued manipulation of forested ecosystems. Understanding the impact of the manipulation is necessary to quantify the effects, both short and long term, determine essential mitigation, and evaluate the costs and benefits of the action. Habitat requirements and the conditions necessary to provide suitable environments for species viability are essential to effectively work in the political spectrum of natural resource decision-making.
>
> Politics continue to play an increasingly significant role in natural resource management. Better methods that more accurately quantify environmental impacts are needed. These methods are required for technical evaluation, to educate the decision-maker, and inform the public of the effected environment.[24]

The article described a situation in which environmental management was a highly political undertaking. But it also implied that one could gain authority with decision-makers, and by implication cut through some of those politics, by creating "better methods and more accurately quantify[ing] environmental impacts." Without such methods and data, one would not be able to "effectively work in the political spectrum of natural resource management." Such data was an admissions ticket of sorts, and without it, one's efficacy was highly circumscribed. Interesting, also, is that resource management is portrayed as a spectrum, one end being political, and the other,

24 "Mule Deer Habitat Effectiveness," *Klamath Newsletter,* 1989 or 1990, Part II of a series on Mule Deer, p. 2.

presumably though unstated, scientific. In this article, one's ability to operate in the political parts of resource management would be bolstered by having scientific data at ones disposal.

The situation described in the article, and again almost twenty years later by Foreman, was that of scientific legality. Scientific legality forced the tribes to confront directly the question of the politics knowledge in environmental law. In our conversation, Foreman described to me how ecological research created an entryway into regulatory decision-making that had previously been unavailable to the tribes. In his account, in the nineteen-seventies, when tribal members began to recognize and speak about the decline of the suckers at historical fishing grounds, tribal government tried to bring it to the attention of state and federal agencies. The tribes felt, however, largely ignored. The tribes were attempting to speak from inside one social world—that of tribal fishers—into another—that of policy makers and regulators—but found that the other would not accept their narrative as grounds for regulatory action. In fact, said Foreman, policy makers seemed generally disdainful of what they were hearing from the tribes.

The tribes faced two problems. First, they seemed unable to effect management changes by making claims solely based on the fish's tribal trust status or the tribes' treaty fishing rights, both of which were arguably being adversely affected by declining fish populations. Second, the tribes found that in order to make claims via other legal avenues, for example the ESA, they had to speak in the authorized discourse. People demanded science and not, Foreman said, "what they call the folklore of the tribes" as a justification for action under the ESA. Here, Foreman identified the recurring hierarchical portrayal of tribal fishers' and elders' understanding of the fish as stories, or "folklore," and scientific understandings as "knowledge." Foreman seemed to clearly understand that attempts to cast these understandings as "stories" in contrast to "knowledge" had the effect of diminishing their authority, as he pointedly referred several times to "tribal historical knowledge" in contrast to non-native's use of the term "folklore." But Foreman also seemed to acknowledge that rhetorically framing tribal

understandings as knowledge was itself insufficient to meet the expectations of "mainstream society." According to Foreman, tribal claims had to be made in another discourse in order to be heard: that of science. Foreman offered a vivid metaphor for the situation until that was achieved: "They had us over a barrel until we could produce it." Without access to scientific discourse, the tribes were in a subordinate legal position in environmental disputes.

In the struggle to protect culturally vital animals, including the *c'waam* and *qapdo*, as well as other tribal trust species like the mule deer, the tribes have established themselves over the last forty years as major producers of scientific knowledge about the Klamath Basin environment, and the suckers and their habitat in particular. Deer data had been gathered since at least 1979, and water-related data had been gathered for longer as part of *Adair*. Tribal research projects on and about the fish have included the initial life-history and population studies that led directly to their listing as endangered, trials on raising the fish in captivity should they go extinct in the wild and require reintroduction, genomic research, environmental tolerance experiments, and water quality monitoring in Upper Klamath Lake and its tributaries.

The Klamath Tribes' recognition of this situation is highly astute, as was their response. Acting "on an understanding of organizational behavior, an understanding gained through experience and learning," the tribes realized that it would be effective to adopt a new role in legal disputes, in this case, the role of scientist (Ewick and Silbey 2003, p. 1351). By doing so, the tribes' previous subordinate legal position ("over a barrel," so to speak) could be "upended" (p. 1364), and the tribes could make more authoritative legal claims under the ESA. The result, while on the one hand increasing their legal authority, has also produced tensions at both personal and institutional levels about the relationship among environmental knowledges.

The tensions originate in the complex relationships between what Foreman called "tribal historical knowledge" and "science." It is a relationship that is often described as fraught with, perhaps insurmountable, difficulties. One of the most outspoken voices

emphasizing tensions between "western science" and traditional tribal knowledge is the American Indian scholar Vine Deloria. In *Red Earth, White Lies*, Deloria has written that the very continued existence of American Indian culture is at risk due to "western science." If Native America is to survive, "much of western science must go" from tribal life (Deloria 1995, p. 3). For Deloria, "western science" fundamentally threatens native culture and oral, traditional understandings of the world. Deloria based his position, in large part, on the tangled and sometimes violent history among native peoples, scientists, and the colonial state. The push for scientific systemization the natural world, often in the name of economic expansion, was a central justification for European colonial exploration (Drayton 2000). From these earliest encounters, Europeans endowed scientific explanations of natural phenomena with far more epistemic authority than accounts by native people (Cruikshank 2001). In addition, the *perceived* absence of "science" and "technology" in these cultures was often used by Europeans as evidence of European racial superiority (Adas 1989). Nineteenth-century claims of purported biological difference between "races" then helped naturalize racial hierarchies in the public mind (Gould 1996). Research methodologies in regards to native peoples are often described as colonial, in that they have historically perceived as extracting knowledge from native peoples while offering little or nothing in return (Smith 1999). Bioprospecting by pharmaceutical companies provides a contemporary example, but anthropological research was historically focused on explaining the perceived cultural superiority of Europe over non-Europeans, often through evolutionary models (Stocking 1991). Additionally, concerns that archeologists placed research over the cultural rights of American Indians led to stricter regulation in the field through the Native American Graves Protection and Repatriation Act (Preston 2007).

Interactions such as these with scientists threatened American Indian cultures, according to Deloria, and continue to do so. Based on this history, Deloria has suggested that American Indians who become scientists are acting inauthentically and are in a sense internalizing the historical processes of imperialism that have sought to strip them of their

culture. "College and graduate education . . . have now created a generation of technicians and professionals who also happen to have Indian blood. People want the good life and they are prepared to throw away their past to get it" (Deloria 1995, p. 2).

Here, Deloria has associated the way one understands the world and communicates that understanding with biology—with Indian blood and ancestry. Because Deloria made culture biological through blood,[25] rather than social through learning, Deloria set up a situation in which particular biologies result in particular cultural or professional systems of understanding. In this model, a person with a particular blood, cannot legitimately practice another social world's system of understanding and communicating the world. Such participation would be, quite literally, unnatural, in that it would contradict the biological basis of the person in question. This is a highly static systemization, in which two systems of knowledge and the people who practice them are strictly and clearly demarcated and in rigid opposition to each other. Crossing from the world of the native person to that of the scientist can be a traumatic experience in which a traveler's status and membership can be lost or fundamentally altered.

Such sharp distinctions run contrary to the experiences of the Klamath Tribes. For the tribes, it seems that for their tribal culture to survive and prosper, science should not "go," as Deloria admonished. Instead, their legal strategy to protect and restore the *c'waam* and *qapdo*, and the cultural practices that depend on them, now heavily involves scientific expertise. The Klamath Tribes' choice suggests that individuals can speak in multiple ways about the environment, and in so doing, adopt multiple roles that are not dictated by biology, as Deloria has suggested, but instead based on the opportunities and constraints at hand. These roles and the knowledge associated with them interact with each other and come into contact with each other continuously through boundary objects, like the fish. The complete cultural disenfranchisement found in Deloria's narrative has

25 In making this statement, Deloria reproduces the idea that culture is biological, and can be quantified through blood. This idea has been codified in the legal concept of blood quantum (see, e.g., Kauanui 2008; Garroutte 2003).

not occurred. Rather, in my conversation with Foreman, I saw a continuum of metaphors to describe the relationship between narratives, ranging from dichotomous to complimentary.

The first of these metaphors was that of "conversion." The word conversion suggests the extent and completeness of traversing this boundary, and maps most closely onto Deloria's conceptualization. It suggests a radical transfiguration of worldviews, in which one would need to change the way one understands and thinks about nature and adopt a vastly different one. But at the same time, Foreman also used another metaphor, this time "translation." As opposed to the all or nothing connotations of a conversion, the idea of translation suggests that there exists some degree of commensurability between the knowledge of scientists and native peoples, even as they remain distinct discourses (Espeland 1998). The narratives more or less parallel each other, and are occasionally "bridged," to use Foreman's imagery. Just as in translating a literary work from one language to another, there may not be a perfect match between what each is communicating, and these things are certainly being expressed in different languages, but the meanings survive the passage from one narrative to the other. In environmental law, the official language happens to be science, so things have to be translated into that.

A final metaphor employed by Foreman was that of "confirmation." Confirmation suggests if not homology, then at least an intersection between narratives, a point where the understandings expressed in each one are identical. It also suggests that scientists can validate things already known about the natural world by native peoples, but that are not generally accepted as true by others. Once scientized via confirmation, these ideas become acceptable and commensurable to forma-rational bureaucracy (Cruikshank 2000; Nadasdy 2003). On the one hand, the metaphor of confirmation sets up a familiar hierarchy, in which one has the power to validate or invalidate the other. Even as it brings the two together, in other words, it does so on highly unequal terms, making the epistemic authority of hunter's, fisher's, and elder's knowledge claims contingent on their being vetted by scientists. On the other hand, confirmation

establishes native understandings as prior to scientific ones, endowing the former with temporal priority. In this framing, scientists are achieving today the understandings that have long been already known by American Indians.

All this is to say that the idea that the environmental understandings of a scientist and a tribal fisher or hunter are distinct, even opposed, greatly simplifies the relationships as they are conceived by Foreman and the Klamath tribal government. Characterizations vary widely, but the relationship is not one of complete disconnection or impermeability.

KNOWING DEER

Ideas about the distinctiveness of knowledge continue to break down when knowledge-making practices are taken into account. During the summer of 2007, I would regularly accompany the Klamath Tribes' wildlife biologist on daily trips into the former reservation's forest to monitor deer traps. The traps are part of a project to tag and collar mule deer. The collars are equipped with Global Positioning System (GPS) units and memory to record the location of deer as they move. The collars also have an analog transmitter that allows researchers to locate the position of collared deer using radio-signal triangulation. Once a collar has been deployed for a period of time and the deer located again, the collar can be remotely opened and collected once it falls to the ground. The data can then be downloaded from the collar and mapped and statistically analyzed using Geographic Information System (GIS) software.

The project provides the tribes with a variety of data, including the migration habits of the deer, locations of and relationships between their winter and summer habitats, and relative population densities, to name a few. It was a continuation and expansion of the project discussed in the *Klamath Newsletter* above. The data is useful for a number of reasons. The mule deer is an important subsistence hunting species for the tribes, and so monitoring and managing their populations is important. The data is also of importance to the tribes because the deer tend to winter outside of the boundaries of the former reservation. The tribes' treaty rights are technically limited to the former

reservation, but deer migration links the treaty rights area with non-treaty rights areas. Such data assists the tribes in claiming a stake in the management of these areas because that management directly affects a tribal-trust species. Finally, the data both augment and serve as independent measures against similar data gathered by the Oregon Department of Fish and Wildlife. The Oregon Department of Fish and Wildlife uses their own data to set annual permit numbers for the public deer hunt. As a result, the tribes must annually make a claim for the proportion of the total deer population that should be reserved for the tribal hunt versus the public hunt. Having independent population density and distribution data is essential to make these legal claims, the tribes have found.

Here, I want to focus on the practices by which scientists collect their data about deer movements, as an example of a site where knowledge making practices between hunters and scientists blur. Trapping a deer takes at least two people, so the tribal wildlife biologist would always be accompanied by another member of the tribal Natural Resources Department. The wildlife biologist was not a tribal member, but the natural resource specialist who often accompanied him was. Many times while driving to the traps, the natural resource specialist would talk about places where deer had been spotted in the past during hunting trips. These hunting stories were a central way that the specialist knew these animals, and his knowledge was extensive. It was a profoundly personal experience from the moment he would spot a deer. Things proceeded very quickly as he raised his gun. There was hardly time to take aim, he said. Over time, he said, you learn where to point the gun; it would be less accurate to call it consciously aiming than simply knowing where to point. Once a deer was shot, the process of preparing the carcass began. Needless to say, this process involved quite close contact with the deer, including the removal of its internal organs and blood.

At the same time, the natural resource specialist had extensive knowledge of the former reservation and the animals that lived there gained from ecological scientific research. He had participated in some of the early tribal studies of the suckers' life history. He conducted population surveys of mule deer on the former reservation, and

planned ecological restoration projects intended to help restore sucker habitat and water quality. He observed and recorded data about bald eagle nesting sites, contributing to a cooperative project monitoring the birds in the Basin. He had extensive experience working at the interface of the tribes and other governmental management agencies on wildlife and habitat management. The specialist drew his knowledge of the environment from a wide array of knowledge generated in a wide variety of ways. He also participated in the production of a wide variety of knowledge about the former reservation's environment, both as a hunter and a scientist.

In my second summer of field work, in the summer of 2008, I had repeated opportunities to accompany the natural resource specialist onto the former reservation to collar deer. That field season, due to staffing changes, the natural resource specialist and the tribal GIS specialist were running the deer collaring programs. With the natural resource specialist, I assisted in setting and checking traps. As we drove we would discuss changes in the deer patterns we could glean from our trapping successes so far and notice where deer seemed to be showing up (and where not). The specialist also told me a great deal about habitat change in the reservation forests, and how this change in brush was affecting deer populations over the long term. Interestingly, logging had stimulated the growth of underbrush that was eaten by the deer. With the reduced logging on the former reservation, habitats were filling in, sometimes at the expense of fodder. Aspects of the environment were unexpectedly connected, I thought. Along with these ecological scientific narratives, I would listen as he told hunting and fishing narratives. I often marveled at how the specialist switched between one discourse and another, discussing hunting and fishing one moment and GPS collar initiation and ecosystem dynamics the next.

As a hunter, he knew deer through observing numerous deer over years of hunting, both at close range and from afar. For hunters such as himself, producing knowledge about deer also involved direct contact with the deer. At first glance, these practices seem quite different from producing knowledge about deer with GPS collars.

The hunter's knowledge of the deer was embodied, visceral, and experiential. As a scientist, his knowledge seemed remote, cooly space-age, and computational. This characterization of difference can be maintained, however, only if one de-emphasizes another part of satellite-assisted deer monitoring: actually getting the collar on the deer. All the satellites orbiting the world do nothing if the GPS collars remained on a shelf. Tranquilizers, which put the deer at a serious risk of death, are not used, so the animals must be tagged when they are fully awake. This promised to be an exciting experience, and I had been waiting for the moment when I would be able to assist in this process. But I was secretly afraid of it, as well. I had heard stories of researchers getting kicked in the ribs and spat on. In addition to stories of scientists getting tossed about, I had also heard cautionary tales of how researchers could easily hurt, even kill, a deer while collaring it. Accidentally breaking even a single bone in the deer is essentially a death sentence for the animal, since it puts the deer at a major disadvantage in terms of foraging and taking cover from predators or hunters. Additionally, healing a broken bone requires extra energy, which the deer would not be able to acquire easily, precisely because of the broken bone.

In my first summer of field work, in May 2007, the wildlife biologist, the tribes' GIS specialist, and I parked our truck on the side of a dirt road, unloaded our tool boxes full of data forms, tags, screw drivers, pliers, zip-ties, and a collar, and quietly walked towards a trap that we had baited with salt the day before. That morning, we approached the trap and peered over a berm to see if an animal had been trapped. One had. We nodded to each other with expressions of excitement and questioning—are you ready? Do you remember what you are supposed to do?—and then we started to run towards the trap, each holding tool boxes. It was best to approach as quickly as possible, to minimize the amount of time between the deer seeing us and our reaching the deer. The deer, of course, saw us immediately and began to jump violently inside the trap, which had a steel frame supporting hockey-goal like netting. It threw itself against the metal and the net, causing the trap to leap along with it. It was frantic, clearly terrified. The division of

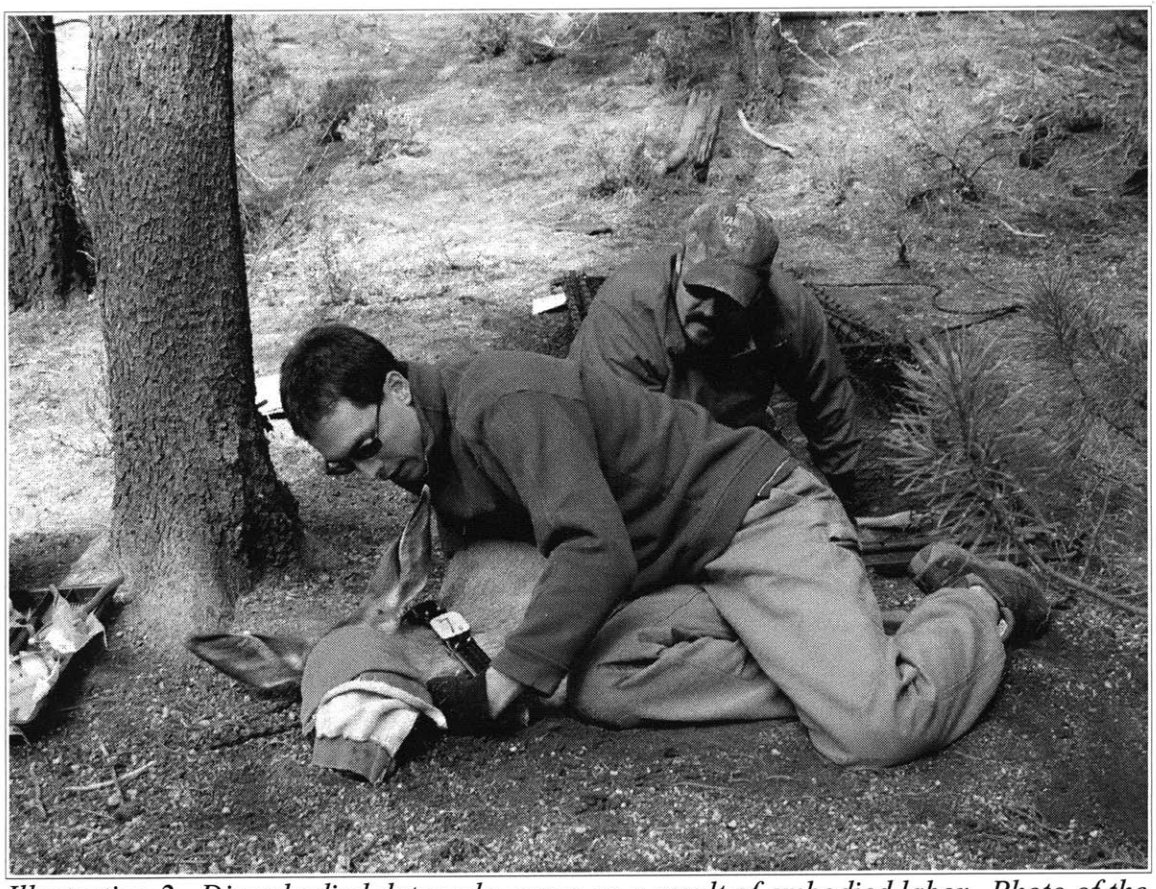

Illustration 2. Disembodied data only comes as a result of embodied labor. Photo of the author, the Klamath Tribes GIS specialist, and a deer. Photo by the Klamath Tribes Wildlife Biologist.

labor decided upon in the truck—mostly involving me staying out of the way and providing instruments as needed to the two more experienced workers—dissolved in the reality of the situation. The trap was designed to collapse in order to force the deer to the ground so that they can be immobilized and collared. The two experienced researchers began to collapse the trap and force the deer into a position in which it could be collared. But once the deer was on the ground, no one seemed to be exactly where they were supposed to be, and it fell to me to hold the deer's neck and keep it blindfolded while the biologist activated the GPS collar. The GIS specialist pinned down the hind-quarters of the deer. This was more than I had bargained for.

To hold a deer to the ground as it is being converted into data (collared, tagged, and measured) is an experience that ends all fantasies about the supposedly disembodied nature of scientific knowledge production (Haraway 1988). Grasping closed the blindfold with one hand, my other arm was wrapped around the deer's neck. My torso was over its back. The deer felt both incredibly strong and incredibly fragile, as if my weight could snap its bones. I remembered the cautionary tales, and loosened my grip slightly. But then the deer struggled and nearly shook me off. I allowed more of my body weight to pin it to the ground. But every muscle in my body was still tense as I tried to apply just enough weight to immobilize the animal but not enough to crack its forelegs, which were forced under its stomach and against the black steel frame of the trap. Every few moments, the deer would twitch or strain or jump in an effort to escape. Each time, I was dragged a little farther from the trap through the dust. Mosquitoes, perhaps realizing that my hands were otherwise occupied, began to settle on my face and bite. My face was inches from the back of the deer's head. I could see the blood vessels in its ears; they were large and pronounced. I could also smell the animal. Deer have a very distinct smell, one that incidentally does not easily wash from clothing. This smell is especially pronounced when the deer is convinced, as this one must have been, that it was about to die a terrifying death. How else could it have understood the situation? I asked myself as I was inched yet further away from the trap. It is trying to escape

because it believes it is about to die.

Meanwhile, the GPS collar was not turning on as it should, perhaps because of the vulnerability of GPS receivers to weakened signals in forested areas. We continued to hold the deer in place. Finally, the collar initialized, and the biologist attached it around the deer's neck. He then took an ear tag from his tool box and punched it through the deer's ear. The tag's post had the diameter of a large nail, and the deer jumped again as the tag pierced its ear. Finally, all data had been recorded. We counted down and then pushed back from the deer, trying to get clear of its hind legs as quickly as possible. The deer lay there for a fraction of a second. Then it bolted away.

If wildlife biologists know deer as dots on GIS-generated maps in a computer lab, they also know deer by being in full body contact with them, feeling their hearts beat and their lungs fill and empty, inhaling air that they have just exhaled, smelling them and smelling like them, and sporting hoof-shaped bruises on their bodies from tagging attempts gone not-quite-according-to-plan. The knowledge-making practices of scientists and hunters are not so different on the ground. Both are up close and personal in a way that is omitted from the narrative portrayal of scientific knowledge and emphasized in the portrayal of hunting knowledge.

The wildlife biologist, and myself—along with Oregon Department of Fish and Wildlife scientists who were also involved in deer tracking—were "hunting" dear just as much as any hunter. Both biologists and hunters located their deer (or where to put their traps) using a combination of observation, experience, and received knowledge. In the deer collaring project, for example, we routinely reset traps in areas that showed observational evidence of deer activity (hoof prints or evidence of rooting), while we disabled traps in areas where we observed no evidence of activity. We also tended to favor traps at which we had experienced successful catches. The traps were originally placed in their locations both based on observations, but also because of consultations with hunters and with the wildlife biology literature concerning deer habits. Similarly, hunters tend not to go back to places where they have never encountered deer, and tend to

favor places with observed evidence of deer populations. Similarly, they also tend to return to paces where they have experienced encounters with deer. They also search for deer based on knowledge transmitted by other hunters about where deer habits.

That wildlife biologists were motivated in their hunt by data, and that a hunter is motivated by meat suggests a distinction between wildlife biology and hunting: the former is motivated by knowledge, while the other is materially motivated. However, this essentializes the motivations of both hunters and scientists (Walley 2002). A scientist is certainly motivated by the generation of knowledge about the deer, but that knowledge is desired not only for its abstract value, but also for a practical and material purpose: a management policy concerned with improving a population of animals for subsistence hunting. Additionally, within the world of the wildlife biologist, data is not only knowledge but also professional capital and the product of labor within the world of natural resource science.

Additionally, portraying the hunter's priority as solely material is an essentialization, as well. Hunters do not produce only meat through their efforts. They also produce knowledge. While hunting deer, hunters observes numerous deer, their location, age distribution, preferred habitats, and changes in their habits over seasons or years. These observations are not only qualitative but also quantitative, since hunters, in my observation, tend to be keen counters of their possible targets. Hunters encounter numerous deer, and thus have an extensive set of observations from which to draw conclusions. These observations become knowledge, which is later circulated among other hunters, where it is compared with the knowledge of others. Such knowledge is often regarded with considerable skepticism by fellow hunters—especially if it contradicts the general body of hunter's knowledge about deer. It may ultimately become integrated into a general pool of knowledge about deer, or it may not. If it is, it contributes to generalization about deer that inform a hunter's conclusions about where to hunt, his or her perceptions on population trends, and his or her overall understanding of deer. Both scientists and hunters, in other words, produce generalized knowledge about

deer, knowledge that is vetted by peers before it enters a larger pool of community knowledge, and that inform decisions about how humans should interact with the deer.

However, hunter's knowledge and scientist's knowledge tend to inform decisions by different groups of people There is a tendency among regulators to prioritize scientific knowledge over hunter's knowledge (Nadasdy 2003). I was told that scientist's observations of deer migration patterns using GPS collars, for example, contradicted the hunter's observations about those patterns. Hunter's knowledge is also occasionally framed as anecdotes with partial perspective, rather than knowledge. This framing was similarly identified by Foreman in his description of tribal research into suckers. While the legal pressures to prioritize scientist's knowledge are clear and recognized, as Christine Wally pointed out in regards to similar tensions between claims of marine biologists and fishers off the Tanzanian coast, "Although science may have more elaborate methodologies and verification procedures, making it a powerful tool that can expand knowledge far beyond the realm of commonsense observation, this does not invalidate the observations or knowledge of fishermen" (Walley 2002, pp. 274-275). Indeed, wildlife biology can provide certain observations and related insights that a hunter cannot, for example, the path of a deer every several hours over the course of an entire season. But the fact that environmental sciences can provide certain conclusions does not necessarily render incorrect other conclusions reached by other mean. However, because of the legal authorization of scientific claims and the negotiated context of Klamath tribal resource management, the Klamath Tribes must conform to such discursive expectations—indeed, at times, requirements—in order to gain legal legitimacy.

CONCLUSION

Scientific legality has had the effect of narrowing the authoritative discourses available to groups wishing to make environmental claims. When environmental laws authorize scientific claims, they implicitly or explicitly de-authorize others by tightly

circumscribing the discourses that are considered to be legitimate within a dispute. The result is that groups who wish to participate in certain disputes must frame their claims in the authorized discourse.

For the Klamath Tribes of American Indians, the impact of this situation has been multi-faceted. The tribes clearly recognize the discursive constraints of scientific legality, and have realized them since before their restoration in 1986. In response, the tribes have become major producers of ecological knowledge about the Upper Klamath Basin. This research has, in turn, helped them to play a central role not only in environmental disputes over endangered species, but also over other tribal trust species, as well. The ability of the tribes to produce scientific knowledge of the Upper Klamath Basin's environment, in other words, has opened an opportunity for the tribes to upend historical patterns of exclusion from environmental management. At the same time, the turn towards science has brought front and center questions about the relationship between presumed "types" of environmental knowledge, particularly "scientific" and "indigenous" knowledge. The tensions between these must be navigated each day in the tribes' natural resources work.

In this chapter, I've argued that dividing knowledge into distinct "types" is difficult for a number of reasons. Particular speakers tend to draw on a variety of knowledge when narrating aspects of the environment, not only on one in particular. In addition, roles that have traditionally been associated with certain knowledge—regulators with legal knowledge, American Indians with indigenous knowledge, and ecologists with scientific knowledge—are becoming increasingly ill-defined in practice. In the Upper Klamath Basin, people fill numerous social and professional roles.

However, differences remain, primarily in terms of the relationship between knowledge and authority. Not all knowledge is endowed with equal authority in environmental disputes. As a result, speakers tend to emphasize knowledge that will gain them the most authority in a given situation. In legal disputes over the environment, this is often scientific knowledge. Because of the close relationship between knowledge and

authority, efforts to define boundaries have the result, intended or not, of legitimating or delegitimating certain claims and, by extension, certain speakers. Efforts to draw boundaries through assertions that something is, or is not, "scientific" or "indigenous" environmental knowledge must always be viewed not solely in an epistemological but also in a political context of unequal power relations (Gieryn 1999).

These patterns of knowledge-based inclusion and exclusion are not new in the Upper Klamath Basin or in the history of the Klamath Tribes. In the remainder of this dissertation, I examine two environmental conflicts in detail, one over water rights in the nineteen-seventies and -eighties, and one over the management of endangered species in the first decade of the twenty-first century. In both, the question "who is an expert with the authority to speak for the natural world?" is at the center of disputes over both the practical aspects of environmental management and conflicts over who, in the first place, can legitimately participate in the dispute.

Part Two

Environmental Agency in *United States v. Adair et al.*

Scientific legality frames a wide variety of environmental disputes, not just those over endangered species. In the next three chapters, I discuss the relationships between expert witnessing and American Indian agency in *United States v. Adair et al.*, a federal court case filed in 1975 over disputed water rights in the Upper Klamath Basin. Rather than focusing on the outcomes of the case, I focus instead on the place of expert witnesses in the arguing of the case. In particular, I explore the implications of the central participation of expert witnesses, as well as their testimony's content, for American Indian agency.

Chapter Three outlines the central argument of the part, as well as the details of the case, including why expert witnesses came to play such a central role.

Chapter Four discusses the legal role of the expert witness and the establishment of expert authority in courts, as well as the disputed issues of fact in *Adair* that were at the center of expert testimony in the case.

Chapter Five focuses on the implications of the plaintiffs' and defendants' expert narratives on the agency of American Indians, and the members of the Klamath Tribe in particular, both as historical actors and as contemporary authors of history.

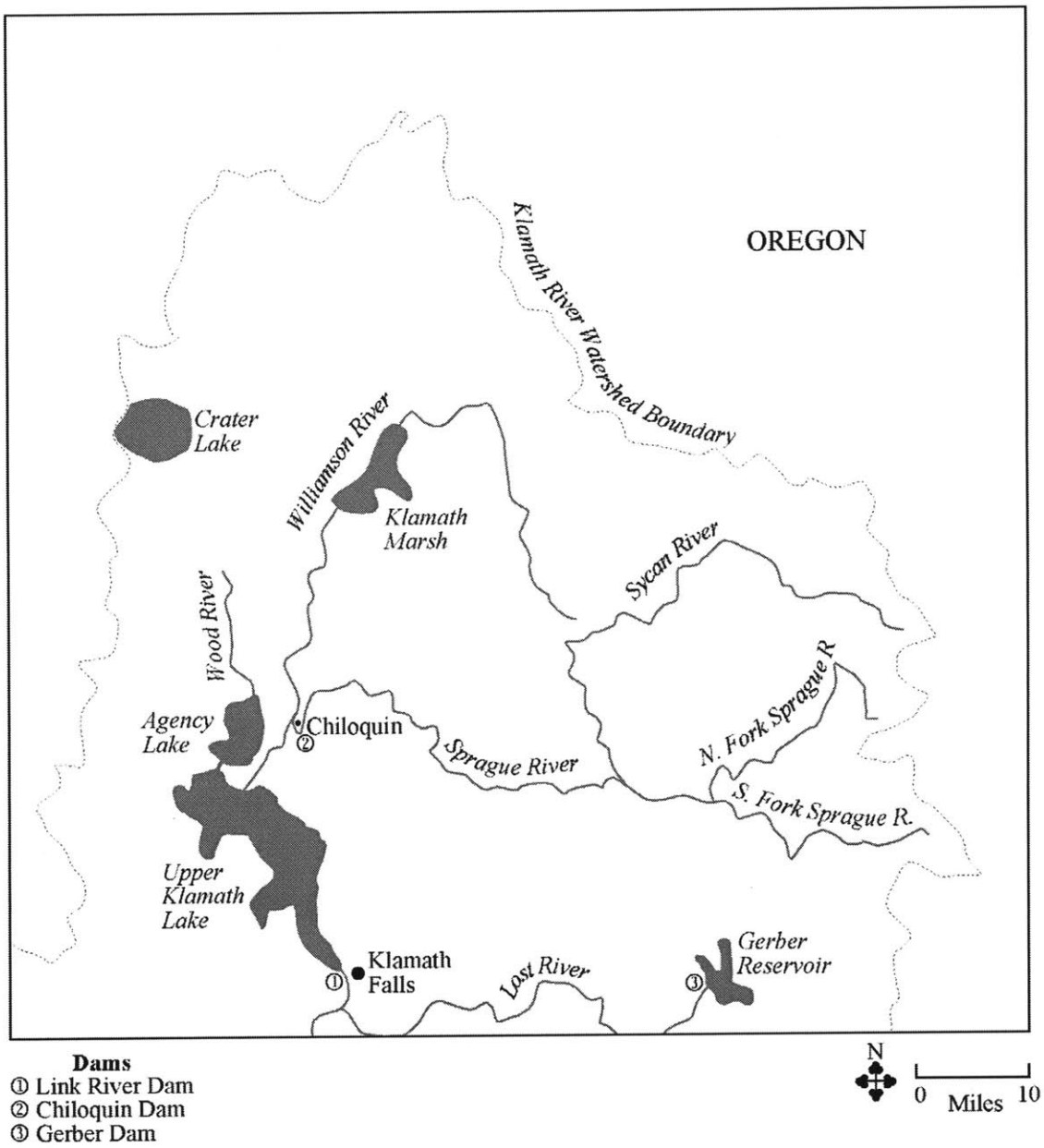

Illustration 3. The general area of concern in United States v. Adair et al. *(Based on U.S. Bureau of Reclamation (1999)).*

Chapter Three

From Disputed Rights to Disputed Histories

INTRODUCTION

In the early twentieth century, the Klamath lived along the Williamson River, a tributary to Upper Klamath Lake in southern Oregon. Klamath tribal members spent considerable time on the river and on Klamath Marsh, an extensive, shallow wetland that formed along the Williamson behind a natural rock reef (a sort of geologic "dam") in the river above Kirk, Oregon. In both the river and the marsh, the tribe gathered plants, hunted birds, and fished. "Many years ago," one tribal member recalled, "the Klamaths would paddle around the tules in the springtime and pick mudhen eggs. These eggs were used just as anyone today would use chicken eggs. The mudhens themselves were good-eating." The Klamath also picked wocus, a water lily-like plant with a large seed pod. Tribal members would put wocus in gunny sacks, let the seed pods dry, and then boil the seeds for food.[26]

Or was the situation so straightforward? "When I first saw the Klamath Marsh," the same tribal member recalled some six months later, "there were diversions in the Williamson River and in the smaller streams that flowed into [it] so that water could be controlled by spreading [it] to irrigate the land . . . so that the land could be hayed." In addition, there were "large numbers of cattle ranged on the Klamath Marsh." Tribal members and non-tribal ranchers used the marsh, not for gathering wocus, or for fishing or hunting, but instead of for ranching.[27]

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26 Sidney I. Lezak, Thomas C. Lee, Jean Lowman, and Donald W. Redd. "Plaintiff's Brief in Support of Its Claims," December 27, 1977 (USDC, vol. 4 of 21, DN 401), p. 1 (exhibit 7).

27 Hugh L. Biggs, Jere M. Webb, and Theodore R. Conn, "Defendants' Brief," January 16, 1978 (USDC, vol. 5 of 21, DN 412), p. 84.

These descriptions painted two vastly different pictures of the Williamson River and Klamath Marsh, as well as the historical activities of the Klamath Tribe.[28] In the first, the Klamath lived in harmony with their natural environment, which was characterized by fish, waterfowl, and wetland vegetation. In the second, the landscape of the Klamath Tribe was one of environmental alternation, characterized by irrigation, cattle, and agriculture. Each account narrated the Klamath's environmental and economic relationships in very different ways. In the first, the Klamath's primary use of the marsh was predicated on naturally abundant fish, wildlife, and plants that grew in and around the marshland. The result was a *subsistence economy* closely in tune with the natural environment. In the second, the Klamath and non-native landowners engineered the marsh to increase the production of commodities, such as cattle and hay. The result was the Klamath's participation in a *market economy* that was based on the modification of nature towards human ends.

These recollections were told neither to an ethnologist conducting a study of the Klamath's historical ways of life, nor to an historian investigating the close and often-contentious relationship between the tribe and the settler agriculturalists whose numbers in the area increased quickly following contact. Rather, they emerged in two affidavits in the matter of *United States v. Adair et al.*, a federal court case filed in 1975. The account describing the Klamath's stewardship of the marsh's abundant waterfowl, edible plants, and fish appeared in a brief for the plaintiffs. The account of the reclaimed marsh-turned-range-land appeared in a brief for the defendants.[29]

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28 As noted in the Introduction, the Klamath Tribes have referred to themselves, and been referred to, in two different ways during the historical period covered in this dissertation. In this chapter, I use historically appropriate singular usage.

29 Although attributed in the court record to the same person, it is highly likely that these accounts were written by different people. There is a distinct difference in writing style between the two accounts, suggesting distinct authorship. Statements such as "This affidavit is made for the purpose of establishing the facts that the waters of the Williamson River and its tributaries have been continuously used for the production of grass for the raising of cattle," from the defendants' brief, pointedly address particular legal issues in the case, suggesting

In *Adair*, Sidney Lezak, a United States Attorney, acting on behalf of the United States Fish and Wildlife Service and the National Forest Service, filed suit against approximately one hundred forty landowners in and around Klamath Marsh and along the Williamson River. The United States claimed that the National Wildlife Refuge on Klamath Marsh and the National Forest along the Williamson River were threatened by the use of water by upstream irrigators. As a result, the United States sued for clarification of water rights. The government claimed that the Wildlife Refuge and National Forest had water rights that were senior to all other water users along the river and marsh. To make this argument, the government asserted that it had inherited the Klamath Tribe's water right when it had acquired the tribe's reservation in the late nineteen-fifties and early -sixties as a result of the Klamath Termination Act of 1954. Lezak made this claim based on a contention that the Klamath Tribe had possessed reserved (or *Winters*) water rights on their reservation that guaranteed enough water in the marsh and river to foster an environment conducive to hunting, fishing, and gathering. The United States claimed that when it had acquired the lands, it had also acquired this right. The justification: the purpose of the Wildlife Refuge and National Forest was to preserve the marsh and river in "a natural condition," just as the Klamath Tribe had done before.[30] Thus, the United States hoped to establish a history of continual water uses between the tribe and the government that would justify the transfer of the very senior tribal water right to the United States.

Adair is a foundational case for the Klamath Tribe. Today, *Adair* is widely known in the Upper Klamath Basin as the case that ultimately affirmed the Klamath Tribe as the most senior water right holder in the Upper Klamath Basin. Soon after the *Adair* decision, the court expanded this water right to apply to all bodies of water within the

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that this affidavit was written by a lawyer. While it is impossible to say that the affidavit for the plaintiffs was not written by someone with legal training, its style is vastly different. It is a personal narrative as opposed to a discursive presentation of legal issues.

30 Sidney I. Lezak; Thomas C. Lee; and Charles N. Estes, "Complaint," September 29, 1975 (USDC, vol. 1 of 21, DN 1), p. 7.

boundaries of the tribe's former reservation, not just the marsh and river that were the topic of the original case. Furthermore, the case established that these water rights had survived the Klamath Termination Act, which had ended the Klamath's federal status and resulted in the loss of their reservation. In doing so, *Adair* would ultimately lend support to the Klamath Tribe's successful restoration to federal status. More generally, *Adair* helped solidify the concept of aboriginal water rights (i.e., water rights that pre-dated a tribe's treaty with the United States) in federal American Indian law. Today, the decision is a key underlying component in the state of Oregon's adjudication of water rights in the Upper Klamath Basin, as well as on-going efforts to create a Klamath River watershed-wide settlement of water claims.

However, as important as these consequences of *Adair* are in shaping the landscape of the Upper Klamath Basin, they are not the subject of this part. Instead, I focus on *Adair* as a site where historical narratives of American Indians were produced and contested within law. Thanks to the legal argument of continuity of uses asserted by the United States, questions of the Klamath Tribe's cultural and environmental history were in the forefront of the case. The intersection of American Indian legal claims and contested histories is far from new. Norris Hundley has written that in disputes over the confused and contradictory history of "what has come to be euphemistically known as Indian water law," "the opponents invariably invoke history (or what they claim to be history) in their battles with one another" (Hundley 1978, p. 457). Similarly, disputes over tribal histories were common occurrences in the proceedings of the United States Indian Claims Commission and in struggles for tribal recognition (Rosen 1977). On the international stage, Elizabeth Mertz has explored the varied ways in which colonial societies deploy historical narratives in justification of present-day legal regimes that marginalize native peoples (Mertz 1988). Historical narratives, she has suggested, can naturalize the present-day inequality between native and colonial societies as teleologically inevitable outcomes of history.

In this part, I focus on the ways in which the judicial process drew upon, and in

the process reshaped, narratives of Klamath tribal history, in particular in regards to the environmental and economic roles of the Klamath Tribe. In exploring this process, I highlight the tensions between the court's choice to rely on expert witnesses to generate these narratives and the agency of the Klamath people. In *Adair,* the court relied on the testimony of expert witnesses in anthropology, history, and the ecological sciences to produce and contest competing historical narratives. The court ultimately picked one of these narratives as true and ruled accordingly. By endowing expert witnesses with the authority to construct the tribe's history, the court reduced the legitimacy of other witnesses, namely the Klamath themselves. Within *Adair*, a hierarchy of authority was established among ways of knowing the former reservation's historical landscape and the activities of those who lived there.

In the process, the court also endowed experts with the authority to draw boundaries around Klamath agency. This agency has two interrelated components, one in the nineteen-seventies as *Adair* was being litigated, the other in the more distant past that was the subject of much expert debate in *Adair*. The aspect of Klamath agency in the nineteen-seventies concerned the tribe's ability to narrate their own history and their own relationship with their environments. I suggest that the court's construction of expertise marginalized the Klamath from this process. The past component was their agency as historical actors. I suggest that the plaintiffs constructed an historical narrative that drew on and reinforced the mythology of the "ecological Indian" (Krech 1999), while the defendants built a counter-narrative I call the *economic Indian* that portrayed the Klamath as having become part of the market economy. Each of these narratives situated the Klamath in a different relationship towards the environment and the settler colonial process.

It is of consequence that this process happened in court. Through its judgments and decisions, courts authorize the intervention of the state (Bobbio 1956). While such decisions are hardly final—*Adair*, for example, was appealed first to the Ninth Circuit, where it was largely upheld, and then to the Supreme Court, where it was denied

certiorari—rulings nevertheless command state force. In addition to changing the configuration of water allocation and the reorienting environmental management in the Upper Basin, I suggest that *Adair* helped solidify—in fact legalize—environmentally determinist mythologies of native peoples. These mythologies had, and retain, a powerful grip on the popular imagination, and their enshrinement as legal fact on which state action is justified only served to reinforce them. Such mythologies pose difficult questions about the portrayal of the agency of native peoples in the environment.

In this and the two chapters that follow, I first outline the historical prelude to *Adair*, followed by an overview of the legal arguments in the case. These arguments, which focused on *Winters* water rights and the continuity of water usage between the Klamath Tribe and the United States government, set the stage for the detailed construction of two opposing histories of the Klamath. These histories were constructed and contested for the most part by expert witnesses, and in Chapter Four I discuss the construction of expert authority in the court and the histories that these experts produced. In Chapter Five, I analyze these historical narratives in terms of the ways that each reconfigured Klamath agency in relation to the environment and the Klamath's ability to define their own historical and environmental roles.

DISPOSSESSION IN THE PRELUDE TO *ADAIR*

The legal situation that faced the *Adair* court in 1975 was long in the making. By the time the Klamath, Modoc, and Yahooskin Paiute signed a treaty with the United States in 1864, the three groups had been in contact and conflict with white settlers and the federal government for over twenty years (Limerick 2000a, p. 37). The treaty forced the Klamath, Modoc, and Yahooskin onto a single reservation (Limerick 2000a, p. 36-41). In the treaty, the three groups relinquished title to approximately twenty million acres of their aboriginal homeland and reserved for themselves a reservation approximately ten percent that size. The reservation was located entirely within the Klamath's aboriginal territory and the Modoc and Yahooskin were moved onto this reservation from the south

and east, respectively.

For the United States government, one of the chief goals for combining the three tribes was the simplification of the region's complex ethnic geography (Scott 1998). The logic of the United States was as follows: if the groups could be settled together, the number of tribes which the United States would have to engage, not to mention the geographic range over which the Army would have to subdue them, would be greatly reduced (Report of the Commissioner of Indian Affairs 1864, p. 109). Their other goal was the opening of substantial amounts of land for settlers. The Klamath Reservation was located in a densely forested area north of the most promising agricultural land that was sought after by settlers.

In 1887, and shortly after the establishment of the reservation, Congress passed the General Allotment Act, which became the primary piece of legislation responsible for creating the mosaic of private, federal, and state land ownership that faced the *Adair* court in 1975. Under the Act, and combined with a provision in the 1864 treaty that "[t]he United States may, in their discretion, cause a part of the whole of the reservation . . . to be surveyed into tracts and assigned to member of the tribes of Indians . . .," (Kappler 1904, p. 1) the Office of Indian Affairs divided the Klamath Reservation and transferred the title from trust to individual tribal members, in fee simple.[31]

The Allotment Act furthered Congress' policy of "the domestication of the Indian," as the defendants' counsel wrote in a brief to the *Adair* court. "The idea was to settle the Indians on homesteads, introduce them to farming, and make them members of the non-Indian society."[32] While presented as a benefit, Klamath tribal members were often the last to gain from allotment. The severalty and allotment of the reservation

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31 Gus J. Solomon, "Pretrial Order," [November 14, 1977] (USDC, vol. 3 of 21, DN 392a), pp. 6-7. Early in the trial, all parties agreed to conduct the trial based on written affidavits in lieu of live testimony, and to forgo a jury trial for a declaratory judgement by Gus Solomon, the presiding judge.

32 Biggs *et al.* "Defendants' Brief," p. 19.

opened the land to state taxation. If an individual could not pay tax on the land (as was often the case), he or she could be dispossessed. In addition, once the land was in private allotments, settlers could rent it or even buy it. The Allotment Act also permitted the government to seize and sell land "left over" once every registered tribal member had received a homestead. Finally, the Allotment Act made it possible for settlers and the government to claim "abandoned" American Indian rights: if a Klamath tribal member did not use his or her water on his private plot of land, for example, it could be claimed by others (Wilkinson and Bigg 1996, pp. 200-202).

The Termination Act of 1954 was an outgrowth of the aggressively assimilationist policies of the General Allotment Act (Nagel 1996). The Termination Act singled out the Klamath among other tribes as targets for Termination. Following a long and bitter struggle within the tribe and between the tribe and the federal government (Haynal 1994; Haynal 2000), the Termination Act was in full effect on the Klamath Reservation by 1961. The Termination Act ended the federal recognition of the Klamath Tribe and transferred the Klamath Reservation to the Department of the Interior and Department of Agriculture. The proceeds of the sale were to be paid to the members of the terminated tribe as compensation.

While the language of the Act did not extinguish tribal sovereignty, in practice it largely had this effect. Because the tribe no longer held any land, it no longer had jurisdiction over an area in which to express that sovereignty as it related to land management, hunting and fishing, or any of the other forms of sovereign expression that are commonly associated with territory (see, e.g., Delaney 2005). While some Klamath tribal members maintained that the tribe's rights continued to exist, the state of Oregon maintained that none of the tribe's rights had survived termination. Based on this assertion (which was later to be declared erroneous in *Kimball v. Callahan I* and *II*), the state of Oregon actively enforced state hunting and fishing laws on Klamath hunters, who, according to the 1864 treaty, had the right to hunt, fish, and gather on their reservation without state interference (Wilkinson and Bigg 1996, pp. 210-212).

Meanwhile, termination plunged the Klamath Tribe into decades of social and cultural turmoil (Ball 1998; Haynal 1994; Haynal 1986). In terms of lost land, the Klamath Tribe was the most heavily affected of the 109 terminated tribes. By some accounts, the tribe lost 862,662 acres of land. In terms of lives and livelihoods, the Klamath Termination Act affected the federal status of approximately 2,123 tribal members. In all, 78 percent of the tribe, or 1,656 people, withdraw from the tribe and accepted payment for their reservation lands. Eighty members voted to remain in the tribe, while 394 abstained from the vote. By default, those who abstained remained in the tribe. The remaining members received no monetary compensation (Wilkinson and Bigg 1996).

In 1961, each withdrawing member of the tribe received $43,000, or that member's share of the proceeds from the sale of their former reservation. The Bureau of Indian Affairs (BIA) transferred the remaining members' small amount of land to the United States National Bank of Oregon, a private bank with a branch in the nearby town of Klamath Falls, to hold in trust. Then, in August 1973 by Congressional order, the government purchased most of the land from the trust at ten million dollars below market value and added the lands to the Refuge and Forest (King 1980; *New York Times* 1980).

By the time the United States government filed suit against Ben Adair and the other landowners along the Williamson in 1975, the Klamath Tribe as a legal entity owned no land along the river, the marsh, or even within the geographic area covered by the litigation (Wilkinson and Bigg 1996, pp. 209, 212). The United States seemed to have succeeded, as Wilcomb Washburn has written, in "break[ing] up tribal holdings and forc[ing] the Indian into the individualistic economy of his white brothers" (Washburn 1971, p. 150).

WINTERS RIGHTS

The United States Attorney's filing of *Adair* was cause for great concern among irrigators along the Williamson and throughout Oregon, as well as for the state of Oregon itself. The filing of the case represented the long-feared intervention of the federal government

into water law in Oregon, an area of law long understood to be in most cases the province of states. Letters sent between state politicians, as well as minutes of state water users associations, testify to the worry about this issue.[33] Not far beneath the surface of these worries was another long-seething issue of federal versus state jurisdiction, the question of American Indian sovereignty. The nineteen-seventies and -eighties saw American Indians making a number of large claims in the courts, and aspects of *Adair* bore a striking resemblance to these other American Indian legal claims underway at the approximately the same time. In 1972, for example, the Passamaquoddy Tribe sued for a large swath of the state of Maine, and in 1976, Mashpee Indians sued for approximately three quarters of the town of Mashpee on Cape Cod (Brodeur 1982; Clifford 1988). Along the Columbia River, tribes won the right to half the annual salmon catch in *United States v. Washington* (Cohen 1986). Even the terminated Klamath contributed to this trend, winning affirmation of their continued hunting, fishing, and gathering rights within their former reservation in *Kimball v. Callahan I* and *II*. However, lumping *Adair* in with these other cases, would be not entirely accurate. Although *Adair* ultimately resulted in the articulation of the Klamath Tribe's time immemorial right to water on their former reservation, this was not the original intent of the United States government as it embarked on the suit. The case originated with the United States government suing on behalf of its own interests, and not those of the Klamath Tribe. In fact, Klamath

33 See, e.g., A. E. Smith to Marshall, February 13, 1967; J. Herbert Stone to Wheeler, February 28, 1967; John L. Stewart to Ullman, March 7, 1967; and Al Ullman to Stewart, March 21, 1967, all found in SHL, Ottoman Collection, Oregon Water Resources Congress, Box 1, Folder 5 "Forest Service Water Rights Wish, 1966." On the Oregon Water Resources Congress, an association of irrigators and other water users in Oregon, see Arthur S. King, "A History of the Oregon Water Resources Congress," n.d. (SHL, Ottoman Collection, Oregon Water Resources Congress, Box 2, Folder 11 "A History of the Oregon Water Resources Congress); "Annual Meeting Oregon Water Resources Congress," October 27-28, 1975 (SHL, Ottoman Collection, Oregon Water Resources Congress, Box 1, Folder 1 "OWRC Minutes and Correspondence, 1965-1985"), pp. 2-3.

landowners were named as defendants.[34]

The United States was unambiguous about its intent in 1975. "The United States contends," wrote Lezak in the typical absolute terms of a legal complaint, "that the priority of the water rights it holds . . . is superior to any priority which the defendants may be able to establish in this action."[35] The government's goal, in other words, was expressly to obtain adjudicated priority dates and quantities for water on the National Forest and Wildlife Refuge.[36] In response to that sort of rhetoric and to protect its interests against a possible federal incursion on its sovereignty, the tribe intervened as a plaintiff-intervenor in 1976, a full year after the case was filed.[37] Water rights were important to protect the government's investment in value of the lands. In the dry climate and hydrological variability of the Upper Klamath Basin, the government worried that upstream irrigators named in the suit could reduce the river's flow to such an extent that the marsh would dry and the forests would cease to be productive.

> The uses of water being made in connection with [upstream] lands presently owned by defendants threatens irreparable harm to the United States in years of low water runoff by interfering with flows in the Williamson River needed for purposes of the . . . National Forest and by interfering with the water supply needed to maintain the . . . National Wildlife Refuge in its natural condition . . .[38]

For these reasons, the federal government sought to establish the seniority of its water rights.

Establishing seniority, however, was likely going to be exceedingly difficult, since the government had gained title to the land in question long after many of the region's other residents. Some residents, in fact, claimed land titles and water rights that stretched

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34 Lezak, *et al.*, "Complaint," p. 3, 1-3.

35 Lezak, *et al.*, "Complaint, p. 3.

36 "Transcript of Proceedings," October 2, 1980 [1 August 1977], p. 79.

37 Daniel H. Israel; Raymond Cross; and Michael L. Hanley, "Motion to Intervene of the Klamath Indian Tribe," September 13, 1976 (USDC, vol. 2 of 21, DN 282), pp. 1-2.

38 Lezak *et al.,* "Complaint," p. 7.

back into the nineteenth century, while the United States government had acquired title to the land only in the nineteen-sixties.[39] The originating title date was critical because Oregon water law was grounded in the doctrine of prior appropriation (Bastasch 2006). Also known as "first in time, first in right," the doctrine of prior appropriation divides a water right into two components. The first is a quantity. The quantity, of course, is the amount of water a right holder can use in any given year. This quantity is based initially on a claim filed with the state, and eventually on an adjudicated value. The second component of a prior appropriation water right is the right's priority date, which establishes a hierarchy of rights among water users. Those who filed earlier claims have earlier priority dates, which means that they are allowed to use their quantity first. Those with later claims must wait in line for those with senior claims to draw their water, and are only allowed to draw water from a source if there is enough for senior water users to satisfy their claims.

This system would seem to have vested the government with a vastly junior water right compared with the irrigators and ranchers who were being sued. Under a strict prior appropriation regime, the junior right holder is perennially vulnerable: it is entirely possible that a junior right holder will receive no water in any given year, if senior right holders first exhaust the supply. Such was the government's fear: that irrigators who claimed senior water rights would so deplete the available water that the marsh and river would dry completely.

In its suit, however, the United States argued that the government's water rights in the refuge and forest derived from a legal doctrine that allowed the leapfrogging of prior appropriation. This argument was made by evoking the *Winters* doctrine of reserved water rights. The *Winters* doctrine was established in 1908 at the conclusion of a lawsuit, *United States v. Winters*, filed in 1905 by the Office of Indian Affairs. The suit was filed against a group of irrigators living upstream of the Fort Belknap Indian Reservation in Montana. The reservation had been established as part of an 1888 treaty between the

39 Solomon, "Pretrial Order," p. 1.

United States and the Gros Ventre and Assiniboine tribes. On the reservation, the Office of Indian Affairs carried out a policy of supplanting the two tribes' traditional hunting and gathering economy with one based on sedentary agriculture. The Milk River was the sole source of irrigation water for the reservation, and when droughts hit the region in 1904 and again in 1905, the river ran dry before it reached the reservation. The desiccation of the Milk was not solely a result of drought, however; there were human causes as well. Upstream farmers had diverted the river's entire flow to irrigate their crops. These settlers claimed water rights that were senior to those of the reservation, and diverted water accordingly. Additionally, the farmers pointed to the fact that the Fort Belknap treaty, like many other American Indian treaties, did not specifically vest the tribe with rights to any water (Shurts 2000).

William H. Hunt, a federal judge in Montana, however, did not rule in favor of the irrigators. Instead, he ruled for the reservation, and awarded it a water right for five thousand miner's inches of water, nearly the entire flow of the Milk River. He made this decision based on the fact that the treaty had reserved for the tribes a reservation that was part of a large swath of ceded land (Hundley 1982). Even though the treaty did not specifically mention a right to water, the judge ruled that sufficient water rights had, by implication, been reserved to fulfill the purpose of the reservation. That purpose, according to the judge, was agricultural, and in particular the assimilation of the Gros Ventre and Assiniboine via farming. The decision was upheld by the United States Appeals Court in 1906 and again by the Supreme Court in 1908. Henry Winters and his fellow farmers were forced to relinquish "all of the waters of the river . . . necessary for . . . the purposes for which the reservation was created" (Hundley 1978).

Winters water rights sat in the middle of the two primary models of American water law. Unlike prior appropriation rights, *Winters* rights were "based on historical occupancy, intention, and agreement, not on diversion and use" (Shurts 2000, p. 6). Unlike riparian rights, *Winters* water could be diverted to non-riparian property. And unlike both riparian and prior appropriation rights, *Winters* rights were federal water

rights, despite the fact that water rights were otherwise understood to be the jurisdiction of the states. *Winters* rights were broad, and covered not just water that was being used to irrigate land, but also water that might in the future become necessary to fulfill the reservation's purpose. Private water-users could not claim rights that might interfere with these future needs. The doctrine was expanded in 1963, in *Arizona v. California*, a long-running Supreme Court battle between the two states over the allocation of the Colorado River (Bradshaw 1968). The decision in this case extended the doctrine to include not just American Indian reservations, but also other federal "reserves," withdrawn from the public domain of land. National Forests, Wildlife Refuges, and National Parks could therefore claim to have reserved water rights associated with them.

One thing that made *Winters* such a powerful legal doctrine was its assumption that a water right was implied in the very act of creating a reservation. And just as the Ft. Belknap treaty failed to mention water rights, so too did the Klamath Treaty. The *Winters* doctrine suggested that this was not necessarily a weakness in the government's position in *Adair*. The omissions of an explicit water right, under *Winters*, did not mean that one did not exist. However, while *Winters* seemed to solve this problem, it also created another: *Winters* tied reserved water rights specifically to the "purposes for which the reservation was created." To make a successful *Winters* claim, therefore, the government would have to establish the reservation's purpose. This purpose, in turn, would establish the type and scope of water rights that were reserved by the treaty.

DISPUTED INTENT

Establishing a purpose for the Klamath Reservation, as it turns out, was not straight forward, since the Klamath Treaty did not clearly single-out a primary purpose for the reservation. The Klamath Treaty described the land "set apart as a residence" for the Klamath, Modoc, and Yahooskin Paiute as "not likely to be traversed by any important line of travel [in the future], and but a small portion of it will be coveted by whites for settlement" (Stern 1965, p. 42). The treaty proclaimed that the Klamath Tribe would

have "the exclusive right of taking fish in the streams and lakes, included in said reservation, and of gathering edible roots, seeds, and berries within its limits . . ." At the same time that the treaty mentioned traditional subsistence, however, the treaty stressed agriculture. The federal government agreed to pay the tribe $80,000 over the following fifteen years in an effort to convert the Klamaths away from their old ways of life. Of this money, "all of [the] several sums . . . shall be applied . . . to promote the well-being of the Indians, advance them in civilization, and especially agriculture . . .," Christianity, and sedinterization. The treaty also set aside money for the purchase of horse "teams, farming implements, tools, seeds," and other accoutrements of the pastoral life. In other words, the treaty acknowledged the continuance of the Klamath's traditional means of semi-nomadic subsistence while at the same time it laid out plans to replace those activities with sedentary agriculture (Kappler 1904, pp. 1-3).

The fact that the Klamath Treaty seemed to clearly lay out two purposes for the reservation complicated the situation for the United States. In order to make their claim, the government had to first establish what the purpose of the reservation was, and thereby the nature of the *Winters* rights. Was the purpose agriculture or was it hunting, fishing, and gathering? The government needed to show that it was the latter because the second component of its argument was that the *Winters* right had passed to the government when the Klamath Tribe was terminated. To make this claim, the government had to show that there was a *continuity of uses* between the historical water uses of the Klamath Tribe and the present water uses of United States. There would be no continuity of uses if the water had been intended and used for agriculture. As a result, a debate emerged in the trial as to the primary purpose of the reservation and the associated purpose of the reserved water right. The need to prove continuity of use opened up the culture and historical water uses of the Klamath to intense scrutiny.

As Judge Solomon summarized, the United States government argued that when the treaty creating the Klamath Indian Reservation was signed, water rights necessary to fulfill the purposes of the reservation were created along side it.

> . . . the Government asserts that one of the purposes of the Klamath Reservation was to protect the Indian's traditional uses of the Marsh and the forests in the Reservation. The Government asserts that this purpose cannot be fulfilled unless enough water flows through the Marsh to maintain it as wetlands, and flows through the forest to provide the Indians' traditional resources on a sustained-yield basis. The Government asks for a declaration that since 1864 no one has been entitled to divert of appropriate water from the River, if the diversion or appropriation would threaten the Marsh and forest.[40]

The United States argued that the purpose of the reservation was the continued traditional hunting, fish and gathering rights of the tribe. These tribal rights, they argued, predated the individual water rights of the defendants, since these landowners had acquired their land after the establishment of the reservation. When the government acquired the Klamath Reservation through termination, the tribal water right passed to the government along with the land.[41] The government laid claim to the tribe's superior rights by alleging that the government's use of the Williamson's waters in the nineteen-seventies was the same as the Klamath Tribe's use in the eighteen-sixties and before: i.e., the ecologically sustainable conservation of plants and wildlife. Because the use of water was uninterrupted in both quantity and quality, the government argued, the water right had transferred unchanged to the federal government when it had taken the tribe's land.

The government claimed that the treaty had specifically stated that the primary purpose of the reservation was to preserve the tribe's traditional hunting, fishing, and gathering practices, and that these activities required a "marshy" and "natural" hydrology, which in turn reserved a large amount of water. "A portion of the Klamath Tribe's ancestral homeland," contended Lezak,

> known as Klamath Marsh was included within this reservation. At the time of the 1864 Treaty, the Klamath Tribe had long been dependent upon plants growing naturally in the Klamath Marsh for a major part of their diet and had utilized the marsh area for hunting. Therefore, as an incident of establishing the Klamath Indian Reservation, sufficient water from

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40 "Opinion," 478 F. Supp 336, p. 7.

41 Solomon, "Pretrial Order," p. 3-5.

> available sources of supply was reserved to maintain . . . the Klamath Marsh in a condition approximating its *natural state*.[42]

Lezak's choice of words was important. Earlier, when Lezak had described the Department of Interior's current use of the water, he had used the phrase "natural condition," in an effort to establish continuity of use:

> The uses of water being made in connection with [upstream] lands presently owned by defendants threatens irreparable harm to the United States in years of low water runoff by interfering with flows in the Williamson River needed for purposes of the . . . National Forest and by interfering with the water supply needed to maintain the . . . National Wildlife Refuge in its natural condition . . .[43]

The similarity in his phrasing drew a direct link between the Klamath's environmental and cultural past and the government's present demand for water. His choice to highlight the part of the treaty that discussed the continuation of traditional hunting, fishing, and gathering practices allowed him to suggest that the *Winters* rights of the Klamath Tribe were for the purpose of maintaining an environment that could support that particular use. That environment, according to Lezak, was "in a condition approximating its natural state," a state that was essentially the same as the "natural condition" which the government in 1975 was trying to maintain for its Forest and Refuge. Lezak continued to draw these connections across time.

> The United States acquired the water rights previously reserved in connection with these lands for the benefit of the Klamath Tribe of Indians. The measure of the right thus acquired is the quantity of water *needed to keep these lands in a marshy state approximating natural conditions*.[44]

The government made a bold statement that summed up its position concerning the continuity of uses between the Klamath Tribe and the Department of Interior's Wildlife Refuge:

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42 Sidney I. Lezak; Thomas C. Lee; Charles N. Estes, "Plaintiff's Contentions of Law," 5 January 1976 (USDC, vol. 1 of 21, DN 237), p. 1-2, emphasis added.

43 Lezak et al., "Complaint," p. 7.

44 Lezak et al., "Complaint," p. 4, emphasis added.

> There was no real change in the use of the Klamath Marsh lands or in the use of the water on those lands when they passed from the Indian Reservation to the Wildlife Refuge. Before and after the transfer[,] the lands were utilized as a wildlife habitat and this habitat was being maintained in its marshy condition, which made it an ideal habitat for waterfowl and other wildlife found there, by the waters of the Williamson River and its tributaries running into and through the marsh.
>
> From these facts, we must conclude that when the United States purchased the Indian interest in the marsh lands it obtained the Indian interest in the water rights appurtenant to those lands . . ."[45]

The government did concede one difference: "The only difference is that this wildlife habitat is not maintained for the benefit of all of the citizens of the Unites States rather than just for the Indians."[46]

The tribe, which intervened in 1976, argued similarly to the United States Attorney, but with important distinctions.[47] The tribe claimed that it—and *not* the United States—was entitled to enough water to preserve the marsh as a suitable habitat for fish and wildlife because

> Under the Treaty, the Tribe reserved the exclusive right to hunt and fish on the Reservation. By reason of this reservation, the Tribe asserts that it reserved to itself as much water as it needed to fulfill the purposes of the Reservation, including the preservation of hunting and fishing rights.[48]

The tribe then asserted that the priority date of these rights was time immemorial. Because the right to hunting and gathering was reserved, not created, by the treaty, these rights preexisted the creation of the reservation. As a result, the priority date for such a water right would be the date on which the tribe began to use the environment for

45 Lezak, "Plaintiff's Brief in Support of Its Claims," p. 14.

46 Lezak, "Plaintiff's Brief in Support of Its Claims," p. 20. The government made a nearly identical statement in regards to the National Forest lands, see p. 19.

47 Daniel H. Israel, Raymond Cross, Michael L. Hanley, "Motion to Intervene of the Klamath Indian Tribe," [signed September 10, 1976, docket date not legible] (USDC, vol. 2 of 21, DN 282); Raymond Cross, Thomas W. Fredericks, Daniel H. Israel, Michael L. Hanley, "Complaint in Intervention," November 17, 1976 (USDC, vol. 2 of 21, DN 286)

48 Solomon, "Opinion," 478 F. Supp. 336, p. 343.

hunting, fishing, and gathering. Since the tribe had always done this, the date of the reserved water for hunting, fishing, and gathering right should also be time immemorial. Finally, the tribe argued that the Termination Act, which "expressly preserved the Tribe's Treaty hunting and fishing rights" preserved by implication the right to have enough water flow though the lands in which they exercised these rights. *In other words, it was the tribe, not the United States government, that owned this right.* While they differed on the fate of the right following termination, both the Klamath Tribe and the United States agreed on the original purpose of the reservation (and the nature of the associated *Winters* rights). As a result, much of the historical and environmental testimony that both sides advanced was very similar.[49]

Such assertions on the part of Lezak and the Klamath Tribe was vulnerable to an obvious defense. After all, the treaty had also explicitly stated that the purpose of the reservation was to convert the Klamath from hunting, fishing, and gathering and to sedentary agriculture. If this had happened, the reserved rights would be much smaller and, for that matter, non-continuous (since these rights would have been for agriculture, and not for the maintenance of a "natural condition"). If the landowners being sued could show that this was the purpose and use of the reservation, they could completely disrupt the plaintiffs' claim.

The defendants were a varied bunch, and included the state of Oregon, Klamath landowners, non-native farmers and ranchers, and corporate landowners, such as the logging, paper, and pulp giant Weyerhaeuser and the McDonald's french fry supplier JR Simplot.[50] In response to the government's filings, the defendant landowners organized a

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49 Although technically the United States was the plaintiff and the Klamath Tribe was a plaintiff-intervenor, I refer to both as "the plaintiffs" since the expert testimony they offered was so similar. Of course, the two had divergent legal interpretations as to the final fate of the water rights at issue, and when the two separated on these points I note this point. Similarly, I refer to the defendant landowners and defendant-intervenor State of Oregon as "the defendants.

50 Robert M. Christ, "Summons," September 29, 1975 (USDC, vol. 1 of 21, DN 3), n.p.; Sidney Lezak; John L. Hemann, "Stipulation for Extension of Time to Make Appearance," October 28, 1975 (USDC, vol. 1 of 21, DN 175), n.p.

joint defense, and they argued that there was no continuity of uses between the Klamath Tribe and the government. In addition, they argued, termination made the existence of any right impossible. There may be a *Winters* right, but the purpose of this right was *not,* as claimed by the United States government, to preserve an environment conducive to hunting, fishing, and gathering. It was instead to promote agriculture on the reservation. The irrigators' rights, therefore, should remain untouched.[51]

The state of Oregon intervened for the purpose of filing a motion to dismiss the case. Oregon argued that the federal government could not adjudicate state water rights, and that this was essentially what it was trying to do in *Adair*. This was especially true, it argued, if there was an ongoing state process for adjudicating the same rights. Here, the state of Oregon pointed to the state adjudication of water rights in the Klamath Basin, and argued that this precluded the jurisdiction of the federal government. But, in fact, the State of Oregon had only begun this process in the Klamath Basin *after Adair* was filed, and for the purposes of creating a conflict of jurisdiction that would serve as grounds for dismissing *Adair.* The state's motion was dismissed.[52]

By focusing the trial discussion on the marsh's "natural condition" and on the Klamath's being "dependent" on that condition, the plaintiffs had to construct a supporting history of the Klamath Tribe and the marsh environment that would validate its particular interpretation of the treaty and the *Winters* rights derived from it. The defendants would have to counter this history with one of their own. Here, the case moved from contesting the treaty's intent to disputing what actually happened on the ground more than a century before *Adair* was even filed.

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51 Biggs, "Defendants' Brief."

52 Lee Johnson, Clarence R. Kruger, "Motion of the State of Oregon Acting by and Through Its Water Resources Director, James E. Sexton, to Intervene as a Defendant," May 6, 1976 (USDC, vol. 2 of 21, DN 267).

Chapter Four

Expert Witnesses in *Adair*

Court cases are exercises in constructing and disputing events, facts, and interpretations of the past. Did the defendant commit a fraud, or was he or she acting on information he or she believed to be true at the time? Did the defendant rob a bank, or was he or she in another town when it happened? What did the legislature intend when it wrote a particular statute? Was the technology in question patented by Widget, Inc. truly original, or had another party previously invented it, making it *prior art*? In such cases, histories are both produced and contested by the parties, and witnesses contribute evidence to support or undermine one or the other.

Adair was a display of the legal production of history on a grand scale. In *Adair*, however, the disputed issues of fact in the case were not directly related to the water situation in 1975 (i.e., how much water was being used by a particular person or organization, whether one user had recently overstepped his or her rights, or what were the effects of water use on present-day conditions). Instead the disputed facts related to the historical culture and environments of the Klamath Tribe and the processes of settler colonialism, all of which had transpired some one hundred to one hundred fifty years prior to the filing of *Adair* in federal court.

In this chapter, I discuss the role of expert witnesses and the expert disputes over historical and environmental facts in *Adair*. Because the government had relied on *Winters* as the basis of their water rights claims, the historical intent of the Klamath Treaty and historical activities of the Klamath Tribe were immediately brought into question. The case ultimately became one that was as much about water rights as it was about tribal history. What were the "traditional" activities of the Klamath Tribe? How

were those uses related to the marsh's water? Could the marsh even support those uses? The answers to these questions had major legal importance, namely, whether the United States could successfully claim that the Klamath Tribe had particular *Winters* water rights, and whether those rights passed to the government when the tribe was terminated and their reservation was alienated to the federal government.

To build these narratives, to contest the opposing narrative, and most importantly, to make them convincing to Judge Solomon, each side called on a variety of expert witnesses, from anthropologists and ethnohistorians to ecological scientists and range managers. Testimony by Klamath tribal members, in stark contrast to the centrality of expert testimony, was presented by attorneys as decidedly secondary in importance. This established a clear hierarchy of authority to narrate the cultural and environmental history of the Klamath people.

Within the highly ritualized, controlled space of the courtroom, the right to produce authoritative knowledge about the Klamath was professionalized in a bounded group whose members employed a variety of methods to establish their testimony as authoritative. In many ways, expert witnesses are courtroom versions of the "modest witness" in early laboratory science (Shapin and Schaffer 1989; Haraway 1997). Donna Haraway has described the modesty of the witness as "the virtue that guarantees that the modest witness is the legitimate and authorized ventriloquist for the object world, adding nothing from mere opinions, from his biasing embodiment. And so he is endowed with the remarkable power to establish the facts" (Haraway 1997, p. 24). To establish this authority, expert witnesses rhetorically situate themselves in a network of expertise and intellectual allies, they emphasize their dis-involvement from their subjects of study, and they present themselves in ways that make the evidence seem to speak for itself.

Expert witnesses play an important role in the production of authoritative, judicial statements of truth in a wide variety of cases. In a legal system in which judges are often generalists, the ability of both defendants and plaintiffs to provide specialized knowledge and interpretation of that knowledge is especially important. However, expert testimony

does not offer an unfiltered window upon reality. In fact,

> What the common law adjudicator sees in practice are two carefully constructed representations of reality, each resting on a foundation of expert knowledge but each profoundly conditioned by the culture of expert witnessing as it intersects with the interests, ingenuity, and resources of the proffering party (Jasanoff 1995, pp. 43, 45).

The versions of the world that each side in a legal dispute presents are dependent not just on what the expert witness seeks to channel, but also on the ways the expert witness channels it, on the methods the expert witness employes to construct his or her own expertise, and on the tactics used to undermine the authority and legitimacy of opposing expert testimony. Writing about the use of expert testimony in the court, Jasanoff argues, "The authority of scientific claims derives . . . not directly . . . from the representation of physical reality, but indirectly, from the certification of claims through a multitude of informal, often invisible, negotiations . . ." (Jasanoff 1995, p. 52).

These methods of establishing credibility had the effect of excluding the Klamath as authoritative producers of truth-claims about their history and environment in court. These methods of establishing one's legitimacy as an expert contrast to the ways that non-expert witnesses establish their credibility in court. Unlike standard, non-expert witnesses, whose testimony is restricted to that which they observed first hand (i.e., actually *witnessed*), expert witnesses are allowed to offer professional interpretations about matters that they did not in fact witness. While the testimony of a non-expert witness gains credibility (and admissibility) by highlighting a direct experiential link between events and testimony, expert testimony gains credibility (and admissibility) by obscuring this link and casting claims as abstract and universal. For example, the experiential witness to murder is allowed to speak at trial based on his or her having experienced something relevant to the case, for example by virtue of actually seeing the murder take place. The expert witness to DNA evidence in the same murder trial, on the other hand, is allowed to speak based on his or her abstract knowledge of the links between DNA and individual identity, an authority that is bolstered by the fact that he or

she has a professional relationship to the technical issues relevant to adjudicating the case, not a personal relationship to the case itself. The two constructions of authority and admissibility are, in broad stroke, the reverse of each other. In *Adair*, of course, *no one* had experienced the events at issue, these events having taken place at least one hundred to one hundred fifty years before the filing of the case. As a result, no one was capable of testifying as an experiential witnesses. But Klamath tribal members who offered testimony in *Adair* seemed to be marked by a supposed experience with the issues at hand, and were therefore unable to construct abstract, expert authority for themselves. Tribal witnesses were therefore stuck in a no-mans-land between the roles of the experiential and expert witness, and largely sidelined as a result.

A BRIEF HISTORY OF EXPERT WITNESSING

The idea that someone can bear witness to something they did not actually witness is an interesting one in the Anglo-American legal system, where strict rules for hearsay govern the admissibility of testimony in court. Such rules generally restrict testimony to topics that witnesses have directly experienced. In this section, I discuss briefly the history of expert testimony struggles over its position in the courts.

Expert witnessing began as a practice in England during the mid-seventeen-hundreds at a time when the English judicial system was undergoing a radical change. Roles within the courtroom were becoming far more differentiated. Whereas before the jury had acted as both fact-finders and deliberators, the fact-finding power of the jury in eighteenth-century England was being increasingly delegated to the lawyers for the opposing parties. No longer could the jury directly question a witness. The division of fact-finding authority between plaintiff and defendant (or between the crown and the accused), in turn, promoted adversarial confrontations in court, as each side presented conflicting evidence about the matter at hand (Jones 1994; Golan 2004).

Early expert witnesses considered themselves to be generalist "men of science" who were eager to apply newly formulated scientific principles to the worlds of law and

business (Golan 2008). One of the first recorded cases involving the use of expert witnessing was a nuisance case to determine who was at fault for the silting of a harbor. From this case, the English courts articulated the principle that "men of science," in the court's words, could offer the court interpretations within the realm of their expertise. This rule contrasted sharply with the solidifying rules of general (what I have called experiential) witnessing, which barred testimony based on opinion or interpretation. Other cases, mostly insurance and patent claims, soon followed, and lawyers increasingly turned to expert witnesses to elucidate complex topics for the jury and the judge. By the nineteenth century, experts witnesses were becoming increasingly differentiated, and included microscopists and medical experts, in addition to engineers and physical scientists. By the turn of the twentieth century, the field had widened even farther to embrace psychologists (who probed the minds of criminal defendants), social scientists, and forensic scientists (who applied scientific methods specifically to police work) (Golan 2004). Two tracks of witnessing were beginning to emerge, that of the expert witness and that of the experiential witness. Each had particular areas in which they could legitimately speak, and each had different ways of establishing that authority.

While the practice of expert witnessing was drawing practitioners of science and law closer together, the spectacle of courtroom disagreements between expert witnesses threatened to damage the authority of the scientific professions those witnesses represented. Courtroom battles between experts hired by opposing counsels created a new threat to the emerging and yet-to-solidify authority of scientific institutions. After all, the underlying claim of the expert witness was one of universality, but court proceedings seemed to almost always produce conflicting expert claims. Expert disagreement reached paralyzing proportions in early nineteenth-century England, and the court's faith in science as an institution was increasingly questioned. In response to this "humiliation for science," professional societies, such as the Royal Society of London, engaged in campaigns to contain expert disagreement on the witness stand (Golan 2004, p. 137). The hope was that rules of professional conduct would help

maintain the image of an objective, disinterested scientific enterprise that offered its services to the court, but was not corrupted by the worldly matters that the court concerned itself with.

Despite the potentially damaging effects of disagreement to scientific authority, however, by continually turning to expert scientific testimony despite these battles, the courts ultimately reaffirmed the underlying authority of these experts. As expert witnessing became increasingly common in late eighteenth- and early nineteenth-century England, the courts served as a patron for scientific research (Golan 2004). In one instance, for example, lawyers on opposite sides in a fire insurance claim commissioned studies on the flammability of a variety of industrial materials. In sponsoring research, and then in relying on that research for decision-making, the courts bolstered the authority of of scientific professionals while promoting scientific endeavors with infusions of funding.

This early role of the court as a patron of science, and as a spur towards both crisis and professionalization in response, has repeated itself. Forensic science developed in the first decades of the twentieth century precisely to fill a demand for the interpretation of crime-scene evidence in the court (Johnson-McGrath 1995). A new profession of finger-print experts claimed to be able to positively identify a person based only on the patterns of finger-oil they left behind (Cole 2001). In the nineteen-fifties, litigation before the Indian Claims Commission (ICC) funneled new money into anthropological research on American Indians, some of which produced major scholarly insights in addition to expert testimony. A new scholarly field, that of ethnohistory, began to form with researchers involved in the ICC, and eventually resulted in the founding of the American Society of Ethnohistory (American Society for Ethnohistory 2010).

In the United States, legal institutions responded to the problem of expert disagreement with guidelines meant to formalize and restrict the admittance of expertise. In 1923, the first formal rule on the admittance of expert testimony was articulated in the verdict of *Frye v. United States*. At issue was the admissibility of a precursor to the

polygraph. The device, claimed the prosecution, proved Frye had committed murder. The defense objected, and the court eventually barred this new-fangled device, although Frye was convicted nonetheless. The court ruled that in order to be admissible, scientific evidence must be "sufficiently established to have gained general acceptance in the particular field in which it belongs" (*Frye v. United States*, quoted in Solomon and Hackett 1996). While seemingly clear, in practice, this "general acceptance" rule proved to be fraught with problems. How did one identify the "particular field in which [evidence] belongs?" What constituted "general acceptance?" The *Frye* rule assumed that scientific professions and institutions were fairly uniform and static. It also assumed that science and law were generally separate, only coming into intermittent contact. The court failed to realize that "general acceptance," and "a particular field" of expertise are often established through the court's recognition of expert testimony. Forensic science, or polygraphy, for example, existed as fields of expertise *as a result* of the legal system, not prior to it.

In 1975, the Federal Rules of Evidence (FRE) replaced the *Frye* rule with a more liberal guideline on the admissibility of expert testimony. Called the "helpfulness test," FRE 702 allowed the admittance of expert witnesses if their testimony could "assist the trier of fact" in reaching a decision. This is a far more lax standard then the *Frye* rule, and it is often blamed for the so-called crisis of expert witnessing in the courts since its enactment (Solomon and Hackett 1996). However, such a characterization of FRE 702 is highly presentist, as it ignores the fact that expert disagreement has been a concern of the court since the advent of expert witnesses. Indeed, the history of expert witnesses in the court can be viewed as a continual tension between the realization that expert testimony is obviously useful, and a need to keep expert disagreement from derailing the judicial process.[53]

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53 Although beyond the historical period covered in this part, it is worth briefly following the rules governing expert testimony to the present, if only for the sake of completeness.

Despite FRE 702, *Frye* remained in use through the nineteen-eighties in

While cases involving technology, bio-medicine, patents, and emerging sciences figure centrally in the literature on expert witnesses in the twentieth century, expert witnesses have also played a central role in other areas of adjudication. Expertise in social science, for example, contributed to major social litigation in the twentieth century, including the limitation of the work day and the desegregation of schools.[54] Anthropologists, too, have appeared in an astonishingly wide range of "cases. . . . They

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some state and federal courts (Jasanoff 1995). The two contradictory rules for the admittance of expert witnesses eventually resulted in a Supreme Court appeal in the matter of *Daubert v. Merrel Dow Pharmaceuticals*. At issue was whether the morning sickness drug Bendectin caused birth defects. Citing the *Frye* rule, lower courts had dismissed epidemiological studies produced by the plaintiff. Such evidence, however, would likely have been admissible under FRE 702. The Supreme Court's 1993 hearing of the case, then, was a much anticipated reckoning of *Frye* and FRE 702. In its ruling, the court announced a four-point test for judges to determine the relevancy of expert testimony. The court announced that first, admissible conclusions must be falsifiable; second, they must be peer-reviewed; third, the reliability rate of the method used must be known; and fourth, the method in question must be "generally accepted." The *Daubert* ruling, in other words, wove together Popperian notions of a singular scientific method and falsifiability with constructivist understandings of the social production of scientific facts through practices such as peer review (Jasanoff 1995).

54 In twentieth-century American jurisprudence, social scientific evidence was first introduced to court proceedings in 1908, with Louis Brandeis' brief to the Supreme Court in the case of *Muller v. Oregon* (Brandeis 1907). In the case, the owner of a laundry appealed a $10 fine levied by the state of Oregon due to his violation of a law limiting the work day for women to ten hours. Representing the state of Oregon, Brandeis pursued what was at the time a novel approach. His brief immediately acknowledged the precedent set by *Lochner v. New York*, which had struck down attempts to limit the work week of bakers. However, he also noted that *Lochner* allowed for the right to purchase and sell labor to be restricted in the "protection of health, safety, morals, and the general welfare" (p. 9). He then proceeded to detail numerous examples from "the world's experience" that showed how working longer than ten hours a day was detrimental to the public good (p. 18). These examples were taken from labor, sociological, physiological, psychological, and economic studies.

Brandies' innovation was that he offered social evidence in a forum that had long been limited to arguments based on legal reasoning. The Brandeis Brief not only influenced lawyering, but also judicial reasoning, and judges began to

have testified on everything from racial segregation, miscegenation laws, and child custody to the blood types of putative fathers, the nature of religious communities, and the cultural background of criminal defendants" (Rosen 1977, p. 556).

Expert witnesses have also played a central role in the legal experiences of American Indians, testifying both for and against tribes. One of the primary theaters for this participation of experts in American Indian law was the Indian Claims Commission (ICC) (Rosenthal 1990). Established in 1946, the ICC's goal was to settle outstanding claims by American Indian tribes against the federal government. If a tribe agreed to adjudicate its claim before the ICC, they waived claims against the United States in the future. Claims brought against the United States ranged from claims for land lost, federal mismanagement of tribal assets and entitlements, illegal appropriation of treaty protected natural resources, and the non-provision of treaty guaranteed services, to name but a few. From the perspective of the United States government, an unexpected number of tribes

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appreciate the benefits of incorporating social evidence into their decisions. Benjamin Cardozo, in his essay "Nature of the Judicial Process," articulated this new judicial outlook. He noted that he employed a number of different approaches for reaching a decision. At a certain point, what he terms philosophical, customary, and historical approaches to legal reasoning did not provide sufficient guidance necessary to make judicial decisions. These approaches were classically jurisprudential in nature, and tended to rely on legal reasoning alone. Instead, because "the final cause of law is the welfare of society," he suggested that the jurist must look at that society and examine its organization in order to make decisions (Cardozo 1921, p. 66). Cardozo's aim with sociological jurisprudence was to justify departures from precedent in order to use law as a vehicle for societal change. To do so, he advocated for the incorporation of social factors and considerations "objectively determined"—if not social science—into decision making. The result, he argued, was a more socially just, but equally legitimate, jurisprudence.

Cardozo's assertion has maintained its importance in some of the most fundamental social litigation in the United States. In *Brown v. Board of Education*, for example, the use of social evidence was centrally important. In the famous Footnote 11 of the *Brown* decision, the Supreme Court justices identified psychology experiments that showed that African American students at segregated schools developed inferiority complexes. They pointed to this social scientific evidence as a reason why separate schools were inherently not equal.

filed claims. Thanks to several renewals of the ICC's charter, the ICC heard cases until 1978, when the remaining cases on its docket were transferred to the United States Court of Claims.

Several aspects of the ICC proceedings put expert witnesses in the spotlight (Gormley 1955). The first of these was the historical nature of the questions the court sought to answer. Often, the questions before the court dealt with events that had occurred long in the past, and an extensive amount of historical research was necessary in order to construct historical narratives and counter narratives for the cases. The second, and perhaps more fundamental, source of expert disagreement in the ICC stemmed from its charter, which bounded the ICC's jurisdiction to cover only "recognizable tribes and bands." As a result, many ICC cases devolved into arguments between anthropologists and historians testifying for tribes, on the one hand, and the United States government, on the other, as to whether a claimant in fact constituted a "tribe" or a "band." If not, then the claimants would have no standing before the ICC, and the case would be dismissed. To attempt to prove or disprove status as a "tribe" or "band," experts would conduct ethnohistorical research to show political, social, and cultural organization among the claimants. The American Society for Ethnohistory, in one of its first journal issues, published a series of papers considering the role of expert witnesses in the ICC, as well as the professional and ethical implications of expert witnessing (Ray 1955). Discussions among anthropologists on this topic have continued (Feldman 1980; Stewart 1979).

Expert witnesses also figured centrally in American Indian claims litigation outside the ICC (Rosenthal 1990). Claims for land or compensation outside the ICC, for example the Passamaquoddy in Maine, also involve the reconstruction of events long in the past, to which no living person was witness (Brodeur 1982). Tribes able to marshall academic or other expert witnesses on their behalf are able to produce far more authoritative accounts. Claims for recognition, such as by the Mashpee of Cape Cod in federal court (Clifford 1988), involved proving historical continuity as a tribe, and this often involves expert witnesses in ethnohistory and anthropology.

> In non-claims cases, they have testified as to the nature of Indian peyotism, the nature and consequences of acculturation, and the religious significance of Indian ritual artifacts. In all of these different kinds of cases certain general issues present themselves (Rosen 1977, p. 556).

The centrality of expert witnesses in *Adair*, then, was not particularly novel. In the preceding decades, as the ICC waded slowly through its docket of cases, experts in anthropology, archeology, and ethnohistory had become a fairly normal sight in American Indian litigation. Nor was the expert disagreement that was about to ensue in *Adair* new to the court or the ethnohistorical profession. The profession existed, in part, as a result of expert wrangling in court. *Adair* is so interesting, however, because its focus was centrally environmental. The case became, therefore, a window into how American Indian environmental relationships were constructed and contested, and into the role that law and expertise played in the construction and propagation of those narratives.

ESTABLISHING EXPERTISE AND CONTESTING FACTS IN *ADAIR*

Culture

To reconstruct the Klamath Tribe's cultural activities at the time of contact and in the early days of the reservation, the government relied on two main expert witnesses, Carrol B. Howe and Theodore Stern, both of whom had written monographic studies of the Klamath (Howe 1968; Stern 1965). Howe's study, *Ancient Tribes of the Klamath Country*, focused primarily on the pre-contact and contact periods, while Stern's *The Klamath Tribe* dealt with the establishment and history of the reservation. In addition to their books, both of which were referred to as evidence, the two men provided written testimony to the court.[55]

Howe's involvement in the case began in April 1977 with his receipt of a letter

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55 For Stern, see Timothy LaFrance; Richard B. Collins; Daniel H. Israel; Raymond Cross; and Richard B. Thierolf, "Amended Affidavit of Dr. Theodore Stern," January 9, 1978 (USDC, vol. 4 of 21, DN 403). For Howe, see Lezak *et al.*, "Plaintiff's Brief in Support of Its Claims," December 27, 1977 (USDC, vol. 4 of 21, DN 401), pp. 37-47.

from Lezak. By 1977, the importance of the Klamath Tribe's past was clear to all the parties involved in *Adair,* and the Department of Justice had carried out a number of internal studies on the history of the Klamath Tribe.[56] In the letter to Howe, the government lawyers broached the possibility of retaining him as an expert witness for the case.

> The Government is presently engaged in litigation . . . in which certain issues relate to culture and ancestral customs of the Klamath Indians. We have therefore read with considerable interest your book, Ancient Tribes of the Klamath Country, which seems to us to be an excellent compendium of the accumulated knowledge of the tribal customs in which we are interested.[57]

Howe agreed, and Lezak then informed him of the particular points they hoped his testimony would address.

> The essential facts which we would like to have in your witness statement are those that establish that the Klamath Indians, prior and during the period of time encompassing the entering of the Treaty of 1864 and the subsequent establishment of the . . . Reservation . . . were dependent for their sustenance and their economy upon the waterfowl and wocus that thrived in the Klamath Marsh, and the fish that could be harvested from the Williamson River.[58]

Lezak warned Howe that he could be challenged by the defense and that his credibility could be adversarially confronted. To counter these things, they included a number of pointers in their letters to him on how do deal with such situations. They suggested that

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56 Lois Albright, "Memorandum on the Circumstances Attending the Establishment of the Klamath Indian Reservation [I]," n.d. [definitely prior to March 1977]; and Lois Albright, "Memorandum on Circumstances Attending the Establishment of the Klamath Reservation [II]," n.d. definitely prior to March 1977], all found in SHL, Carrol Howe Collection, Legislative Series, Box 2, Folder 21 "US District Attorney."

57 Sidney I. Lezak and Thomas C. Lee, "[Lezak to Howe]," April 15, 1977 (SHL, Carrol Howe Collection, Legislative Series, Box 2, Folder 21 "US District Attorney), n.p.

58 Sidney I. Lezak and Thomas C. Lee, "[Lezak to Howe]," May 12, 1977 (SHL, Carrol Howe Collection, Legislative Series, Box 2, Folder 21 "US District Attorney), p. 1.

he described how his "knowledge has been derived," including both his methods and his credentials. Howe would have been at least somewhat familiar with the judiciary and its methods. In addition to his archeological and historical activities, which included museum work and involvement "with both universities and local museums in research and dissemination of information on the cultural heritage of Indians," he had served in several civic capacities, from school district superintendent to State Representative for Klamath County.[59]

As with other testimony in the trial, Howe submitted his in the form of a written affidavit. Howe began his affidavit by establishing himself as someone with the authority to make claims regarding the Klamath Tribe's past. First, he presented himself as a scholar within a community of other experts. Beginning first with the University of Oregon professor who had advised his Master's degree, Howe situated himself in a network of professional anthropologists and archeologists. Through these associations, Howe illustrated his status within the community of experts. Following this mapping of his network, Howe demonstrated his dis-involvement with the Klamath by stating that his knowledge of the tribe did not originate from *being* part of the tribe, but rather as a witness to it: "The information presented here is based upon direct research, consultation with professional scientists, and interviews . . ." [60] While there were times that he was "tempted to trade his scientific training for the 'spirit power' of the old Indian conjurors, in order to solve the mystery that still surrounds [the uses of] certain artifacts," his knowledge came from fundamentally non-spiritual sources (Howe 1968, p. 10).

Following this introduction, Howe began to describe what he had learned about the Klamath Tribe's culture through his research. The Klamath had arrived, "scientific evidence shows," some fourteen thousand years ago and had quickly "adapted" to their environment. They changed their fully nomadic way of life and gave up large game

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59 Carrol Howe, "Carrol Howe Bibliographical Information," n.d. (SHL, Carrol Howe Collection, Legislative Series, Box 1, Folder 7 "Bibliographical Writing"), pp. 1-6.

60 Lezak *et al.*, "Plaintiff's Brief in Support of Its Claims," p. 38, 39.

hunting, replacing it instead with a culture of subsistence based around the marsh. "By the time of the eruption of Mount Mazama about 7,000 years ago, they had made a complete adaptation to this marsh environment."[61] They changed their dress, substituting clothes made from hides with textiles made with marsh resources such as tule and waterfowl skins.

Howe portrayed the Klamath not as agents of environmental change, but rather as the objects of environmental forces. Howe felt that the Klamath blended in so well with the environment that he described their environment as a "habitat," in the way one would discuss the habitat of an endangered species, and not a *home* (Howe 1968, p. 103). The use of the word "habitat" explicitly framed the Klamath as having adapted to their environment, as opposed to agents who engaged actively in the building and modification of the *homes*. In this "habitat," the Klamath gathered eggs, hunted birds, fished, and most importantly gathered the water lily-like wocus. Surprisingly (or perhaps, sadly, not so surprisingly) the use of the word "habitat" was not something that garnered attention or criticism in the court. Such a framing of the Klamath aided the legal position of the United States government very well, because it helped to establish the continuity of uses between the Klamath and the National Wildlife Refuge and National Forest—that is the maintenance of a natural environment, unaltered by people. By framing the Klamath as part of the natural environment, not people in an environment, Howe narrated this continuity perfectly.

The establishment of the reservation did not change these fundamental ways of life, Howe reported. The Klamath, Howe continued, certainly began to use western tools. However, he argued, the Klamath used these tools to expedite their pre-contact ways. They began to use horses to operate grinding stones that ground wocus seeds, for example. The Klamath replaced their spears with string nets and fishing rods, but continued to catch the "twelve to fourteen pound trout [that] were not unusual in the days

61 Lezak *et al.*, "Plaintiff's Brief in Support of Its Claims," p. 39.

following the formation of the . . . Reservation and into the 1930s."[62] In summary, he wrote, "the products of the marsh were a dominant part of the native Indian economy. Waterfowl and marsh plants were to the Klamath what the buffalo was to the Plains Indians . . ."[63] Howe's argument was that basic ways of life—with their close integration into the natural environment—did not change simply because the tools changed. This was an important assertion, as the defense made the implicit argument that the mere presence of the agricultural tools provided through the treaty suggested the growing importance of agriculture on the reservation.[64]

Stern, the government's second expert witness on culture, was a professor at the University of Oregon.[65] Even with this professional position, he still needed to establish his expertise for the court. Bruno Latour, in *Science in Action*, developed the idea of the "trial of strength" to describe the ways in which scientists establish their authority and undermine adversaries in scientific papers (Latour 1987). Latour showed that in a scientific paper, each statement is designed to anticipate and address preemptively the criticisms of an adversary. Stephen Hilgartner has applied this device to National Research Council advisory reports, and has shown that trials of strength are important rhetorical tools in establishing the authority of these reports (Hilgartner 2000, pp. 45-52). Trials of strength also offer a way to understand the construction of authority in courts. In open court, when a witness is cross examined, the trial of strength between the witness and the opposing lawyer is explicit. Although written, Stern's affidavit, as with the affidavits of other expert witnesses in *Adair,* displayed a similar rhetorical framework to an imagined cross examination and a trial of strength. Each statement in the affidavit was directed at a particular criticism that could be leveled against it by a critic. The

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62 Lezak *et al.*, "Plaintiff's Brief in Support of Its Claims," p. 46. Throughout the expert testimony, there was little, if any, differentiation between Klamath, Modoc, and Yahooskin Paiute cultures and environmental practices.

63 Lezak *et al.*, "Plaintiff's Brief in Support of Its Claims," p. 46.

64 As discussed in the next chapter, this represented a distinction between technologically and environmentally determinist narratives.

65 LaFrance *et al.*, "Amended Affidavit of Dr. Theodore Stern," p. 45.

hypothetical conversation served to shut down as many avenues of dissent as possible, before they actually arise in any sort of formal response to the expert's testimony.

What follows is the introduction to Sterns affidavit, with a hypothetical opposing lawyer posing difficult questions, and Stern (in his actual words) addressing them:

> HYPOTHETICAL SKEPTIC: *Who are you, and what qualifies you to be here?*
>
> DR. THEODORE STERN: I, Dr. Theodore Stern, depose and say: . . . I currently hold the position of Professor of anthropology at the University of Oregon . . .
>
> SKEPTIC: *How long have you worked there? Are you merely junior faculty?*
>
> STERN: I joined the University of Oregon's faculty in 1948 . . .
>
> SKEPTIC: *That was thirty years ago, a long time. But how long have you researched the Klamath?*
>
> Stern: In the summer of 1948, I commenced my research on the Klamath Indian Reservation and continued that research over a period of sixteen years.
>
> SKEPTIC: *That, too, is a long time. But how do we know what the quality of your research was? Was it supported by reputable people?*
>
> STERN: This research was funded by grants from the Social Sciences Research Council, the American Council of Learned Societies, the Fund for the Republic . . . and the Faculty Research Fund of the University of Oregon.
>
> SKEPTIC: *Still, this list of prestigious organizations does not prove that your research results were well-received by other scholars.*
>
> STERN: My research on the Klamath and Modoc Tribes resulted in a number of publications in scholarly journals and culminated in my book, [published by the] University of Washington Press [in] 1966. I have also testified before the Indian Claims Commission. . . . Most recently, at the request of the editor of . . . the Handbook of North American Indians to be

published by the Smithsonian Institution, I have written a summary article on the Klamath and Modoc tribes of Indians.

SKEPTIC: *While this sounds impressive, have other researchers confirmed your accounts?*

STERN: The archeological researches of my colleague, Luther S. Cressman, author of Klamath Prehistory (American Philosophical Society, Transactions, 46 (4): 375-513), confirm [my conclusions].

SKEPTIC: *To accomplish your research, you must have spent considerable time with the Klamath. Is it not likely that this contact has clouded your objectivity?*[66]

In answer to this final question, Stern concludes his introduction by noting that, like Howe, he based his conclusions on "research and personal experience" with the Klamath.[67]

Howe's and Stern's conclusions were quite similar. Stern, like Howe, discussed the "adaptation" of the Klamath, again using a word that connotes a biological process as opposed to a social one.[68] "Authorities are in agreement," said Stern. "The Klamath and Modoc people's adaptation to the lakes, streams, and marshes . . . was particularly close. This adaptation laid its mark upon the Klamath culture."[69] Here, Stern amplifies the connotations of the word "adapt" by suggesting that the Klamath culture did not leave its mark on the environment, but that the environment left its mark on Klamath culture. Like Howe, Stern highlighted the harmony between nature and the Klamath. The Klamath lived around and even on the marsh in huts built on tule mats. From the water, the Klamath gathered food and raw materials. From the forests, they collected berries and seeds and felled the occasional tree for a dugout canoe. Stern further characterizes

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66 The responses of Stern are his words, quoted from LaFrance *et al.*, "Amended Affidavit of Dr. Theodore Stern," pp. 44-46.

67 LaFrance *et al.*, "Amended Affidavit of Dr. Theodore Stern," p. 45.

68 Consider, for example, the difference between saying that a newcomer *learned* the norms of his new home as opposed to saying that a newcomer *adapted* to the norms of his new home.

69 LaFrance *et al.*, "Amended Affidavit of Dr. Theodore Stern," p. 46.

the Klamath's relationship to the marsh as one of "dependence," again suggesting that the Klamath did not posses control over their own livelihoods and were instead determined by the environment. However, their "dependence" did not lead to excessive extraction; nor did "[t]he use of the natural . . . products . . . cease with the onset of the reservation in 1864."[70]

The defense, in response, painted a starkly different picture of the Klamath Tribe's history, one in which the Klamath ranched and farmed. The defendants, like the plaintiffs, submitted testimony from experts. According to defense experts, the marsh was not the lush and unspoiled source of sustenance portrayed by Howe and Stern. Rather, the Klamath had radically reshaped it. "The water was manipulated so that the lands to be hayed could be dried out, and after the hay was put up it could then be irrigated to that there would be some crop . . . for grazing after haying."[71] Gordon Barrie, a range management expert called by the National Bank of Oregon, testified in his affidavit that "the use of the waters of the Williamson . . . during the time it was in Indian ownership" was dominated by cattle grazing.[72] Another defense expert reported that the claims that American Indians survived on wocus and fish were unfounded. He stated "*Occasionally* Indians came in the fall of the year to gather wocus."[73]

Highlighting the dispute's complex character, the defendants' brief contained two chapters from Stern's own book, *The Klamath Tribe*, in support of the landowners' claims. By including Stern's book, the defense attempted to deconstruct Stern's expertise by highlighting contradictions between his affidavit for the defense and his published work. In particular, two chapters, the first on the reservation economy, and the second on the General Allotment Act, formed the core of the defendants' use of Stern's book (Stern 1965, ch. 5, 11). "It was fundamental to other parts of the [reservation] program of planned change that the Indians cease to depend upon fishing, gathering, and hunting, and

70 LaFrance *et al.*, "Amended Affidavit of Dr. Theodore Stern," p. 51.
71 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," p. 11 (exhibits).
72 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," p. 8 (exhibits).
73 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," pp. 38-39 (exhibits).

that they turn instead to farming," wrote Stern (Stern 1965, p. 57). The shift toward sedentarization among the Klamath seemed to have begun upon first contact, and Stern's research found that they had begun to cultivate fields almost immediately. The Klamath also began to raise cattle "with the discovery that the upper valley of the Sprague [River] provided satisfactory condition for winter range . . ." (Stern 1965, p. 60). In their decision to include Stern's chapters in their brief, the defense was clearly attempting to discredit his expert testimony for the plaintiffs by illuminating contradictions between his affidavits for the government and his book.

Even as the defense relied on experts as conduits of historical truth, they also followed an evidentiary strategy that might be called *you-don't-need-an-expert-if-the-evidence-speaks-for-itself.* The defense appended numerous primary historical documents to their brief.[74] These documents included the annual reports and handwritten correspondence of the Klamath Reservation agents. From the annual reports, which usually were five to seven pages long, the defense photocopied the sections on grazing and agriculture on the reservation following 1864. The defendants' inclusion of these primary documents likely had several intentions. First, it implied that the evidence was incontrovertible; anyone who looks at these documents, suggested the defense, will see the same thing. Second, the defendants' selective display attempted to show that the historical record sometimes differed from the testimony of the plaintiffs' experts. Third, by including a written historical record in their arguments, the defense attempted to create a hierarchy of authenticity and authority between oral and documentary evidence, which it could then use to undermine the plaintiffs' experts. On the one hand, the plaintiffs had relied primarily on oral, anthropological evidence conveyed through the expertise of Howe and Stern. Both had chosen to emphasize the consensus among scholars and experts, as well as their own ethnographic observations, as the basis of their expertise. On the other hand, the defense relied on the documents themselves. Such an evidentiary tactic attempted to create "a contest between oral and literate forms of knowledge," the

74 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief."

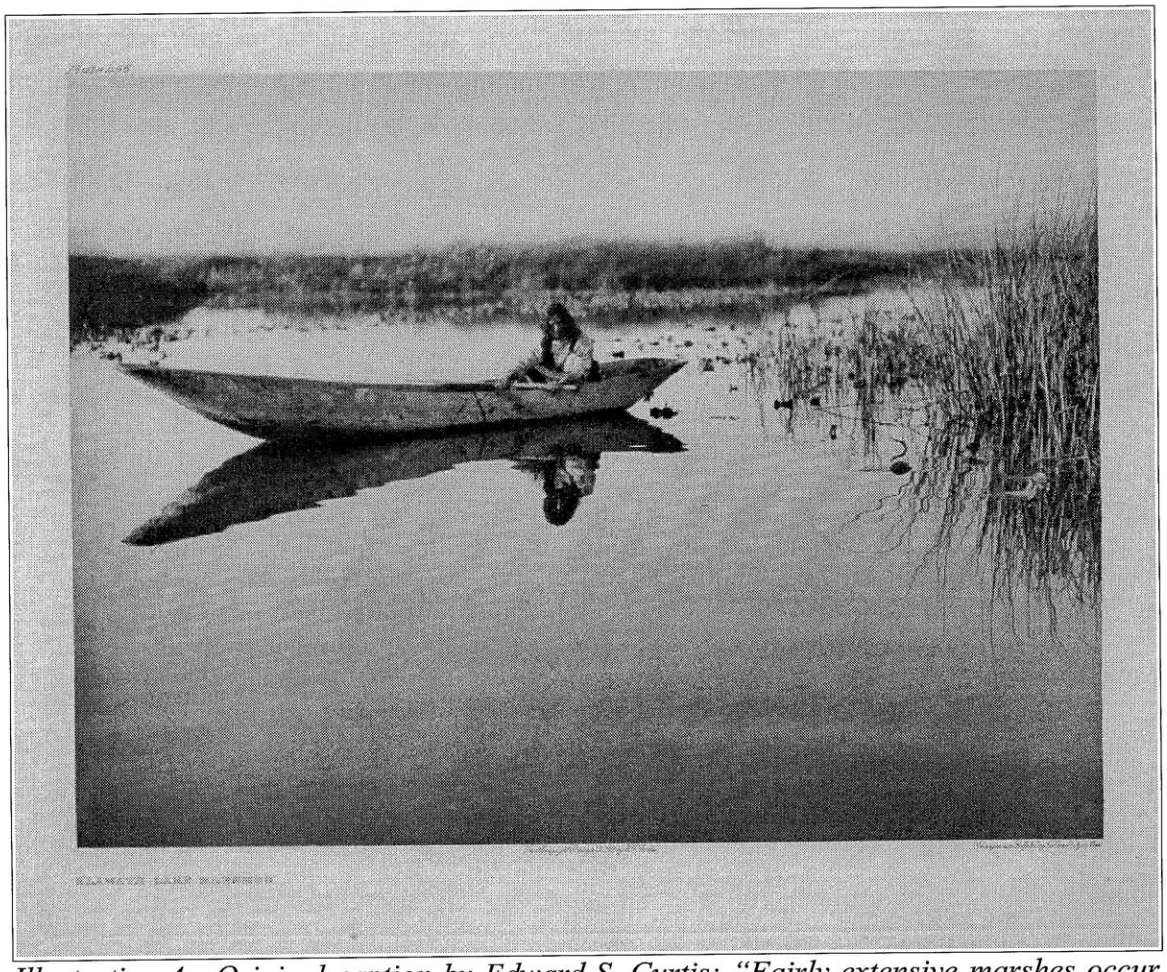

Illustration 4. Original caption by Edward S. Curtis: "Fairly extensive marshes occur along the shores of Klamath lake, and Klamath marsh covers about a hundred square miles. These areas are the resort of innumerable waterfowl, which were of great importance to the aboriginal Klamath, and thousands of acres were a mass of water-lilies, which yielded in abundance an edible seed" (Source: Charles Deering McCormick Library of Special Collections, Northwestern University Library, Northwestern University Library, Edward S. Curtis's "The North American Indian": the Photographic Images, *2001. http://hdl.loc.gov/loc.award/iencurt.cp13021, accessed July 1, 2010. Used with permission).*

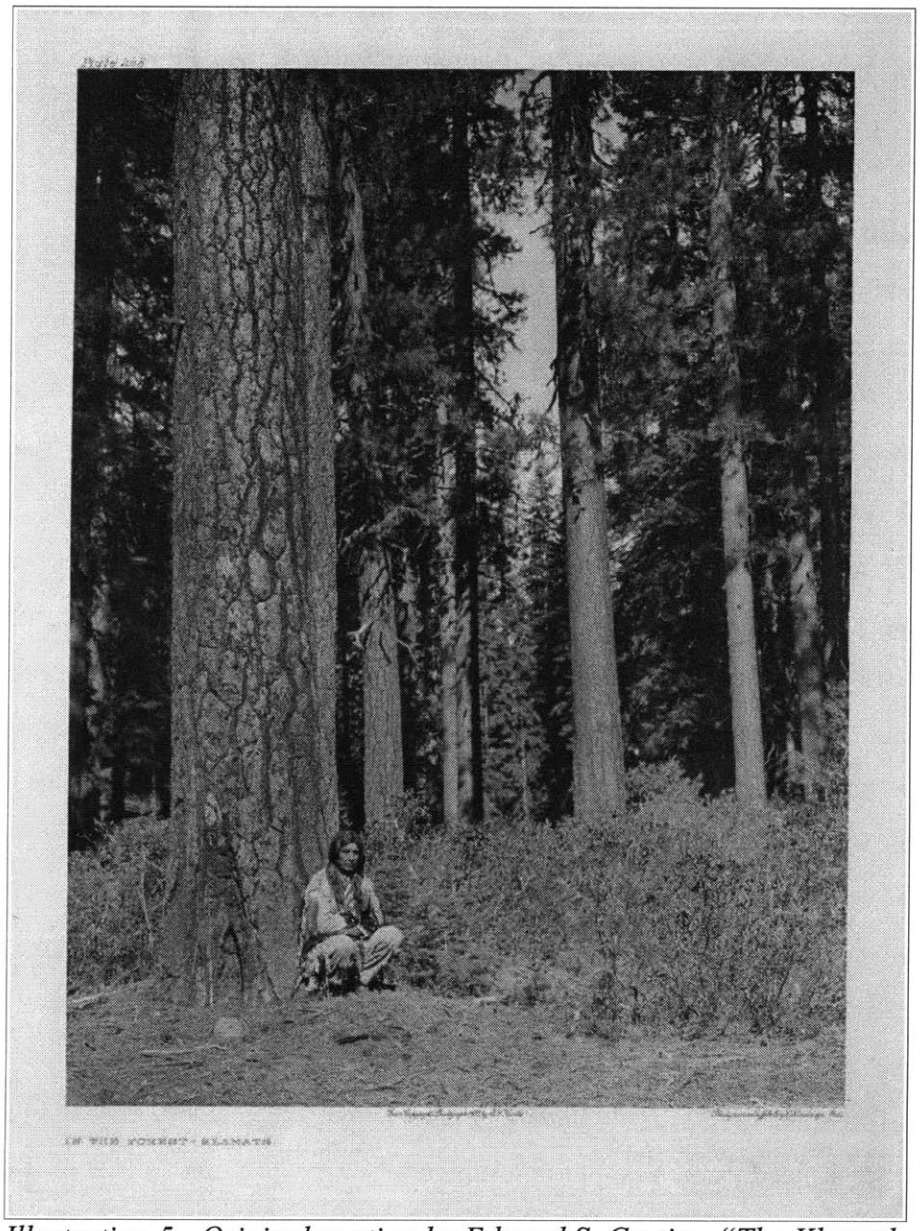

Illustration 5. Original caption by Edward S. Curtis: "The Klamath live in a country of lakes and marshes, broad meadows, and forested mountains. The reservation itself includes an extensive area of splendid pines (Source: Charles Deering McCormick Library of Special Collections, Northwestern University Library, Northwestern University Library, Edward S. Curtis's "The North American Indian": the Photographic Images, *2001. http://hdl.loc.gov/loc.award/iencurt.cp13013, accessed July 1, 2010. Used with permission).*

implication of which was that ". . . the written archive had more value than the evidence of . . . the intersubjective practice of fieldwork," which had been the basis for the plaintiffs' expert claims (Clifford 1988, p. 339).

Environment

Both the plaintiffs and the defendants had alleged particular versions of the social history of the Klamath Tribe. They then had to show that the environment at the time corresponded to a particular version of cultural history.

The United States and the intervening Klamath Tribe argued that "the Klamath Marsh and the watershed of the Williamson River had been an area rich in plant and animal life utilized by the Indians and continued to be so after the Reservation was established. The forest lands in the upper Williamson River watershed were rich in forest resources—timber, grazing, fish and wildlife."[75] Larry Safley, a biologist for the Klamath Indian Game Commission, told the court: "Based on my expert opinion," the marsh was, and had been, a key stop-over for birds migrating between the arctic north and the tropical south along the Pacific Flyway.[76] Recent changing patterns of water flow due to irrigation were changing this natural role. In addition to an environment teeming with wildlife—"The Williamson . . . harbors rain-bow trout, brook trout, suckers, chub or roach, dace and brown bullhead," Safley said. The region's plant life was also dense and lush.[77]

On the other hand, the defendants claimed that the marsh was less like a marsh and more like a meadow. To emphasize this, defense lawyers and witnesses liked to put the word marsh in scare-quotes. The marsh, said Donovan Nicol in his affidavit, "is not covered with water and is not 'marsh' [sic] as the word is commonly used."[78] Rather,

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75 Lezak *et al.,* "Plaintiff's Brief in Support of Its Claims," p. 12.

76 Timothy LaFrance; Richard B. Collins; Daniel H. Israel; Raymond Cross; and Richard B. Thierolf, "Amended Affidavit of Larry E. Safley," January 9, 1978 (USDC, vol. 4 of 21, DN 404), p. 54.

77 LaFrance *et al.*, "Amended Affidavit of Larry E. Safley," p. 55.

78 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," p. 5.

"[t]he area know as the 'Klamath Marsh' [sic] is a large grass-land valley surrounded by forested hills and mountains on the north, east and west."[79] Other defense witnesses reemphasized this characteristic by suggesting that "[t]he *grassland* has traditionally been used by the Indians, their lessees and by non-Indian owners of allotments for grazing of cattle."[80]

In conjunction with portraying the marsh as a grassland, the defendants' strategy concerning the region's historical ecology also included an emphasis on the changing, dynamic character of the region's environment. If the marsh were always changing, argued the landowners' expert witnesses, sweeping claims about environmental conditions, such as those made by the plaintiffs' experts, were simply untenable from the start. Several witnesses for the landowners noted that the marsh differed depending on when you examined it, both throughout the year, and from year to year.[81] For instance, "[t]he water level in the Klamath Marsh had been very low in 1930 and 31," testified a range manager, "but it began to come back by 1934."[82] Others noted that, because the depth of the Williamson in the marsh varied so much depending on the amounts of snow and rain, that the plaintiffs' images of perennial wetness were impossible. The marsh was highly variable: "[t]he thing that governed the quantity of water available was the snow fall[:] during the wet years drainage was a problem, and during the dry years it was a matter of getting as much ground wet [using irrigation] as possible."[83] Even Judge Solomon, found the variability of the environment difficult to fully comprehend.

> THE COURT [Solomon]: Is there a shortage of water in that area?
>
> MR. CONN [an attorney for the defendants]: In some years, Your Honor, there is.

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79 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," p. 4 (exhibits).

80 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," p. 4 (exhibits) emphasis added.

81 For example, see Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," p. 4 (exhibits).

82 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," p. 10 (exhibits).

83 Ibid., p. 26 (exhibits).

THE COURT: I thought some of this land was marsh land.

MR. CONN: Even marsh land dries in Eastern Oregon, Your Honor. In some of the years, the water doesn't run out of the marsh over the reef.[84]

In addition to year-to-year changes, in the time between 1864 and 1975, the marsh had no doubt changed dramatically due to natural succession, argued the defense. If the marsh were filling in due to natural causes, could the plaintiffs still claim a right to use it in the way they did when the marsh was watery? "The 'Marsh' [sic] at the lower end of the valley is the remnants of an old and dying lake," explained Nicol.[85] By focussing on the natural succession of marsh to meadow, or as Nicol called it, the "dying" of the marsh, his rhetoric paralleled the discourses of "civilizing" that for so long dominated United States American Indian policy. Just as marshes ultimately became meadows, Nicol's rhetoric implied, so too did hunters and gatherers become agriculturalists over time. By suggesting that natural processes—the succession of a marsh to a meadow—had slowly eliminated the possibility of continuing traditional subsistence patters, the statement naturalized the economic shift in the area.

The state of Oregon's Deputy Director of Water Resources, Chris Wheeler, added to Nicol's testimony regarding succession and environmental changes over time. He warned that keeping the marsh swampy against its natural succession towards a meadow could require the use of defoliants to retard the accumulation of plant litter on its floor.[86] For Wheeler, this hardly seemed like the work of stewards of the natural environment, as the United States Fish and Wildlife Service claimed to be. Nancy Langston, however, has argued that for the Fish and Wildlife Service, being stewards of the environment sometimes involved a very hands-on approach that could involve herbicides. Until as late as the nineteen-fifties, the Fish and Wildlife Service was driven by a perception that the

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84 "Transcript of Proceedings," October 2, 1980 [13 September 1976] (USDC, expando, DN 663), p. 68.

85 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," p. 4 (exhibits).

86 James A. Redden and Timothy D. Norwood, "Brief of Defendant State of Oregon," March 21, 1978 (USDC, vol. 5 of 21, DN 413), p. 27.

production of waterfowl, who preferred semi-open water, was an indication of the health of their preserves (Langston 2003). To increase waterfowl populations, and in their mind to maximize the potential of nature, the Fish and Wildlife Service used chemical defoliants to keep Malheur National Wildlife Refuge in eastern Oregon from becoming "overly" vegetated. In an attempt to denaturalize changes to the marsh, Safley, testifying for the plaintiff-intervenor, agreed that the marsh needed more open water, but identified human intervention, not natural succession, as the reason for change. He pointed to the current "imbalance" in the marsh's open water to vegetated area ratio as evidence that the landowners were drawing too much water. Interventions were necessary, Safley argued, to support the *return* of wildlife that *had once* lived in the marsh. His statement implied a state of balance that had been lost at some time in the past, and the implied cause was settler agriculture.

Simplified Narratives of Complex Situations

Both the defense and the plaintiffs presented extreme renderings of a highly complicated history. While the purpose of this chapter is to highlight the process of how competing historical narratives are contested, it is important to point out that both narratives were highly simplified in their portrayal of the past. The defense, for example, in the included excerpts from reports of Klamath Reservation agents, tended to emphasize only the parts of their reports on the conversion of the Klamath to agriculture. At the same time, the plaintiffs did not emphasize the zeal with which agents of the Office of Indian Affairs repeatedly attempted to force, at times with violence, the Klamaths, Modocs, and Yahooskin Paiutes to abandon traditional subsistence methods in favor of agriculture. In doing so, the government's narrative glossed over the casualties of its colonial agricultural programs, namely the Klamath tribal members who had become ill or had died as a result of malnutrition, as well as the toll such attempts had on the continuation of Klamath tribal culture. Similarly, the defendants' narrative glossed over the persistence of Klamath tribal members who continued to practice traditional subsistence,

and the lengths to which they went to continue their cultural practices in the face of continual attempts to disrupt these.

The tendency and desire to simplify the past is strong. This is especially true of western history, which is often simplified, even romanticized. The temptation to identify clear heros and villains is great, although almost impossible given the violence perpetrated across the board (Limerick 1987; Limerick 2000b). The tendency towards simplification was apparently equally strong in the *Adair* court, where each side attempted to provide clear-cut narratives that directly supported particular legal claims. The results were highly simplified narratives of complex situations. Before moving on to a discussion of the Klamath's testimony, it is therefore appropriate to offer a more complete reading of the very documents relied on by both defendants and plaintiffs. Such a reading suggests a far more complex situation on the Klamath Reservation in the decades following 1864.

When Agent Applegate, one of the first Office of Indian Affairs agents on the Klamath Reservation, arrived in 1865, for example, he began to survey the reservation for an appropriate plot of land to experiment with farming (Commissioner of Indian Affairs 1866, p. 90). Farming was clearly on the minds on United States agents in the Klamath Basin. Succeeding agents followed suit, and they regularly listed the different climates and landscapes of the reservation in their annual reports, often assigning to each a supposed suitability for agriculture.

Applegate was fairly successful in his early attempts at growing "corn, turnips, potatoes, barley, oats and wheat," and he made sure that his superiors knew it (Commissioner of Indian Affairs 1866, p. 89). But it quickly became clear that the environment of the reservation was not suitable for grain and vegetable agriculture. Superintendent Huntington, the top Office of Indian Affairs official in Oregon, wrote to the commissioner in Washington, DC, "I must say, however, that some very limited experiments, made by the military officers at [nearby Army] Fort Klamath . . . do not warrant quite so sanguine a view of the future production as that gentleman [Applegate]

has taken" (Commissioner of Indian Affairs 1868a, p. 71). In 1870, after six years of failed attempts by the three different agents, Agent Knapp of the Klamath Reservation pleaded, "I again urge upon the Department the uselessness of trying to make this an agricultural reservation" (Commissioner of Indian Affairs 1870a, p. 69).

But the pressure to establish agriculture must have been high, since nearly every year, agents directed the planting of fields once again; nearly every year, the crops in these fields would fail. As Stern wrote in *The Klamath Tribe*, when Joseph Emery, a professor from the state agricultural college, took over as Indian Agent in 1885, he proclaimed with scriptural grandiloquence:

> I have not been able to depress the mountains nor lower our altitude above the sea, yet I believe, from experiments made the present year in a number of localities, that agriculture can be made a comparative success on the Klamath Agency" (Commissioner of Indian Affairs 1886, p. 213 quoted and discussed by Stern 1965b, p. 59).

However, in 1889, Emery reported that he had failed to grow enough wheat to feed the reservation population, let alone to sell at market. "The unprecedented heat of June and July," he reported, "and the want of rain have cut short the crops. The yield will be small, probably half enough to supply them [the Klamath] with bread" (Commissioner of Indian Affairs 1889, p. 271).

The agents explained their failure to establish agriculture in two ways. First, like Emery, the agents blamed what they perceived as the "unprecedented" vagaries of the environment and the variability, over time and space, of that environment. However, what the agents did not understand was that the climate they described as "erratic" was in fact normal. The seeming confusion of the seasons reported by Knapp in 1870 was not uncommon for the region: while "[t]he crops started favorably . . . a drought in May, cold rains and frost all the month of June, hot days and frost in July, have seriously damaged them, especially the vegetables, which will be almost a total failure" (Commissioner of Indian Affairs 1870a, p. 68). Second, and more unfortunate, the agents blamed the Klamath. The failure of agriculture seems to have reinforced in the agents' minds the

supposed importance of their "civilizing" mission. Agents, in other words, mapped their own failures and the unsuitability of the environment onto the potential of the Klamath to succeed at agriculture, the agents' metric of civilization.

The repeated agricultural disappointments had important practical consequences in terms of everyday subsistence, especially through the winter. Over and over again, "enough food could not be raised . . . to subsist the Indians" (Commissioner of Indian Affairs 1868b, p. 123). The realities of the basic failure of agriculture caused a shift in the agents' attitudes towards traditional subsistence. Upon the reservation's establishment, agents had actually prohibited traditional subsistence methods. In stark contrast to the treaty's guaranteeing the "right of taking fish in the streams and lakes . . . and of gathering edible roots, seeds, and berries within its limits" (Commissioner of Indian Affairs 1870b, p. 177; Kappler 1904), the agents nevertheless prevented tribal members from making annual trips to different parts of the reservation to gather food (see, e.g., Commissioner of Indian Affairs 1868a, p. 92). Combined with the failure of agriculture, the prohibitions on hunting, fishing, and gathering put the agents in the position of having to buy food to keep the tribal members alive.

But despite attempts to end traditional subsistence, the practice continued, and over time, the agents grew to appreciate this fact. Being the "great father" of the Klamath was clearly a responsibility that the agents could not live up to (Prucha 1995). As a result, even as they continued to report yearly attempts to grow crops, the agents also began to speak more highly of the subsistence traditions that they had previously decried. After all, they realized, the reservation's fish, fowl, and vegetation, unlike agriculture, constituted "a never-failing source of subsistence to the Indians" (Commissioner of Indian Affairs 1888, p. 208). And the more the Klamath hunted, fished, and gathered, the less food the agents would have to supply (Commissioner of Indian Affairs 1870a, p. 69). Agent Nickerson, for example, remarked, "There is no difficulty in the way of these Indians living upon the natural products of the country, but such a life does not tend to their civilization" (Commissioner of Indian Affairs 1882, p. 136). Agent Emery, in 1886,

admitted the continued, if not growing, importance of traditional subsistence: "The streams abound with fish. . . . When all other sources . . . fail, the Indians turn to this unfailing source, sure to find food to stay their hunger and that of their famishing children" (Commissioner of Indian Affairs 1886, p. 212).

By 1887, Emery described traditional subsistence practices on Klamath Marsh in a way that made it sound like a positively industrious agricultural activity:

> In what is known as Klamath marsh the pond lily grows in great abundance, covering thousands of acres. During the months of August and September the seed of this lily is gathered mainly by the women and children. For centuries this has been their harvest-field. Probably 300 bushels of this seed will be gathered this year (Commissioner of Indian Affairs 1887, p. 187).

If the volcanic Upper Basin could not actually be transformed into a pastoral landscape, then his rhetoric, chocked full of agrarian imagery—the "great abundance" from "thousands of acres" of "harvest-fields"—could attempt to reframe the Klamath's gathering into an agricultural activity.

Klamaths as Witnesses

Klamath tribal members themselves provided some testimony on the marsh and their uses of it. Some Klamath landowners, who had perhaps made a modest living from their land, defended their water right as agriculturalists and testified for the defense.[87] At the same time, numerous Klamath tribal members submitted affidavits on behalf of the United States government and the tribe.

One Klamath witness, for example, testifying for the defense, said:

> . . . I have spent most of my life on the Klamath Marsh since [1910].
>
> . . . when I first came to the Marsh between Kirk and the Military Crossing, there were 20 families living on the Marsh and all of them had cattle. They cut hay to winter the cattle at the time and grazed their cattle

87 See, e.g., Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," pp. 76-79, 80-82, and 83-85.

on the Marsh during the summer months.[88]

Another agreed with this testimony, saying:

> In my earliest remembrance, cattle were driven into the Klamath Marsh area in the spring of the year for pasturing. . . . I have no recollection of any members of my family gathering wocus in the Klamath Marsh Area.[89]

Others challenged this picture.[90] Emphasizing the conservationist character of the Klamath's use of the marsh, another Klamath witness testified, "As far back as I can remember,"

> the Klamath Marsh was used by the Klamaths for the gathering of food which was needed for their survival.
>
> . . . Also in the spring the eggs of these [migratory] birds were gathered for consumption. Always, the Klamaths only took what was needed in order to insure the survival of the species.[91]

Others told of similar memories and activities, none of which fit easily with a landscape of reclamation and grazing.

The Klamath witnesses for the plaintiffs also emphasized environmental decline, and intimated the likely cause. One eighty-two year old witness recalled:

> I remember well the time when Indians lived all year along the Klamath Marsh and the Williamson. . . . Old friends of mine . . . lived up there, but most of those old friends are gone now.
>
> . . .
>
> Taking a year like 1907 for example, I recall my family devoting two or three weeks out of the summer, in late July or early August, to picking wocus. We would camp on the marsh by Silver Lake Crossing during this

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88 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," p. 77.

89 Biggs *et al.*, "Exhibits to go Along with Defendants' Brief," pp. 81-82

90 See, e.g., LaFrance *et al.*, "Klamath Tribe's Brief and Evidence on Issues Presented in the Pretrial Order," December 14, 1977 (USDC, vol. 3 of 21, DN 398), exhibit C, D, E, and F; and Lezak *et al.*, "Plaintiff's Brief in Support of Its Claims," exhibit 5, 6, 7, 8, 9, 10, 11, and 12.

91 Lezak *et al.*, "Plaintiff's Brief in Support of Its Claims," p. 59.

> time; and people would work at picking wocus all day long, getting enough to fill quite a few gunny sacks.
>
> I remember when Solomon Flat, which is where Hog Creek flows into the Williamson, was entirely underwater. Indians used to gather wocus there. There were perhaps four square miles literally covered with shallow water in which the wocus grew. Now Solomon Flat is dry land.[92]

One did not have to be eighty-two years old to see decline, however, according to the witnesses. A twenty-seven year old witness, testified, "I fish in the Williamson River as often as possible. . . . Fishing is worse than it used to be. I notice a gradual decrease in the quality of the water in the Williamson. I regret this . . ."[93]

Despite offering affidavits, as a group of knowledge producers, the Klamath were kept separate from the experts; their affidavits were filed in separate sections of the parties' legal briefs. The Klamath could not be modest witnesses. As "embodied others," they were in what Haraway calls a *marked category*. According to the codes of expert credibility at work during the *Adair* case, what appeared to mark tribal members as non-experts was their supposed experiential relationship to the conflict, a relationship that prevented them from being objective, expert "mirrors of reality " (Haraway 1988, p. 575; Haraway 1997, p. 23). Ironically, of course, the Klamath testifying in *Adair* had *not* experienced the historical issues being contested—largely because they had occurred so long before. This critique of their objectivity was, therefore, easily countered. But unlike expert witnesses such as Howe and Stern, the Klamath were unable to shake the mark of perceived connection and to establish themselves as experts. Expert witnesses, on the other hand, were able to obscure the social origins of their knowledge and frame this knowledge as *sui generis* and directly derived from an "already-always-there" reality (Gieryn 1999). These experts became, in the eyes of the court, simply the vessels for communicating this reality.

The result was that the Klamath were left in limbo, unable to testify as

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92 Lezak *et al.*, "Plaintiff's Brief in Support of Its Claims," pp. 65-66.

93 Lezak *et al.*, "Plaintiff's Brief in Support of Its Claims," p. 63.

experiential witnesses and unable to testify as expert witnesses. Unable to speak authoritatively in this no-man's land of witnessing, the Klamath became evidence to support expert claims. The experts themselves reinforced this distinction. Howe claimed that taboos among the Klamath against speaking the names of the dead "were certainly enough to suppress all historic knowledge within a people" and were a primary reason "for the failure of the Modoc and Klamath to retain knowledge" of their history (Howe 1968, p. 26). In other words, claimed Howe, only non-Klamath could construct the history of the tribe; according to Howe, the epistemic core of Klamath culture precluded the very participation of tribal members.

Chapter Five

Dueling Narratives

Beyond the disputed facts in the two accounts, the core legal contention of each side rested on very different historical narratives. In this chapter, I discuss how the expert testimony drew in *Adair* upon and reinforced two meta-narratives of American Indian environmental relationships, and in the process reconfigured the historical and contemporary agency of the Klamath. I focus on how these narratives positioned the agency of the Klamath in relation to the environment, the economy, and the transitions brought about by the colonial process. While the plaintiffs' and defendants' narratives endowed or circumscribed Klamath agency in different ways, their similar methods of production—expert witnesses—ultimately served to circumscribe the ability of the Klamath to contribute to the definition of their own historical and environmental agency.

The United States government told a history of the Klamath in which the treaty had created a reservation whose purpose was to allow the continued traditional hunting and gathering practices of the Klamath. The Klamath had continued these activities following the establishment of the reservation. This purpose, in turn, had reserved a *Winters* water right, which had passed to the United States government upon creation of the National Wildlife Refuge and National Forest. It had done so, according to the government, because the purpose of these new federal reserves was the same as the uses of water on the former reservation. The Klamath Tribe told a similar historical narrative, but argued that the right remained with the tribe following termination. The defendants' claim, on the other hand, rested on a history in which the treaty had created a reservation whose purpose was to convert the tribe to sedentary agriculture. In this narrative, the Klamath had switched to these activities following the establishment of the reservation.

The agricultural purpose of the reservation had reserved *Winters* rights, but these rights were for agriculture, not maintaining an environment conducive to hunting and fishing. Therefore, these rights had not passed to the United States government upon its establishment of the new reserves.

THE ECOLOGICAL OR ECONOMIC INDIAN

The narratives produced in the court drew on and reproduced mythologies for understanding the historical lives of American Indians. On the one hand, the plaintiffs narrated a history of the Klamath as "ecological Indians" who had lived in understanding and harmony with their natural environment, altering it little (Krech 1999). On the other hand, the defendants narrated a past in which the Klamath were economic Indians who had quickly adopted agriculture, ranching, and industry, and had altered the environment towards these ends.

The "ecological Indian," discussed by Shepard Krech in his book *The Ecological Indian*, is a prevalent mythology in the United States that frames American Indians, and native people more generally, as ecologists with a relationship to nature that is distinctly different from the dominant western society (Krech 1999). In calling the ecological Indian a *myth*, Krech does not imply that this image is necessarily untrue or false. Instead, Krech employs the term as something that "refers to a narrative account or story which contains the collective wisdom of a society and articulates beliefs concerning key aspects of individual identity or collective life" (Drislane and Parkinson 2010). In this vein, the mythology of the ecological Indian "expresses the widely held perception . . . that there are fundamental differences between the way Americans of European descent and Indians think about and relate to land and resources" (Krech 1999, p. 16). Richard White and William Cronon have also commented on the prevalence of this mythology, noting that:

> There has long been a tendency in the United States, encouraged by the environmental movement of the 1960s and 1970s, to view Indians as 'original conservationists,' people so intimately bound to the land that they

have left no mark upon it . . . . (Richard White and Cronon 1988, p. 417).

As with White and Cronon, Krech has suggested that the social, cultural, and environmental upheavals of the nineteen-sixties and -seventies as formative in the mythology (White and Cronon 1988). During this time, American Indians came to represent an alternative to mainstream, Euro-American culture. Helped in part by the American Indian Movement that brought attention to the poverty and isolation of American Indians, by American Indian writers not associated with the movement, and non-native cultural critics, American Indians came to be portrayed as an alternative to high-impact, technocratic American society that was widely criticized at the time (Pursell 2007, ch. 13). "As critics linked many current global predicaments to industrial society, spoke openly of earlier less complex times as being more environmentally friendly, and castigated Christianity for anthropocentrism, they marshaled [images of] Ecological Indians to the support of environmental and anti-technocratic causes" (Krech 1999, p. 20). The myth of "the ecological Indian proclaims that the American Indian is a nonpolluting ecologist, conservationist, and environmentalist, and the white man is not" (p. 21).

Calling American Indians ecologists or conservationists marshals a specific set of popular meanings. Strictly speaking, however, ecology is the scientific discipline concerned with the interlinkages of the biological and physical components of the environment. At the same time, it also has powerful cultural valence as a synonym for the natural world in general. It is also conflated with the environmental movement. Conservationism, meanwhile, was a technocratic movement concerned with the efficiency of natural resource related industries in late nineteenth and early twentieth century America. Government policies that grew out of this movement were closely associated with the American progressive movement and the increasing participation of scientists in government (Hays 1959). Because ecology is ultimately a scientific discipline, and conservationism ultimately a technocratic-progressive philosophy, White and Cronon argue that "portraying Indians as 'conservationists' or 'ecologists' is

fundamentally anachronistic" (1988, p. 417). Krech agrees, but has suggested that

> When speaking of Native Americans as ecologists, we do not necessarily mean that they used mathematical or hypothetico-deductive techniques, but we should mean that they have understood and thought about the environment and its interrelating components in systematic ways (even if the system, all increasingly agree, is more metaphor than hard bounded reality). [Similarly w]hen we speak of them as environmentalists, we presumably mean showing concern for the state of the environment and perhaps acting on that concern (Krech 1999, p. 25).

Closely associated with this is the assumption that such a native person "does not waste or 'despoil, exhaust, or extinguish,' and that he or she does, with deliberation, leave the environment and resources like animal populations in a usable state for succeeding generations" (p. 25-26).

For Krech and numerous other scholars, the mythology of the ecological Indian is problematic. Krech argues that historically, native people did not necessarily live more in harmony with the natural environment than settlers. He draws evidence from the salinization of southwestern agricultural fields, theories attempting to explain pleistocene extinctions of mega fauna, and hunting practices for buffalo that tended to result in over-kill. For Krech, some of the most convincing evidence is found in the participation of native peoples in the fur trade, a trade that led to the near extinction of some animals in the northeast. Krech does not fault American Indians for this participation. Instead, for him it is simply evidence that American Indians can not be considered, *a priori*, environmentalists or ecologists, and that, like others, they act on economic grounds and alter their surroundings in what they perceive to be in their interest (Krech 2008).

At the same time, however, a primarily materialist approach to understanding the varied environmental relationship of native peoples tend to underestimate other aspects of environmental relationships. As Keith Basso pointed out, such materialist interpretations:

> . . . ignore the fact that American Indians, like groups of people everywhere, maintain a complex array of symbolic relationships with their physical surroundings and that these relationships, which may have little to do with the business of making a living, play a foundational role in

> shaping other forms of social activity. What has been ignored, in other words, are the cultural instruments with which American Indians fashion understandings of their environments, the ideational resources with which they constitute their surroundings and invest them with value and significance (Basso 1996, p. 66).

Critiques of the ecological Indian mythology generally focus on materialist evidence that American Indians altered their environments, often in ways that would not easily be understood as conservationist. However, there is another component to environmental relationships, which is that the "cultural instruments" by which the environment is endowed with meaning that is often overlooked. While it is impossible to make sound generalizations given the diversity of American Indian culture, Basso has suggested that in the case of the Western Apache, environmental perception operates in a very different way than it does in European-based cultures. Whether or not this relationship is properly termed "ecological" or "conservationist," Basso has argued that the significance of place among the Apache is different in many respects to western cognitive geographies. Similarly Robert Brightman has suggested that the Rock Cree understand animal behavior as evidence of consciousness, and are thus profoundly different from western understandings of non-sentient living things (Brightman 1993). Materialist critiques must therefore be tempered by a growing consensus that environmental perceptions, the valuation of the environment, and the endowment of meaning in the environment, vary across different cultures. In some cases, American Indian's cultural orientation towards the environment may in fact be quite different from that of Euro-Americans.

Even as the plaintiffs' expert witnesses developed a historical narrative that drew heavily on this mythology, the defendants' experts constructed a counter-narrative that portrayed the Klamath very differently. This counter-narrative, which I call the economic Indian, highlighted the fact that American Indians had altered the environment in a number of ways. This narrative portrayed American Indians as economic actors, whether that economy is the pre-contact economy of hunting, gathering, and trading, or the post-contact economy of agriculture or resource extraction. The narrative draws on historical

evidence of anthropogenic environmental change to suggest that American Indians did in fact have an impact on their environments.

Following contact, the narrative continued by suggesting that American Indians integrated into the dominant economy, adopting sedentary agriculture (in tribes where that was not already in practice, as it was in some places in the southwest) and grazing. In doing so, American Indians altered their environments to suit economic needs. In a further contrast to the narrative of the ecological Indian, the economic Indian is portrayed as having assimilated into the colonial society, either through the money economy, or through the adoption of culture. At different periods in American history, the narrative of the economic Indian was used as a way to suggest that American Indians no longer needed or deserved special legal status. During the termination debates, for example, the perceived economic self-sufficiency of a tribe was used as a metric to help justify the ending of federal tribal status (Prucha 1995; Nagel 1996). Today, some critics of tribal status point to the success of some tribal casinos as evidence that tribal status is no longer necessary or justifiable (this phenomenon is critiqued by Darian-Smith 2004).

In the next section, I discuss the ways in which these two narratives, in the particular context of *Adair* testimony, reconfigured the agency of the Klamath. I suggest that both narratives served to simultaneously grant and remove agency in different ways.

CONFIGURING HISTORICAL AGENCY

The plaintiffs' expert witnesses in *Adair* constructed a history of the Klamath Tribe based on the mythology of the ecological Indian, while the defendants' expert witnesses contested this history drawing on the counter-mythology of the economic Indian. In this section, I discuss the testimony across a number of different dimensions and focus on how agency was reconfigured in each.

The plaintiffs' narrative rested upon a general assertion that the processes of settler colonialism in the western United States had been largely resisted by the Klamath. These colonial projects included the push towards sedentarization, agriculture, and the

The different narratives in* Adair *endowed the Klamath with different configurations of historical and contemporary agency

Plaintiffs' narrative . . .	**Defendants' narrative . . .**
. . . vis-à-vis *the colonial process*	
Resisted imperialism	Assimilated
United States imperial policy failed	United States imperial policy succeeded
. . . vis-à-vis *environment and economy*	
Environment is monolithic/determines culture	Environment is variable
Economy is variable	Economy is monolithic/determines culture
Object of environment change	Agents of environmental change
. . . vis-à-vis *the tribe's relationship to colonial society*	
Alternative to the colonial, mainstream society	Participants in the colonial, mainstream society
Non-economic actors (naturalizing economic poverty)	Economic actors (economic poverty contingent)
Assumptions shared by both narratives	
Environment and economy are dichotomous (economic development means environmental decline, while environmental conservation means economic stagnation)	
Culture and environment are essentialized	
Klamath tribal culture is determined either by economy or environment	

market economy. By emphasizing the continuation of traditional subsistence following the establishment of the reservation, the plaintiffs highlighted the Klamath's resistance against attempts to change these subsistence patterns. The continuation of hunting, fishing, and gathering, all activities that were essential to the plaintiffs' case, were all acts of resistance on the reservation. And according to the plaintiffs' expert witnesses, these practices had prevailed. In sharp contrast, the defendants' narrative suggested that instead of resistance, assimilation better described the Klamath Tribe's response to efforts at sedentarization and market integration. The defendants' narrative, by highlighting the Klamath who had taken up agriculture and ranching, portrayed the Klamath as having largely abandoned traditional subsistence as the central economic activity, and instead portrayed agriculture and later ranching as the mainstays of the Klamath economy. The result was that the two narratives portrayed, on the one hand, the Klamath as having resisted, and on the other hand, as having assimilated. The plaintiffs' narrative endowed the Klamath with far more historical agency as resistors, while the defendants' narrative minimized this agency.

That the United States government suddenly found it advantageous to highlight the success with which the Klamath had resisted its colonial designs should rightly raise eyebrows.[94] In fact, the government's case rested largely on a general assertion that its own imperial policy during the latter half of the nineteenth century had utterly failed. Given the force with which this policy had been implemented via the United States Army, residential schools, and agricultural and medical policies that resulted in malnutrition and disease, the government's assertion in *Adair* that it had, despite this great effort, failed to replace the marsh's natural environment with a prospering agricultural landscape seemed self-serving. The defendants, on the other hand, argued in their narrative that United

94 This is especially so since the government's very possession of a National Wildlife Refuge and National Forest on what was once not only the Klamath aboriginal territory, but also the treaty-reserved Klamath Indian Reservation clearly demonstrated that the program had been, on a number of significant fronts, successfully carried out.

States colonial policy had been largely successful. The result of this success was that the plaintiffs' claims to continuous use were untenable.[95]

Just as the plaintiffs' and defendants' narratives situated the Klamath in very different ways in terms of their resistance to colonialism, so too did their narratives establish specific configurations of environmental agency. For both the plaintiffs and defendants, agency in the colonial process and agency in the environment were directly opposed to each other. This was largely because the question of environmental alteration was so central to *Adair*. Colonial resistance was described in relation to environmental stasis, while assimilation was gaged by anthropogenic environmental change. Therefore, while the plaintiffs emphasized the Klamath's agency as colonial resistors, they minimized agency in the environment. Conversely, while the defendants minimized the Klamath's agency as colonial resistors, they maximized the Klamath's agency in the environment.

The plaintiffs' narrative suggested that the environment determined the culture of the Klamath Tribe. Repeatedly, witnesses described the Klamath's place in the environment in very specific ways. Both Howe and Stern wrote that Klamath *adapted* to *habitats*. Howe described the relationship between the Klamath and the environment as one in which the Klamath "adapted" to environmental conditions. "By the time of the eruption of Mount Mazama about 7,000 years ago, they had made a complete adaptation to this marsh environment," he wrote.[96] He further described their *homes* as a "habitat:"

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95 The government's argument based on the failure of prior policy was especially tragic, since the issues at stake in *Adair* itself would not have existed but for the Klamath Tribe's termination. Indeed, the termination policy represented the culmination of the aggressive prior policies of colonization and assimilation that began with agricultural conversion. Without termination, there would be no National Wildlife Refuge and no National Forest, at least as they existed before the *Adair* court. There would be no issue of water rights succession or the continuation or truncation of the tribe's water rights. And there would have been a property right associated with the tribe's water right, dispensing with the defendants' major appeal to Judge Solomon's decision.

96 Lezak *et al.*, "Plaintiff's Brief in Support of Its Claims," p. 39.

"It is easy to see how they looked upon their marsh habitat, not as a smelly, treacherous barrier, but rather as a place of refuge and security, as well as food supply" (Howe 1968, p. 103). Stern, similarly wrote of the "adaptation" of the Klamath to the environment. "Authorities are in agreement," said Stern. "The Klamath and Modoc people's adaptation to the lakes, streams, and marshes . . . was particularly close."[97] Similarly, expert witnesses to the ecology of the marsh wrote that the Klamath had largely left the marsh unchanged from its natural condition, despite the fact that they lived there.

Such narratives have the effect of starkly limiting human agency. Words like "adapt" and "habitat" are generally not used to describe human culture. Such descriptions contribute to an environmentally determinist discourse in which American Indians, and native peoples more generally, are stripped of culture and are instead situated as the object of environmental forces:

> Depictions of Indians as savages wandering in the wilderness or as innocent children living gratefully off nature's bounty are cultural artifacts of Europe; they have little to do with the actual lives of Native Americans . . . . Indeed, the very word wilderness in the sense of a natural landscape unaffected by human use has little meaning for most of aboriginal North America. To assert that Indians lived on pristine "virgin land" not only ignores the human influences that have long reshaped pre-Columbian North American but also "naturalizes" Indians in a way [that] denies both their histories and cultures (Richard White and Cronon 1988, p. 417).

It is important to note that suggesting that American Indians were agents of environmental change does not necessarily imply that they despoiled those environments. Instead, the suggestion is simply a recognition of the fact that, for example, some American Indian tribes strategically used fire to influence the movement of game animals. This use of fire resulted not only in advantageous changes in game animal distributions, but also lasting changes in forest composition. Far from being a practice that wreaked ecological devastation, such fires were in fact responsible for creating and maintaining the ecosystems that are today thought of as "natural"—as in existing without

97 LaFrance *et al.*, "Amended Affidavit of Dr. Theodore Stern," p 46.

or prior to human intervention. As White and Cronon have suggested:

> The ways Indians used the environment profoundly influenced the historical landscapes of North America. Indian activities brought changes to the continent's forests, grasslands, and deserts, whether by modifying vegetational assemblages, by encouraging or discouraging the spread of animal populations, or by creating habitats [sic] best suited for human settlements. The tools and methods Indian peoples used to gain food, shelter, and clothing before White contact varied widely. Some techniques, such as irrigation, were localized; other techniques, such as burning, were in use across the continent.
>
> The notion that Indians passively "adapted" to their regional environments must be avoided. Natural systems clearly limited human uses of the land, and in the trivial sense that Indians did not do the impossible, they adapted. But if regional environments were diverse, Indian uses of them were even more diverse. Nature offered not one, but many ways for human beings to live in a given region. More important, it gave no clues as to what might be an "optimum" way to live, for only culture could provide the values that defined what an optimum use of land might be (Richard White and Cronon 1988, p. 417).

In other words, within obvious natural limits, environmental relationships are ultimately *cultural* choices as opposed to environmentally *determined* inevitabilities. Despite their unfortunate use of the word "habitats," which reproduced the very problem they seek to critique, the two clearly push for an understanding of American Indians as decision-makers, not simply passive respondents to prevailing conditions. In stark contrast, the defendants' witnesses reversed this configuration of environmental agency. Instead of objects of environmental forces, the Klamath were portrayed as powerful agents of environmental change. The narrative suggested that the Klamath possessed the ability—denied by the plaintiffs—to effect change in their surroundings. It acknowledged that American Indians could succeed on the terms of their colonizers, something that the colonizers themselves had long doubted.

The defendants' narrative of the economic Indian portrayed the Klamath as having assimilated as a result of largely successful United States colonial policy to convert American Indians to sedentary agriculturalists. Klamath tribal members had adopted

agriculture and ranching; in doing so, they had modified the environment of the marsh and river to irrigate and increase the productivity of their lands for the production of commodities. However, even as the narrative minimized the agency of Klamath tribal members as colonial resistors, it emphasized their agency as economic and environmental actors. The defendants' narrative acknowledged the economic achievements of those who managed to establish themselves as ranchers and farmers, and highlighted the ability of the Klamath surpass the expectations of the colonial society. It suggested that they could take an active role in altering their situation for economic gain, and that they had relatively successfully integrated into the colonial society.

In spite of these differences, the two narratives contained several themes in common. The first was the dichotomous opposition of economy and environment. Each narrative suggested that maintaining natural environmental condition and achieving economic development were, if not mutually exclusive, then at least divergent goals and ideologies. They implied that a person either did one or the other; both could not be accomplished at the same time. They framed economic success and environmental sustainability as incompatible goals. Second, in creating this dichotomy, the narratives also essentialized both culture and the environment. The Klamath were portrayed as having a single fixed tradition, and all Klamath tribal members were characterized as having either rejected or defended that tradition upon the arrival of settlers and the United States government to the area. The narratives left no room for variability or the possibility that different people might have chosen to respond in different ways. The Klamath Tribe's environments were similarly essentialized, with each narrative making the assumption that the environment as a whole either remained the same or changed in the aftermath of contact. There was no room allowed for the fact that parts of the marsh may have remained in a "natural condition," while parts may have engineered for agriculture.

Both the plaintiffs' and defendants' narratives suggested that the Klamath Tribe was determined by larger structures, be they environmental or economic. In doing so,

both narratives portrayed the Klamath as having reacted to historical changes, rather than having participated actively in them. The Klamath culture was environmentally determined, as narrated by the plaintiffs, or economically determined, as narrated by the defendants. The economy and environment were presented as monolithic, uniform forces, while the actual situation, as discussed above, was far more complex. Hunting and gathering had continued, *and* agriculture and ranching had become established. Klamath Marsh was a *big* place, and it is quite likely that different places on and around it were used in different ways. Additionally, the people living and working on or near the marsh were a *diverse* group, and it is quite likely that individuals pursued different choices in relation to the marsh and to the political and economic changes of the nineteenth century. Neither narrative was mutually exclusive of the other, despite the fact that the parties portrayed them as such.

THE CONCLUSION OF *ADAIR*

Two narratives were presented to the court, each underpinning different legal claims. Following the submission of the briefs and affidavits, as well as several oral arguments, the question remained: whose history was true? Thanks to the court, there is a single answer. One of these histories—that of the plaintiffs—was legally sanctioned as true, while the defendants' historical narrative was discarded as false. The plaintiffs' history, in which the state's colonial project had basically failed, became law. Far from a merely rhetorical situation, the choice of this history had material consequences (Cover 1986). In addition to authorizing the redistribution of water rights in the Upper Klamath Basin, the decision solidified in law a "natural" condition of the Wildlife Refuge and National Forest that would constrain the future decisions of federal resource managers. It also ratified as official a narrative of history in which the Klamath Tribes were "ecological Indians," with specific effects on Klamath agency, as discussed above.

Judge Gus Solomon issued his declaratory judgment in Portland, Oregon, in April

1979, which he later expanded into a full Opinion.[98] In his judgment, Solomon awarded the federal government a water right based on the date that it had created the National Forest and Wildlife Refuge—on the surface a major setback for the government. Solomon also clarified the priority date for private owners of land that was once part of the reservation: the date they had acquired their land from the original Klamath tribal owner. But in a surprising turn, Solomon responded to the issue of whether the government was a successor to the Klamath's water right by asserting that the Klamath still possessed it. They had not, in other words, lost it—to anyone, state or private—with the loss of their land during termination. Even more surprising, he awarded the tribe a water right with a priority date of "time immemorial" for enough water to support a landscape where they could continue in perpetuity to hunt, fish, and gather (Williams 1996). The decision gave legal authority to the government's version of the past: in 1975, agencies of the federal government were using water in a way essentially similar to the traditional, ecologically stewarding practices of the Klamaths. There was no need, said Solomon, to give the federal government an earlier priority date; because the uses were the same, conferring a right on the tribe was enough.[99] "It is unnecessary to decide these questions," Solomon wrote.

> The protection of the Indian's hunting and fishing rights requires a natural streamflow through both the Marsh and forest lands on the former Reservation. The Indians' use of their rights to that streamflow will ensure that enough water flows through the Refuge and through the Winema National Forest within the former Reservation to fulfill the Government's purposes for those lands.
>
> It is therefore unnecessary to issue a separate declaration of Government water rights for the Refuge and forests of the reservation.[100]

In an unexpected upending of historical power relations, the tribe now held a rights on

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98 Gus J. Solomon, "Declaratory Judgement," April 21, 1980 (USDC, vol. 7 of 21, DN 650); "Opinion," 478 F. Supp. 336.

99 Solomon, "Declaratory Judgment," pp. 2-3.

100 "Opinion," 478 F. Supp. 336, p. 347.

which the federal government depended.

While ultimately favoring the plaintiffs' narrative, Solomon's Opinion attempted to balance the narratives of the plaintiffs and defendants. As to the question of what the primary purpose of the reservation was, Solomon wrote that the principal purpose of the treaty was neither the maintenance of traditional subsistence, nor the conversion to agriculture. Instead, it was "to provide an area of exclusive occupation of the Indians so that they could continue to be self-sufficient."[101] The particulars of *how* the Klamath achieved self-sufficiency were subsidiary points, in Solomon's reasoning. Hunting, fishing, and gathering on the one hand, and agriculture on the other, were simply dual means by which this purpose could be accomplished. However, Solomon then wrote that "In my view, the provisions of Article I, particularly the protection of hunting and fishing rights, were more important to the Tribe in 1864 than the provisions of Articles II to V [on the conversion to agriculture]."[102] Under *Winters*, "if the preservation of these rights requires that the Marsh be maintained as wetland and the forest be maintained on a sustained-yield basis, then the Indians are entitled to whatever water is necessary to achieve those results."[103] Solomon's judgement, in other words, attempted to balance the two competing narratives of the ecological and economic Indian, but ultimately reaffirmed the ecological Indian narrative as his operational understanding of historical events.

While the Opinion clearly benefited the legal standing of the Klamath Tribe, none of the other parties were entirely happy with this decision. After all, while the judgement would ensure enough flow for the Wildlife Refuge and National Forest, the United States was not the owners of the right. The Opinion did assign the Wildlife Refuge and National Forests a priority date in the nineteen-sixties for some water, so it would be incorrect to say that the federal government owned no water right in the area; however, the recent priority date of that right made it arguably of little use. Private landowners and the state

101 "Opinion," 478 F. Supp. 336, p. 345.
102 "Opinion," 478 F. Supp. 336, p. 345.
103 "Opinion," 478 F. Supp. 336, p. 346.

of Oregon balked at the idea of a new and incredibly potent right limiting their use of water and their jurisdiction over water rights claims.

The decision was appealed to the Ninth Circuit Appeals Court, in San Francisco, California. All parties appealed the decision.[104] The defendants appealed that the Federal District Court of Oregon had overstepped its jurisdictional bounds in deciding the case, and that it erred in its assignment of right to the tribe.[105] Their primary legal argument in the second instance was the new nature of the tribal water right—that it was not associated with a property right in land and that it was not consumptive, as prior appropriation law says a right must be. It was in fact a right to prevent water from being consumed by others, and it was a right to keep sufficient water flowing in order to ensure a particular kind of environment. The states of Idaho, Montana, Nevada, Utah, Wyoming, New Mexico filed a brief of *amici curiae*, suggesting that the opinion in *Adair* infringed on state water rights.[106] The United States Attorney appealed on the vagueness of the federal right to water.[107] And finally, the Klamath Tribe appealed on the grounds

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104 "Memorandum" in "Certificate of Record," July 21, 1980, (NARA, Folder 1 of 2), final page. This situation seems to have caused some confusion. In a typed memorandum dated June 23, 1980, Deputy Clerk Tamara J. Ely of the Ninth Circuit wrote: "1—The first notice of appeal was filed June 13 by deft. Ben Adair and intervenor-State of Oregon. 2—Friday June 20—an amended notice of appeal from the above was filed—only change was in the list of land owners. 3—[hand written:] 6-20 [typed:] Notice of appeal received from another deft. Mark Edward Nicol. 4—Cross notice of appeal received 6/23/80 from pltfs [hand-written:] ! ! ! [Typed:] Hope this will help you keep them straight."

105 James M. Brown, John R. McCulloch, Jr., and Jan P. Londahl, "Appellant State of Oregon's Opening Brief," (NARA, Folder 2 of 2); Richard A. Simms and Stephen D. Dillon, "Amicus Curiae Brief of the State of New Mexico in Support of Appellants," October 2, 1980, (NARA, Folder 2 of 2).

106 David H. Leroy, Mike Greeley, Donald D. McIntyre, Richard H. Bryan, Gorge Campbell, Robert B. Hansen, John D. Troughton, and Thomas J. Carroll, "Brief of Amici Curiae States of Idaho, Montana, Nevada, Utah, and Wyoming," October 2, 1980, (NARA, Folder 2 of 2).

107 Jean C. Loweman, Sanford Sagalkin, Sidney I. Lezak, Thomas C. Lee, Jacques B. Gelan, and Robert L. Klarquist, "Brief for the United States," December 16, 1980, (NARA, Folder 2 of 2).

that the court erred when it upheld any water rights to non-Indian landowners who had purchased land from tribal landholders.[108]

The Appeals Court upheld the District Court's decision with only minor revisions. The only change concerned a clarification of federal government's rights to use the water protected by the Klamath Tribe's water right. The Appeals Court noted that the tribe's rights "are essentially non-consumptive in nature. Thus, to the extent that the United States now owns former reservation lands which may be benefited by a compatible non-consumptive use of water, the Government may participate in the enjoyment of the Klamath's . . . rights."[109] However, the Appeals Court noted that the government's claim to be a successor to these rights was not tenable, since the hunting and fishing rights themselves were non-transferrable, and since the water rights derived directly from them. The water right could not exist without the hunting and fishing right, and the government could never be successor to the Klamath Tribe's hunting and fishing right, and therefore could never be successor to the water right. In the instances where the federal lands were purchased from allottees, and not directly from the tribe, the Appeals court established a government water right with a priority date of 1864.

The decision was appealed to the Supreme Court, which denied *certiorari* in 1986, and the case returned to the jurisdiction of the District Court in Portland, Oregon, which continues to oversee its enforcement today (Powers and Adams 1999).

CONCLUSION

The outcome of *Adair* positioned the Klamath Tribe powerfully in the Klamath Basin. The judgement affirmed a water right that had been in serious doubt, and it gave them important legal standing in the Upper Klamath Basin. It affirmed that while termination had brought social and cultural turmoil upon the tribe, rights central to the continuation of their culture still remained. And it bolstered the Klamath Tribe's efforts at achieving the

108 Rochard B. Collins, "Klamath Tribe's Brief," December 17, 1980 (NARA, Folder 2 of 2).

109 Fletcher, "Opinion," 723 F2d 1394, p. 67.

restoration of their federal status, both from the perspective of morale and from that of legal standing.

But instead of producing just a judicial ruling, *Adair* also produced a legally sanctioned social and environmental history of the Klamath Tribe. Aspects of this official version of history were empowering. For the Klamath, the official version of history became one in which they had resisted attempts at assimilation, and in which they had maintained central aspects of their culture—namely hunting, fishing, and gathering—against continual assaults upon it. The Klamath were further positioned as being an alternative to the environmentally detrimental behavior of the colonial society. At the same time, however, other aspects of the narrative were highly constraining. In particular, the Klamath were essentialized into objects of environmental forces, and narratives of environmental determinism were reinforced.[110] The circumscribed agency of the Klamath was further displayed in their marginalization from the process by which culture and environment was constructed in court. Only certain knowers were endowed with the authority to be "ventriloquists of the object world." These strictures were produced, in part, by the legal expectations of how the authority of witnesses is established; but they also mapped along familiar racial lines. Even as Klamath tribal members testified in court, it was the expert witnesses that ultimately carried the day.

In sum, *Adair* was not only a struggle over water rights, but also a struggle over the definition of the environmental roles of a large group of people. Additionally, it was a struggle over the right to speak about those roles in an authoritative way. In *Adair,* Klamath tribal members were largely not able to do so. In the next part, I examine a conflict over the management of endangered species between 2001 and 2004. As in *Adair*, experts played a key role. But in the intervening decades, the landscape of expert knowledge had shifted in the Upper Basin, and the Klamath Tribe, recognizing the importance of scientific expertise in legal conflicts, had established themselves as

110 The official version of history also served to minimize the violence of the assimilation policy of the United States government as carried out on the Klamath Reservation.

producers of expert knowledge about the Upper Klamath Basin.

Part Three

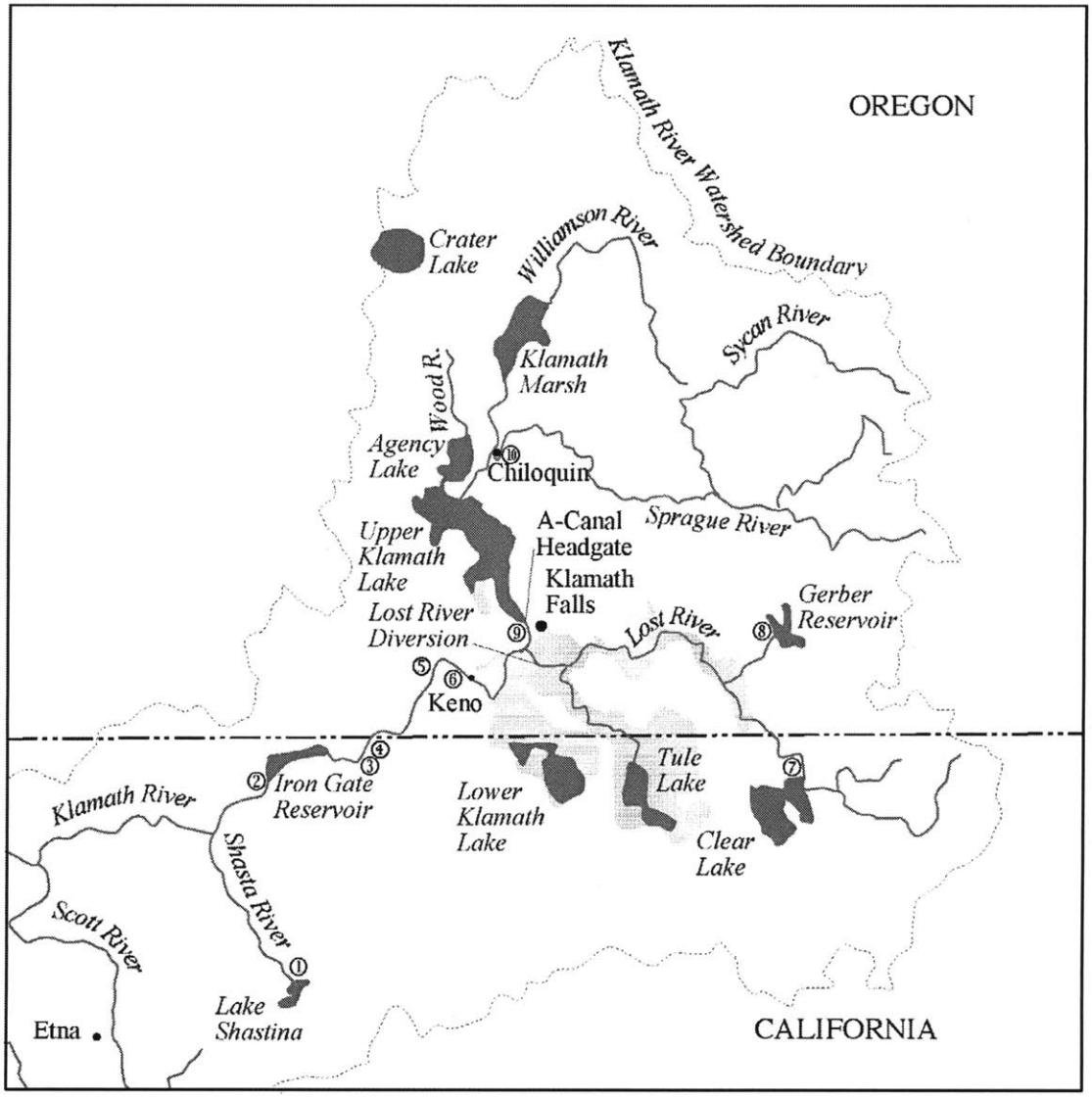
Uncertainty, Expert Disagreement, and the Status Quo

In the next three chapters, I discuss a conflict over the management of endangered species in the Klamath Basin. The conflict involved nearly all Klamath Basin residents and revolved around two endangered species of fish in the Upper Basin and one threatened fish in the Lower Basin. Under the Endangered Species Act of 1973, the United States Fish and Wildlife Service and the National Marine Fisheries Service ordered the United States Bureau of Reclamation to stop deliveries of irrigation water from the Klamath Irrigation Project, sparking intense conflict. The two agencies found that the water was necessary for the fish. The conflict quickly focused around the scientific claims made by the two agencies to justify their management decision. I focus on the role of experts in ecology, biology, hydrology, and other environmental sciences in contesting and supporting these claims, and on the origins and political uses of scientific uncertainty in the conflict.

Chapter Six outlines the central argument of the part, as well as events relevant to contextualizing the conflict, and the initial protests against the water shut-off.

Chapter Seven discusses the turn from protesting a management policy to protesting the truth-claim that legitimated the policy, as well as the central role of experts, especially the National Research Council, in these disputes.

Chapter Eight discusses the concept of scientific uncertainty, its origins both in scientific practice as well as in the object of scientific inquiry—the environment itself—and the strategic uses to which uncertainty was be put.



Dams

① Dwinelle Dam
② Iron Gate Dam
③ Copco Dam #1
④ Copco Dam #2
⑤ JC Boyle Dam
⑥ Keno Dam
⑦ Clear Lake Dam
⑧ Gerber Dam
⑨ Link River Dam
⑩ Chiloquin Dam

Klamath Reclamation Project

N

0 10 Miles

Illustration 6. The Klamath Reclamation Project and the Upper Klamath Basin (Based on U.S. Bureau of Reclamation (1999); U.S. Bureau of Reclamation (1998)).

Chapter Six

Contesting a Water Shut-Off

INTRODUCTION

On 6 April 2001, the water stopped flowing.

Acting under the auspices of the Endangered Species Act of 1973 (ESA), the United States Fish and Wildlife Service and the National Marine Fisheries Service ordered the United States Bureau of Reclamation to end the delivery of water to the Klamath Irrigation Project, located in southern Oregon and northern California. Shutting down the water to the approximately 220,000 acres of agricultural land was necessary, claimed the Fish and Wildlife Service and National Marine Fisheries Service, in order to ensure the survival of two endangered species of sucker and one threatened species of coho salmon in Upper Klamath Lake, the Klamath River, from which the Project draws water.[111] If the water levels in this lake were not increased, the sucker would be in jeopardy of extinction. At the same time, if more water were not allowed to flow down the river, the threatened salmon living downstream could become endangered. To increase lake levels and downstream river flows, water diversion for irrigation would have to be reduced.

As the irrigation laterals dried, the chances for the year's crops dried as well. In the following years, a conflict raged that garnered national attention. At issue was the role of the ESA as a cornerstone of United States environmental law, the place of

111 The three species of fish were two species of suckers, the Shortnose Sucker (*Chasmistes brevirostris*) and the Lost River Sucker (*Deltistes luxastus*), and one evolutionarily significant unit (also called an ESU) of salmon, the Southern Oregon/Northern California Coast coho (*Oncorhynchis kisutch*). The Klamath Project also draws water from several other sources, including Gerber Reservoir and Clear Lake.

agriculture, ranching, and commercial fishing in an increasingly urban society, and the exercise of American Indian environmental rights. At the center of it all raged questions about the place of science in environmental decision-making.

The shut-off was ordered in two Biological Opinions—one for the suckers and one for the salmon. The Biological Opinions are the outcomes of section 7 consultation under the ESA. Under section 7, the Fish and Wildlife Service and Marine Fisheries Service had the regulatory obligation and authority to review the operations of the Bureau of Reclamation's Klamath Project for possible impacts on endangered and threatened species. In the case that either agency were to find that such actions pose a jeopardy to endangered or threatened species, the agencies could require "reasonable and prudent alternatives" to be taken to avoid the threat. The ESA stipulates that the only information that can legally be considered during consultation is "the best scientific and commercial data available," which means that Biological Opinions are often long, complicated, and dense technical reports (16 USC 1536 § (7)(a)(2)). Based on their review of scientific data surrounding the conditions of the suckers and salmon, the Fish and Wildlife Service and Marine Fisheries Service issued jeopardy findings, and they concluded that the only way to prevent jeopardy to the three species of fish was to halt the operation of the Klamath Irrigation Project.

In their efforts to restore the water, irrigators began to dispute these scientific studies. If the irrigators and their supporters could show that the scientific claims made in the Biological Opinions linking the necessity of a water shut-off to the survival of the fish did not meet the benchmark of "the best scientific and commercial data available"—that they were biased, or at the very least uncertain or incomplete—they could weaken the source of authority with which the decision was legitimated. If this authority could be weakened, they could then more easily press for the reversal of the decision. Critics of the shut-off began to scrutinize the Biological Opinions, the data that was included in them, their assumptions, and their methods. At the same time, they began to produce reports of their own that showed different conclusions. Such challenges, however, did

not go unanswered. Those who supported the shut-off quickly rebutted in defense of the Biological Opinions.

Under increasing political pressure and intensifying local agitation, Secretary of the Interior Gale Norton commissioned a National Research Council Committee to investigate the science undergirding the Biological Opinions (National Research Council 2004, pp. 379-380). The Committee on Endangered and Threatened Fishes in the Klamath River Basin (henceforth, the Committee) was charged with reviewing the Biological Opinions and the increasingly contentious and contradictory expert reports produced by interested parties. Based on this review, the Committee was to produce a short interim report offering preliminary conclusions on the scientific justifications for the shut-off within the Biological Opinions. Following that, the Committee was to produce a longer, more complete review that would also offer advice on future environmental policy in the area.

The Committee's deliberations became the central forum for the expert debate in the conflict. The Committee held a series of public meetings at which experts presented their latest scientific findings on the ecology and endangerment of the sucker and salmon. In addition, numerous groups sent the Committee over eight hundred pieces of correspondence and documentation.[112] Based on these documents and a review of the

112 "Updated Klamath PA List1 Pubdoc1-600.xls," August 31, 2004 (NAS); "Updated Klamth [sic] PA List2 Pubdoc 601+.xls," August 31, 2004 (NAS). Known as the Public Access File, this collection of documents contains all of the material sent by third parties to the Committee for consideration during its review. Unfortunately, the Public Access File does not contain any documents actually produced by the Committee itself, or by the National Academy of Science, of which the National Research Council is a part. These records are confidential and are protected by a special provision of the Federal Advisory Committees Act (FACA) that exempts the National Research Council from the transparency provisions that cover other federal advisory committees. FACA, incidentally, became an issue during the conflict itself, as people tried to learn about the inner workings of the Committee; FACA is discussed in more detail in Chapter Five. I am therefore unable to write a direct study of how the Research Council reached its conclusions. Instead, the Committee, while playing a central role in this story as an obligatory passage point (Latour 1987) for all expert clams, remains

scientific literature on the suckers and salmon, the Committee released a preliminary interim report in January 2002 (National Research Council 2002). In this report, the Committee announced that it had found no scientific evidence justifying the claim that increases in water level in the Klamath River system corresponded to increases in fish survivorship (National Research Council 2002, pp. 1-5).

With the Committee's statement that there was no "clear scientific or technical" reason to believe that ending irrigation deliveries would ensure the fish's survival, Norton ordered the Project's flood gate on Upper Klamath Lake reopened (National Research Council 2002, p. 4). For irrigators, it was a major victory. The strategy of overturning the policy by casting doubt on its legitimating scientific truth-claim had succeeded. At the same time, the report was a huge setback for those who supported the shut-off. In the process, the report also managed to seriously damage the credibility of several federal regulatory agencies and scientists working in the Klamath Basin. Accusations of fraud and dishonesty left the Fish and Wildlife Service, the Marine Fisheries Service, the Klamath Tribes,[113] and academic scientists on the defensive. In 2004, the Committee published its final report (National Research Council 2004). While substantially longer and prescriptive in intent, the final report did not alter the general conclusions of the interim report of several years before.

How can one understand what transpired? A popular narrative that emerged from the conflict was a story of good policy based on "good" science displacing misguided

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something of a black box. While public and published statements offer some clues to activities within the Committee itself, direct evidence is missing. Nevertheless, the Public Access File serves as a repository for documents produced by the other groups involved in the conflict, and it has served as *de facto* archive of the conflict.

113 As noted in the Introduction, the Klamath Tribes have referred to themselves, and been referred to, in two different ways during the historical period covered in this dissertation. In this part, in spite of the occasional anachronism, I use the plural version throughout, both for consistency's sake, and because the part is largely focused on the period after the plural usage became standard. References in this chapter to "the tribes" should not be read as a reference to all American Indian tribes, but rather as a reference to the Klamath Tribes.

policy based on poor, perhaps even "junk," science. In this narrative, the Biological Opinions were portrayed as being inaccurate and incomplete, not conforming to the standards of "good" or "sound" science, and as biased by the inclusion of "non-scientific" considerations. In this narrative, difference between "good" or "sound" science, and its foil, "biased," "junk," and "not-sound" science, was easily identifiable. The inclusion of "not-sound" science in the Biological Opinions meant that these documents, and the state intervention they authorized, were not legitimate. In this narrative, the ultimate reversal of the shut-off was portrayed as an inevitable outcome of the removal of junk science from the decision-making process.

However, such a narrative over-simplifies the complex negotiations and debates that characterized the conflict. It also over-simplifies the character of scientific practice in ecology and related fields, as well as the complexity and indeterminacy of the object of ecological study—the environment. In this part, I attempt to problematize this narrative by focusing on the ways that particular groups both constructed their own expertise and conclusions, and deconstructed the expertise and conclusions of other groups. I do not attempt a detailed outline or review of the science itself—such is available elsewhere (Independent Multidisciplinary Science Team 2003; Braunworth, Welch, and Hathaway 2002)—but rather focus on the strategies employed to make and undermine scientific claims.

In this part, I trace the conflict over the shut-off of irrigation water and the endangerment of the suckers and examine the causes and uses of expert disagreement in it. I focus primarily on the conflict as it unfolded in the Upper Klamath Basin, the location of the suckers and of the Klamath Irrigation Project. In this chapter, I outline important aspects of Upper Klamath Basin's historical geography. I then examine the road leading to the Biological Opinions in 2001. In Chapter Seven, I examine how the conflict shifted from a protest about a policy to a protest of the scientific truth-claims that legitimated that policy. In Chapter Eight, I examine the expert disagreement that took place, and the explanations, both political and otherwise, for that disagreement. I then

examine how different groups used the concept of scientific uncertainty as a way to prevent the debate from ending. Ultimately, however, the National Research Council Committee's claim solidified as fact, and the more stringent and immediate conservation measures originally proposed in the Biological Opinion were abandoned in favor of "adaptive management" that emphasized further study of the causes and ecological dynamics of environmental change in the Basin.

My focus throughout is on the role of uncertainty, its strategic uses, and its impact on decision-making processes that rely heavily on scientific truth-claims. I suggest that the ecological scientific claims, as with scientific claims in general, are inherently uncertain. The uncertainty of ecological claims, however, is highlighted by characteristics of the object of study—open and complex natural systems. It is important to note that simply because these claims contain uncertainties does *not* mean they are invalid or that they do not have a legitimate place in policy-making. These uncertainties do, however, open an opportunity for critics of science-based policies to *suggest* that this is the case. By doing so, critics of such policies can incite expert disagreement as a tool for preventing the closure of a policy debate and the solidification of a policy with which they disagree. I argue that expert disagreement is ultimately advantageous to those who wish to maintain the status quo, in this case, the continued delivery of irrigation water to the Klamath Project. Stated more generally, I argue in this part that policies that in one way or another invite a high level of expert disagreement tend to invite stasis, not change.

IRRIGATING THE "HIGH DESERT"

The Klamath Basin conflict unfolded in an irrigated "high desert" landscape long in the making (Anne Hiller Clark 1999, p. 1). Since shortly after the arrival of white settlers in the eighteen-fifties in the Upper Basin, and intensifying following the 1864 Klamath Treaty that officially opened up large areas to settlement, agriculture, grazing, and logging have been key economic sectors (Limerick 2000a). As discussed in Part Two, the Klamath, Modoc, and Yahooskin Paiute were moved to a reservation in 1864 following

the signing of a treaty with the United States. Their sedentarization opened up considerable amounts of land for white settlement and agricultural development. However, farmers faced immediate environmental challenges when attempting to cultivate the land (Stern 1965). Rain in the Upper Basin is extremely limited and summers are often long and dry (Taylor, Hale, and Joos 2005). Mean monthly precipitation in summer—between April and October—is one inch (Gannett et al. 2010). As a result, sedentary western-style agriculture could only be accomplished with the aid of irrigation.

The first irrigation systems in the Upper Klamath Basin, constructed in the late eighteen-sixties, were small scale and privately built (Mark Clark and Miller 1999). Even with irrigation, however, many abandoned farming in favor of cattle ranching, which required less water. In 1905, Congress authorized the recently formed Reclamation Service to being the process of consolidating, expanding, and formalizing Upper Basin irrigation. Construction of a federal irrigation project began in 1908 with the building of canals and draining of marshlands.[114] Dam construction for the Project began with the construction of Clear Lake dam in 1910. In 1921, Upper Klamath Lake was dammed by the Link River Dam, followed by the construction of Gerber Dam in 1925. Tule Lake, the last major drainage undertaking within the Project, was reclaimed in 1949.[115]

The design of the Klamath Irrigation Project was not particularly capital intensive, at least compared to some other Bureau of Reclamation projects.[116] In part, the capital simplicity of the Project was a result of the labor available to build it.[117] Equally

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114 Eric C. Stene, "The Klamath Project, Second Draft," 1994, WRCA, G289-N4-1. See also (Stene 1999, pp. 43-58).

115 "Klamath Project History and Consultation Background," March, 2001, "Administrative Record," (DAP, Doc. #G-7).

116 The Klamath Project resembled in many ways the reclamation situation along the Snake River in Idaho (Fiege 1999).

117 Labor shortages caused considerable delays and several redesigns during the Project's construction (Stene 1999, pp. 43-58).

important in influencing design, however, was the Upper Basin's geography. The Project itself was built in an area of reclaimed shallow lakes and marshes. The soil was rich and level, but highly porous, given its volcanic origins. As a result, irrigation laterals had to be extensively lined to prevent excessive water loss. This also meant, however, that drainage was achieved naturally. The water source for the project also presented some unusual problems. While iconic Bureau of Reclamation projects often rely on large dams and deep water reservoirs to even out the seasonal availability of water (Reisner 1986; Worster 1986), the relatively low relief of the Upper Basin made construction of such a deep water reservoir impracticable, if not impossible. There were simply no suitable valleys available in the Upper Basin.

The obvious alternative water source was the centerpiece of the Upper Basin landscape, Upper Klamath Lake. With a surface area of ninety square miles, Upper Klamath Lake is the largest lake in Oregon. It is, however, quite shallow. After constructing the Link River Dam across its outlet, the average lake level was only nine feet (Lindenberg and Wood 2009). Upper Klamath Lake, in other words, could not provide large-scale storage for the Project from year to year. However, the dammed lake could capture annual snow melt from the Upper Klamath Lake watershed and hold it for distribution over that year's irrigation season. In other words, while Upper Klamath Lake provided seasonal smoothing of water availability, it did so only on an annual basis, making the Project vulnerable in years with low snow fall. Today, the Project draws water directly from Upper Klamath Lake above the Link River Dam, from the Klamath River below the dam, and from Gerber Reservoir and Clear Lake to the east (U.S. Bureau of Reclamation 2004). The Project draws water from Upper Klamath Lake through a large intake known as "A" Canal, which operates for six months each year beginning on April 1. In the remaining six winter months, "A" Canal is closed and sits dry.

In addition to the Upper Basin, the Klamath River watershed has a second, Lower Basin, located mostly in California. Compared to the Upper Basin, the Lower Basin is considerably more rugged, and relief is much higher. Rather than agriculture, the main

post-contact economic activities in the Lower Basin concentrated almost completely on logging and fishing, primarily for the anadromous salmon that spawn in the mountainous tributaries of the Lower Klamath River. Today, laws generally limit river fishing except by Hoopa, Yurok, and Karuk tribes of American Indians; off-shore, however, salmon that spawn in the river's tributaries have constituted an important fishery (McEvoy 1986).

Increasing demands on the Klamath River's water from both the Upper and Lower Basins have resulted in a river that is ever more tightly allocated and managed (Powers and Adams 1999). In the Upper Basin, farming and ranching have expanded, and the use of flood irrigation—a fairly inefficient irrigation practice in which a field is flooded with water—is not uncommon today (although more expensive and more efficient sprinkler irrigation systems are becoming more common, especially after 2001). Beginning in the nineteen-seventies, the Klamath Tribes in the Upper Basin secured large and senior water rights in Klamath River tributaries. In the Lower Basin, tribes also secured water rights to perpetuate traditional salmon fishing (McEvoy 1986). Dams for power generation in both Upper and Lower Basins have heavily impacted the flow and temperature of the river. They also blocked upstream passage for anadromous salmon, which historically migrated into the Upper Basin during spawning season. Today (2010), salmon cannot migrate past Iron Gate Dam, which has no fish passage.

WRITING A POLICY

On June 16, 2001, several months after the water shut-off, and in the midst of an increasing uproar over the policy, Greg Walden, Representative of Oregon, summed up the situation this way:

> You know, sometimes I feel like the fellow who's speeding along on one of those back country roads, and you come up over the rise and here's a four-way intersection and there's a terrible wreck in the middle of it. There's glass and twisted metal and vehicles and injury, each driver saying he had the right of way when he came to that intersection. In some respects, it's that collision that we're examining today. Tribal interests point to treaty obligations. Fishermen say it's their right to have the water.

> Environmentalists say, get the farmers out and give us the water. The farmers point to land grants that I've seen, signed by President Hoover in fact, saying they want water forever. It is this wreck that we've come upon (House Committee on Resources 2001, p. 3).

He portrayed the conflict as one of a grand clash of cultures in the form of a spectacular car wreck, of American Indians versus fishermen versus farmers versus environmentalist. As with many others, he saw these cultures as completely distinct, sitting in four separate vehicles, as it were, heading in very different directions. There is a sense of inevitability in his description of the crash. But most importantly, Walden portrayed himself as simply a bystander, stumbling upon the unfortunate pileup that occurred before he even got there. With this description, he suggested that the government, in which he was a legislator, had had little warning or opportunity to prevent this clash of cultures. He and the government, after all, were on the other side of the hill when it happened. Instead, the government simply happened upon the wreckage already there while "speeding along" through the course of history.

In this section, I outline the events leading up to the April 2001 shut-off and paint a different perspective than the car "wreck" narrative offered by Walden and many others. Focusing on the Upper Basin and the 2001 Biological Opinion on the suckers, my account is based mainly on the Administrative Record of Fish and Wildlife Service Biological Opinion on the suckers.[118] Based on this record, I suggest that rather than

118 The "Administrative Record for the U.S. Fish and Wildlife Service's Biological Opinion for the Klamath Project" was compiled by the Fish and Wildlife Service as a result of *Kandra v. United States*, a court action attempting to enjoin the shut-off. It was sent via hand delivery to the Clerk of the Court at the Federal District Court in Eugene, Oregon. See "[Jacobs to Clerk of the Court]," April 17, 2001, "Administrative Record," (DAP). The Administrative Record contains documents used in producing the Fish and Wildlife Service Biological Opinion on the suckers —such as literature cited in the report—as well as correspondence received or sent by the Fish and Wildlife Service Klamath Falls Office during the consultation process that resulted in the Biological Opinion. It is, in essence, an archive of correspondence relating to this process. References to documents from the Administrative Record refer to a document number (Doc. #), which corresponds to that document's unique identification number assigned to it in the record's

being an unavoidable collision, the conflict emerged out of a long deterioration in relationships between federal resource management agencies necessary to fulfill their legal obligations. Federal resource management agencies recognized this deterioration. In their own words, these agencies described their relationship in the summer of 2000:

> [Fish and Wildlife] Service expressed its frustrations . . . that relationships between Reclamation and Service were deteriorating. [Bureau of] Reclamation agreed.
>
> Reclamation expressed frustration that Service was not doing what it was required to do under the ESA to complete critical habitat and new recovery plan. Service explained that all listing action is set by legal actions and that there was not funding. Reclamation was invited to solicit funding.[119]

Both the Fish and Wildlife Service and Bureau of Reclamation, two of the primary agencies involved in the shut-off (and that, incidentally, shared a small set of buildings near the edge of Klamath Falls in 2001), each saw the other as lapsing in legal responsibilities, being uncommunicative, and being unwilling to cooperate in the processes required by law for both agencies to fulfill their responsibilities under the ESA. Both felt strapped for resources necessary to fulfill those responsibilities, and both seemed upset at each other and at the situation. Additionally, there is evidence that government to government relationships with Klamath Basin American Indian tribes had cooled in some cases.[120] As a result, the working relationship between resource management agencies in the Upper Klamath Basin was such that achieving the cooperation necessary to avoid a conflict over water use and endangered species management proved to be illusive.

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index. A nearly complete copy of the record is in the author's possession, and the original record in the possession of the court was not consulted.

119 "Admin Record—Consultation Reclamation (Meeting Notes)," July 6, 2000, "Administrative Record," (DAP, Doc. #F-2).

120 "G2G for Jan 21 Does Not Work (msg to CNO re frustrations associated with mtngs)," January 21, 2001, "Administrative Record," (DAP, Doc. #F-26).

Listing the Suckers

Suckers were an important source of food for the Modoc and Klamath prior to a moratorium on tribal fishing in 1986 and the fish's listing as endangered in 1988. They continue to be an important spiritual creature. Historically, Modoc and Klamath would catch and dry the fish, which was an important source of nutrition over the winter, and which supplemented a diet based on hunting and gathering. In addition, the Modoc and Klamath also fished salmon, which swam from the Pacific Ocean to spawn in the tributaries of Upper Klamath Lake, much as they used to migrate far inland along the Columbia River prior to the construction of dams without fish passage along both rivers. The right to fish for suckers was reserved in the 1864 treaty recognizing the Klamath Tribes, and as such, the suckers are tribal trust species, the protection of which is a treaty obligation of the United States government.[121]

Despite the common present-day misconception that the suckers were only valued by tribal members for subsistence, historically appreciation for the suckers was widespread. Early settlers caught the fish for food, and in the end of the nineteenth century, the suckers were the focus of a canning industry (Mark Clark and Miller 1999). By the middle of the twentieth century, commercial interest in the fish had waned, but the sucker was still seen as a popular game fish by the state of Oregon and non-native fishers. Each year, the Oregon Department of Fish and Wildlife would send postcards announcing the opening of the sucker spawning run and the commencement of the recreational season. Film footage of the sport fishery reveals that non-native individuals participated in great numbers, and with great enthusiasm.[122] In 1973, the fish was designated as "rare" by the state of California, and in 1986, the Klamath Tribes issued a moratorium on tribal fishing for the suckers, and in 1987, the sport fishery in Oregon was closed.[123]

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121 "Klamath Project Section 7 Consultation Briefing," March 2001, "Administrative Record, (DAP, Doc. #G-07).

122 Historical footage of sport fishery of suckers, ca. 1970, courtesy of Oregon Department of Fish and Wildlife, (DAP).

123 "Klamath Project Section 7 Consultation Briefing," March 2001, "Administrative Record, (DAP, Doc. #G-07).

The Fish and Wildlife Service added the two species of suckers to the Endangered Species list in 1988. Publishing the decision in the Federal Register, the Fish and Wildlife Service wrote that for both species,

> Dams, draining of marshes, diversions of rivers and dredging of lakes have reduced the range and numbers of both species by more than 95 percent. Remaining populations are composed of older individuals with little or no successful recruitment for many years. Both species are jeopardized by continued loss of habitat, hybridization with more common closely related species, competition and predation by exotic species, and insularization of remaining habitats (U.S. Fish and Wildlife Service 1988, p. 27130).

The Fish and Wildlife Service had first published its interest in the suckers in 1982, but noted that at the time, "additional data are needed" to determine whether they should be listed. In the 1980s there was a paucity of data about the basic life histories of the suckers, their population, and their habitat needs. The Fish and Wildlife Service sent a biologist from the Reno, Nevada Office, and the Klamath tribal government began conducting studies to establish some basic information about the fish.

In 1987, the species were proposed for listing as endangered, and the Fish and Wildlife Service published a solicitation for public comments. Only thirteen written comments were received, and "no comments in opposition to the listing were received" (p. 27131). Comments were received from the United States Forest Service, Bureau of Land Management, California Department of Fish and Game, and Oregon Department of Fish and Wildlife, the Klamath tribal government, the city of Klamath Falls, and several conservation organizations and private individuals. In addition, the Klamath tribal government and the California and Oregon agencies submitted additional data used to make the ruling. It is of interest that the Bureau of Reclamation did not submit formal written comments, since they figured so centrally as a resource management agency in the area. The full ramifications of this listing might not have been immediately clear to the Bureau of Reclamation.

However, if it had not previously suspect the importance of the listing, the Bureau

of Reclamation soon would. In the early nineteen-nineties, the Bureau of Reclamation asked a professor of fisheries biology to come to the Upper Basin to determine if suckers were being entrained in the Project's canal system. Such a determination was necessary so that the Bureau of Reclamation could assess the applicability of the ESA to the Project. He recalled standing on the edge of the "A" Canal—the inlet for the bulk of Project water located directly above Link River Dam on Upper Klamath Lake—with a net. The professor threw the net into the water. As he pulled it out, it was immediately apparent that he had caught numerous suckers on his first attempt. It was clear that entrainment of the endangered fish into the Project was taking place, and the ease with which the fish had been caught—in his first attempt and with little effort—suggested the rate may be high. Such entrainment met the legal definition of "take," and was thus a potential violation of the ESA. Having answered the question in the space of a few minutes, he recalled asking the Project managers, "Do you want me to keep going?"

While listing the fish had proceeded relatively smoothly, protecting them was going to be another story altogether. Several massive sucker die-offs occurred throughout the nineteen-nineties (U.S. Fish and Wildlife Service 2001b). Die-offs are mass-mortality events in which large numbers of fish die within a short period of time. During an event, the shores can be covered with the bodies of dead fish. Die-offs were first reported in 1898, and appeared throughout the twentieth century, in 1932, 1971, and 1986. The nineteen-nineties saw three large events, in 1995, 1996, 1997. In addition smaller die-offs have been seen annually since 1992. The causes were not exactly known; however, it is hypothesized that extremely low oxygen content of the water brought about by the sudden crashing and decomposition of algae populations in the lake, in addition to the acidity and ammonia concentration, may be contributing factors. The result was an estimated eighty to ninety percent decline in the population of adult suckers in Upper Klamath Lake.[124]

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124 "Klamath Project Section 7 Consultation Briefing," March 2001, "Administrative Record," (DAP, Doc. #G-07).

In addition to die-offs, other factors were contributing to the endangerment of the suckers. Entrainment in the Project was occurring. In addition, access to important spawning grounds was partially blocked by a dam (not located on the Klamath Project) built by the Bureau of Indian Affairs in the nineteen-twenties. And with demands for water at all-time highs, giving water to the fish (what seemed the most obvious way to protect them) meant taking water directly from someone else. Indeed, with the proposal of critical habitat in 1994, the difficulty of balancing water uses in the basin would have been crystal clear to all, as four of the six critical habitat units proposed were Klamath Project reservoirs.[125] The proposed critical habitat of the fish was largely in the area managed by an agency whose purpose was reclamation.

Since 1992, the Bureau of Reclamation had consulted with the Fish and Wildlife Service on the impact of the Project, as required under section 7 of the ESA. Consultations occurred in 1992, 1994, and 1996, and the Fish and Wildlife Service had issued five jeopardy findings, in 1989, 1991, March 1992, July 1992, and 1994 stating that the operation of the Project placed the suckers in immediate danger of extinction. The Fish and Wildlife Service was concerned that the Biological Opinion produced in 1996 had only been valid for one year. It was possible the Bureau of Reclamation, since 1997, was operating without a valid Biological Opinion, which would be a violation of the ESA.[126] Additionally, according to the Fish and Wildlife Service, "Since 1996, significant new information has become available, incidental take has exceeded levels consulted on, and project operation has changed. Thus, we are re-consulting."[127] Moreover, the Fish and Wildlife Service worried that reasonable and prudent alternatives required in previous Biological Opinions (the installation of fish screens designed to prevent fish from being pulled into the main water intake to the Project, among others)

125 "Klamath Project Section 7 Consultation Briefing," March 2001, "Administrative Record," (DAP, Doc. #G-07).

126 "Admin Record—Consultation Reclamation (Meeting Notes)," July 6 2000, "Administrative Record," (DAP, Doc. #F-2).

127 "Briefing Document: Klamath River, Klamath Project Operation, and Klamath Area Refuges," March 1, 2001, "Administrative Record," (DAP, Doc. #G-5).

had not been implemented by the Bureau of Reclamation.[128]

Consultation and the 2001 Biological Opinion

In December 1999, the Bureau of Reclamation initiated a new consultation.[129] In theory, formal consultation would begin when the Bureau of Reclamation submitted a Biological Assessment to the Fish and Wildlife Service office in Klamath Falls. The Biological Assessment would outline possible impacts of the operation of the Klamath Project on endangered species. Following the receipt of that document, the Fish and Wildlife Service would write a Biological Opinion, if it deemed that the Project's operation would pose a significant risk to the species. Should a jeopardy finding be made, the Biological Opinion would outline the risks to the species and reasonable and prudent alternatives to the proposed action that would minimize this risk.

However, the process was, in reality, far less orderly. The Fish and Wildlife Service began writing their Biological Opinion simultaneously to the writing of the Biological Assessment by the Bureau of Reclamation. The Fish and Wildlife Service Klamath Falls office had several reasons for doing this. First, there existed prior Biological Opinions in which no overall improvement in the status of the species was recorded. Second, the Bureau of Reclamation had not implemented some of the most important reasonable and prudent alternatives required by past Biological Opinions, such as the "A" Canal fish screen. Thus, from the perspective of the Fish and Wildlife Service, the risks to the sucker posed by some aspects of the Project's operation were unchanged. Third, the Fish and Wildlife Service wished to complete a Biological Opinion *before* the start of the summer irrigation season on April 1.[130] The Fish and Wildlife Service hoped

128 "Klamath Project Section 7 Consultation Briefing," March 2001, "Administrative Record," (DAP, Doc. #G-07).

129 "Letter to FWS Requesting Reinitiation of Consultation on Klamath Project Long Term Operations Plan," December 17, 1999, "Administrative Record," (DAP, Doc. #E-1).

130 "Schedule for Completion of Jeopardy BO for Klamath Project (Transmittal to CNO, R1, FWS WO)," February 16, 2001, "Administrative Record," (DAP, Doc.

to meet this deadline in part because it already felt the Project's operation was a threat to the species. But in addition, the Fish and Wildlife Service also hoped to maintain good relations in the Upper Basin between the Fish and Wildlife Service, the Bureau of Reclamation, and Project irrigators. By producing a Biological Opinion before the beginning of the irrigation season, the Fish and Wildlife Service would allow the Bureau of Reclamation some flexibility. An earlier Biological Opinion would avoid putting the Bureau of Reclamation in the position of revoking water allocation promises in the middle of the irrigation season. Fourth, the Bureau of Reclamation proved to be very slow in producing an adequate Biological Assessment that fulfilled the legal requirements of the ESA. If the Fish and Wildlife Service had waited for the Bureau of Reclamation to complete its Biological Assessment, it would have been unable to produce a Biological Opinion in time for the start of the irrigation season.

Ultimately, the Klamath Falls Fish and Wildlife Service office did not receive a final Biological Assessment from the Bureau of Reclamation until February 12, 2001.[131] By then, the Fish and Wildlife Service had sent drafts of a Biological Opinion, without a conclusion, to the Klamath Tribes Natural Resource Department and natural resource agencies in the states of Oregon and California for review. The Fish and Wildlife Service hoped to receive initial comments on its literature reviews, especially for errors or missing studies.[132] The draft Biological Assessments that the Fish and Wildlife Service had so far received had been inadequate, in the opinion of Fish and Wildlife Service. In November 2000, the Fish and Wildlife Service wrote to the Bureau of Reclamation that "We wish to point out that the Bureau of Reclamation (Reclamation) has not delivered an adequate BA [Biological Assessment] to the Service in a timely manner contrary to

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#F-47).

131 "Acceptance of Final BA," February 12, 2001, "Administrative Record," (DAP, Doc. #F-41).

132 "Preliminary Draft KPOP Biological Opinion (Request to Klamath Tribes, ODFW, CDFW ODEQ for professional review of early draft," January 29, 2001, "Administrative Record," (DAP, Doc. #F-27).

agreed-upon schedules . . .[133] By mid-December 2000, the situation had not improved. Steven Lewis, the Project Leader at the Klamath Falls Fish and Wildlife Service office, wrote:

> The November 22, 2000 draft BA [Biological Assessment] is improved over previous drafts, for which we provided comments, however, the Nov. 22 draft is flawed. Our comments that have not been adequately addressed in this draft, still stand. The Nov. 22 draft's most serious deficiency is it lacks a proposed action meeting minimal ESA requirements under section 7(a)(2) to avoid like jeopardy to listed species. . . .
>
> We recognize that the Service has responsibility to determine jeopardy, but this does not remove Reclamation from the responsibility of proposing actions that avoid significant harm to listed species.[134]

On February 23, 2001, the regional Fish and Wildlife Service office sent an "Early Alert" to the Washington, DC Fish and Wildlife Service office.[135] Early alerts are notifications sent when a regional office anticipates that a consultation might result in a jeopardy finding (U.S. Fish and Wildlife Service and U.S. National Marine Fisheries Service 1998, p. 1-9). The Klamath Falls Fish and Wildlife Service office seemed to realize things were getting politically complex as more and more Washington, DC officials requested information on the Biological Opinion.[136]

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133 "Memo to BOR Clarifying Requirements for Adequate Biological Assessment Necessary for Section 7 Consultation," November 7, 2000, "Administrative Record," (DAP, Doc. #E-15); "Clarification to BOR of Minimum Requirements for Adequate Biological Assessment," June 20, 2000, (DAP, Doc. #E-8).

134 "Memo to BOR Indicating Inadequacy of Draft Biological Assessment," December 19, 2000, "Administrative Record," (DAP, Doc. #E-18, pp. 1 and 4.

135 "Early Alert of Pending Draft Jeopardy Biological Opinion on the Bureau of Reclamation's Multi-Year Operation of the Klamath Project . . .," February 27, 2001, "Administrative Record," (DAP, Doc. #G-4); "FOIA Request from CBD (Response to Request)," March 20, 2001, "Administrative Record," (DAP, Doc. #F-76).

136 "Phone Call to Valerie West re Klamath Project (Clarification for David Cottingham, Fish and Wildlife Service WO)," March 13, 2001, "Administrative Record," (DAP, Doc. #F-65); "Alert – DC Contacts on Klamath Water Issues," February 8, 2001, "Administrative Record," (DAP, #F-34); "Schedule for Completion of Jeopardy BO for Klamath Project (Transmittal to CNO, R1, FWS

In addition to attention from the top, Basin residents were also becoming increasingly agitated. Worries among irrigators about content of the Biological Opinion was compounded by growing apprehensions over extremely low snowfall and an oncoming summer drought (Bragg 2001a). By February 2001, it seemed certain that Upper Klamath Lake would not fill to capacity by the summer, a situation that would reduce the amount of water irrigators could draw from it while still sending enough water downstream for other users, as they were required to do by the Klamath Basin Compact between the states of Oregon and California.

Irrigators protested the impending shut-off with politically charged rhetoric of betrayed promises and tradition. On March 9, 2001, irrigators held a rally at the Bureau of Reclamation's and Fish and Wildlife Service's regional offices outside Klamath Falls.[137] The rally's emphasis was the importance of farming to the region's society and economy. One protester emphasized the threat posed by a water shut-off to the generational continuity of farming in the basin, calling it "a slap in the face of rural America." Following the rally, farmers drove at least 100 tractors and farm trucks 20 miles from the town of Merrill, Oregon into Klamath Falls in a show of solidarity and protest (Bragg 2001b).

The demonstration was of great concern to the Fish and Wildlife Service, which only found out that it would be held on March 7, 2001.

> The demonstration is being set up surreptitiously. We do not know who is doing it or any of the details. What Reclamation passed on was that it was to be a tractor convoy, flat bed trailer, speakers and ???? [sic].
>
> In the past we have had death threats on our employees . . .
>
> As Project Leader I am concerned about the safety of our employees. There is no back exit [to] the building and parking area. The demonstrators could block the ability of employees to leave the area. We are on a dead way road that could be completely blocked. The building we

WO)," February 16, 2001, "Administrative Record," (DAP, #F-47).

137 One can only imagine the strained interactions between the two agencies on a day-to-day basis during this period.

are in has no entrance security or control."[138]

After a meeting with the Sheriff, Oregon State Police, Fish and Wildlife Service Law Enforcement, a Klamath County Commissioner, and Klamath Falls city officials, the Sheriff planned to station plainclothes officers in the area and suggested that all non-critical employees would be given administrative leave so that they would not have to come near the office on the day of the demonstration.

While the demonstration was carried out non-violently, implied threats to federal workers nevertheless continued. Jack Redfield, a Klamath Falls Police officer, was suspended after saying, while in uniform, "I think the potential for extreme violence, even to the extent of civil war, is possible if action is not taken in the very near future to remedy this tragedy." He also singled out two individuals in the Klamath Basin who were seen as supporting the shut-off and said "I am talking about rioting, homicides, destruction of property . . ." (quoted in Rampton 2003, n.p.). In the context of growing agitation against federal employees, the United States Geological Survey office in Klamath Falls switched the license plates on its trucks from United States government plates to Oregon State plates in an effort to reduce the attention drawn by their employees.

On March 13, 2001, the draft Biological Opinion was released for wider review.[139] Comments were requested by March 23. On April 6, the Fish and Wildlife Service and Marine Fisheries Service released Biological Opinions containing their jeopardy findings on the three species of fish (U.S. Fish and Wildlife Service 2001b; U.S. National Marine Fisheries Service 2001). The Fish and Wildlife Service and Marine Fisheries Service declared that the continued operation of the Klamath Project at nineteen-nineties levels would place the survival of the three species in danger.

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138 "Demonstration (Msg to CNO, R1, WO)," March 8, 2001, "Administrative Record," (DAP, Doc. #F-61).

139 "Comments to Bureau of Reclamation on Draft BO," March 21, 2001, "Administrative Record," (DAP, Doc. #C-10); "Confirmation of Delivery of Draft Biological Opinion 3/13/01," March 14, 2001, "Administrative Record," (DAP, Doc. #F-68).

The final Fish and Wildlife Service Biological Opinion was far from concise. On behalf of the suckers, the Fish and Wildlife Service reported that low water levels in Upper Klamath Lake were creating toxic, eutrophic conditions. If the water levels in the suckers' habitats were not increased, concluded the report, they would likely go extinct. The shortnose and Lost River Suckers are large, long-lived fish endemic to the Upper Klamath Basin (Braunworth, Welch, and Hathaway 2002). Researchers have documented shortnose suckers up to thirty-three years old, and Lost River suckers up to age forty-three years old. Suckers spawn multiple times in their lives, and a female can produce between seventy thousand and two hundred thousand eggs each season, although they do not spawn each year. Despite their fecundity, female suckers require seven to nine years to reach reproductive maturity, meaning that an individual must survive for a relatively large fraction of its life before it can spawn. Additionally the mortality rate for larval suckers (the first stage of life upon after hatching) is upwards of ninety-three percent. The relative number of individuals that survive to reproductive maturity compared to eggs, therefore, is extremely low.

The fish's long-lived nature is both advantageous and disadvantageous. The fact that the fish are long-lived, on the one hand, provides a defense against natural variability in the environment. Should there be a long period environmental conditions detrimental to spawning, then the fish can survive until those conditions have passed. On the other hand, their long life exposes them to increased risks from anthropogenic pressures. The sport fishery that remained open until 1987 and the fish die-offs in the nineteen-nineties affected older fish more severely than younger fish, and as a result, the fish population is currently young, which means that it possesses a reduced reproductive capacity.

Suckers spawn in springs along the shore of Upper Klamath Lake, as well as in the Williamson and Sprague Rivers, tributaries of Upper Klamath Lake. These preferences have been heavily impacted by a reduction in habitats conducive to spawning and by reduction in access to that habitat. Dams, even with fish passages, impair access, and the shallow gravel river and lake bottoms preferred by spawning fish are rarer than

they once were. Larval suckers lack the ability to move themselves, and tend to be most abundant in wetland areas. As fish age, they spread out in the Upper Klamath Lake, but older fish tend to be concentrated near the northern part of the lake.

In the Biological Opinion, the Fish and Wildlife Service set minimum lake levels for nine different dates throughout the year, each designed to address a particular risk to the fish at that time (U.S. Fish and Wildlife Service 2001b, Section III, Part 2, p. 145). The Fish and Wildlife Service concluded that the Bureau of Reclamation must maintain the surface elevation of Upper Klamath Lake at a minimum of 4,140 feet above sea level. At certain points in the year, the surface elevation was required to be at least 4,142.5 feet. Between these, the prescribed water level ranged throughout the year but was targeted to reduce the potential of winter fish die-offs, provide access to lakeshore spawning habitats, provide habitat for the youngest suckers, maintain water quality, and offer access to water-quality refugia, or areas where the local water-quality was higher than prevailing lake levels. These lake elevations were higher than those proposed by the Bureau of Reclamation in its Biological Opinion, and also represented a more stringent requirement than had been set forth in prior Biological Opinions. The levels were roughly equivalent to the minimum lake level prior to the construction of the Klamath Project (Cooperman and Markle 2003).

On behalf of the coho salmon, the Marine Fisheries Service reported that the reduced flow in the Lower Basin caused by Upper Basin uses—primarily agriculture, but also storage along the middle section of the river for power generation—was resulting in diminished habitat for spawning and dangerously high water temperatures (U.S. National Marine Fisheries Service 2001). To not endanger the salmon, more water needed to be allowed to flow faster down the river. Both agencies concluded that the obvious source for this water was the Klamath Project. The Fish and Wildlife Service ordered the Bureau of Reclamation to draw less water from Upper Klamath Lake, and the Marine Fisheries Service ordered the Bureau of Reclamation to allow more water to flow past the project diversions.

Bound by the ESA, which placed the survival of endangered species above all other federal priorities, the Bureau of Reclamation was unable to meet the requirements of both Biological Opinions and still deliver irrigation water to Project farmers. It shut off all irrigation water. The impact of the water shut-off reverberated downstream, and groups all along the river and up and down the Pacific coast quickly became involved.

PROTESTING A POLICY

Immediately following the water shut-off in April 2001, the dominant strategy on all sides of the conflict—both for and against the shut-off—focused on the "yoking" of moral, cultural, and historical arguments in support of their particular position (Epstein 1996, p. 336). Environmentalists claimed that the Bureau of Reclamation had failed in its responsibility not to the farmers, but to the environment and future generations (Bragg 2001c). American Indian tribes in the Upper and Lower Basins claimed that failure to protect the fish would result in yet another instance of the United States government turning its back on trust guarantees. Offshore fishermen argued the importance of fishing in the national and local economy, and in the coastal communities.[140] Irrigators discussed past guarantees of water made by the United States government, the centrality of farming to the national character, and the demise of rural culture in an urban world.

On May 7, 2001, the Upper Basin agricultural community participated in what it called the Bucket Brigade, a human chain that stretched from the shores of Upper Klamath Lake, through the downtown of Klamath Falls, and to the fields. Bucket by bucket, people passed water scooped from the lake and emptied it into the dried laterals. A rally was held at the head of the chain where people spoke about the struggle. The speech of a teenage girl encapsulated the irrigators' moral protest. "Where is the honor," she asked, "in giving water and land to the veterans who stood proud to defend this

140 Glen H. Spain, "Statement of Glen H. Spain on Behalf of Pacific Coast Federation of Fishermen's Associations to the Subcommittee on Water and Power of the Senate Committee on Energy and Natural Resources," March 21, 2001 (NAS, no DN), pp. 1-5.

country and then turning around and cruelly taking it away?" Applause. In this short rhetorical question, the speaker raised the themes of betrayed responsibility and the honor of farming and ranching.[141]

Much of this initial reaction was a response to the social impact caused by the water shut-off. Even the threat of a shut-off had forced some irrigators to downsize their operations. "For myself and my neighbors," said John Crawford, member of the Klamath Water Users Association, just weeks prior to the shut-off, "this *threat* is devastating. Banks will not talk to farmers. Farmers have already let some workers go . . ."[142] The situation only intensified after April 6. Facing one of the worst droughts in a decade and without irrigation water, some irrigators were unable to meet the loan payments that have become a signature feature of American farming (see, e.g., Dudley 2000; Fitzgerald 2003). In response, the Klamath County government and several private groups began to organize aid networks to help residents pay their monthly bills.

Numerous people blamed the Klamath Tribes for the shut-off, and members of the Klamath Tribes were often targets of racism during this period. A group of teenagers from Bonanza, Oregon, drove through Chiloquin, Oregon a largely tribal community and the location of Klamath Tribal Administration, firing shotguns while yelling "sucker lovers!" and other anti-Indian rhetoric (*New York Times* 2001). The teenagers were sentenced to community service, a sentence that some tribal members viewed as itself racially motivated, as they are sure that had tribal teenagers done something similar, they would have been incarcerated. A tribal member recounted to me that she and her family were refused service at local businesses and restaurants that blamed them for the shut-off. One tribal member sat with her family for an hour in a restaurant, waiting for service while non-tribal customers who arrived after were served, ate, and left. Upon leaving the

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141 Anders Tomlinson, "One Water, One Basin, One People: Tears & Heroes, 2001 Revisited," 2002 (SHL), videocassette.

142 John Crawford, "Testimony of John Crawford on Behalf of Klamath Water Users Association," March 21, 2001 (NAS, DN 57), p. 1. See also (Subcommittee on Water and Power of the Senate Committee on Energy and Natural Resources 2001).

restaurant unserved, they noted that the management seemed pleased. Billboards advertising the tribal Kla-Mo-Ya Casino along the main highway were vandalized and covered with a sign advertising "Sucker sandwiches" for lunch. Personal relationships between tribal members, many of whom were irrigators themselves, and non-tribal residents of the area were strained.

Much of the anti-tribal rhetoric was centered on the idea that the sucker was mainly of value to the Klamath Tribes, and not the non-tribal population. Agriculture, on the other hand, was portrayed as being of universal value. The fish was described as a "trash" fish. Doc Hastings, Representative from Washington, even went so far as to say, in a public hearing, "Regulations and enforcement should not refer to pre-civilized conditions. How did fish survive when drought occurred before the West was inhabited?" (House Committee on Resources 2001, p. 7). Here, he suggested that the Klamath, Modoc, and Yahooskin Paiute peoples, who had lived in the area since time immemorial, did not count as human inhabitants, and that before the arrival of the United States Army to the area, they were "pre-civilized."

Rhetoric blaming the tribes framed the situation as one in which the needs of a small group were taking priority over the needs of a larger group. But despite their prominence as a target of blame, what often seemed to be lost in the controversy surrounding the sucker was the fact that the fish was a tribal trust animal, and that consequently, a treaty obligation was at the center of the conflict. The Klamath Tribes have a court affirmed right to fish the suckers, a right they currently cannot exercise due to its endangerment. In addition, in *Adair,* the court affirmed a water right to maintain the fish. And in *Klamath Water Users et al. v. Patterson et al*, the Ninth Circuit had ruled that "Because Reclamation maintains control of the [Link River] Dam, it has a responsibility to divert the water and resources needed to fulfill the Tribes' rights, rights that take precedence over any alleged rights of the Irrigators."[143]

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143 "Briefing Document: Klamath River, Klamath Project Operations, and Klamath Area Refuges," March 1, 2001, "Administrative Record," (DAP, Doc. #G-5).

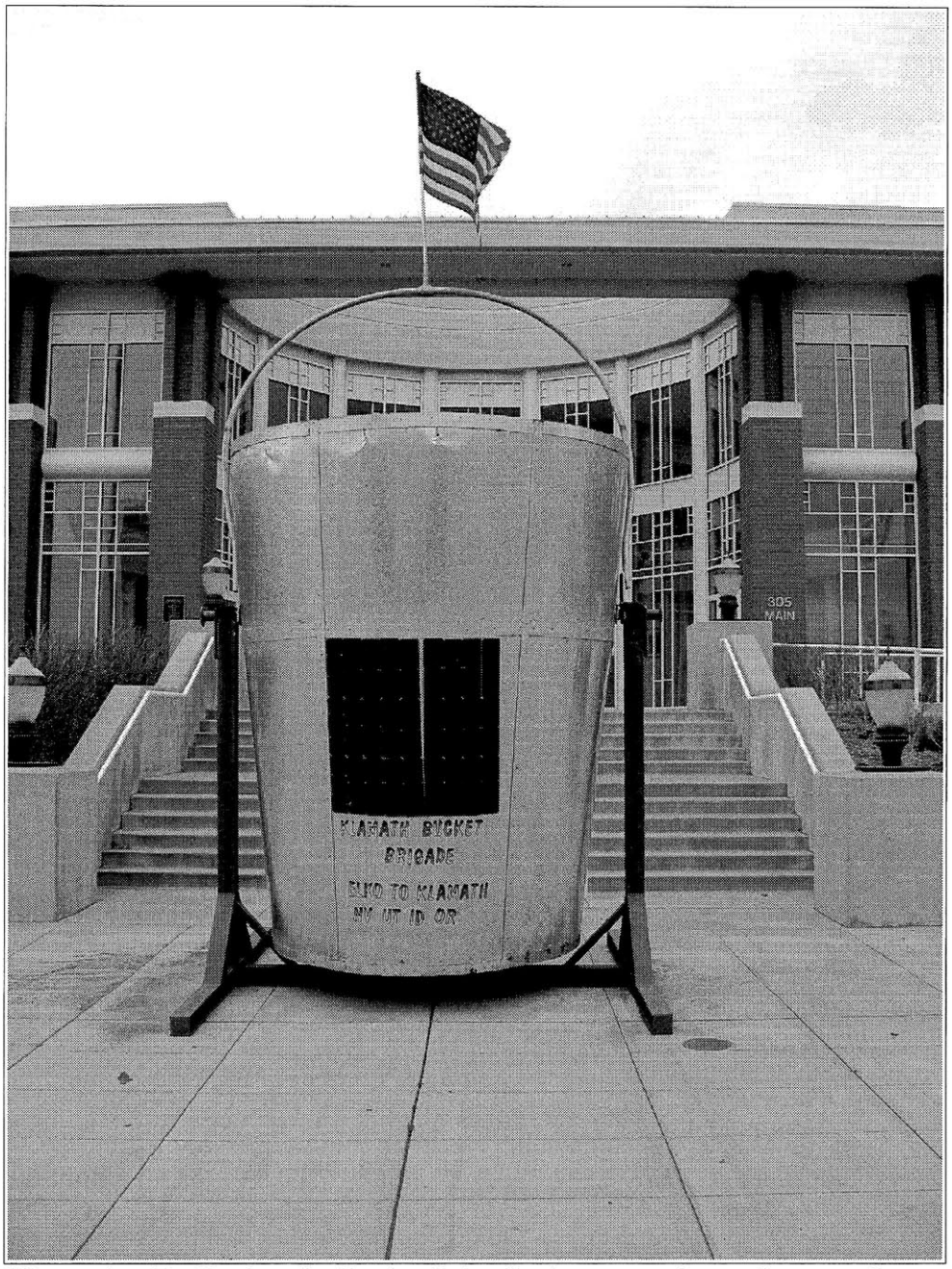

Illustration 7. During the Bucket Brigade demonstration, a large sculpture of a bucket was placed in front of the county seat in Klamath Falls. The Bucket was still there during the summer of 2009, the last time the author was in Klamath Falls. To the tribes, the presence of the bucket is a continual reminder of which side the county government was on in 2001. Photo by the author.

Illustration 8. The second bucket sculpture, this one stored at the county fairgrounds. The sculpture calls out against "rural cleansing" and against the ESA, drawing on the "clash of cultures" narrative that circulated widely during the conflict. Photo by the author.

Chairman Allen Forman reminded Congress members of these facts at a July 16, 2001 field hearing in Klamath Falls, as he had publicly done several times before, and would again in the future:

> I appear before you today representing not only a constituent base, but also as a leader of a sovereign nation, a nation that's recognized by the United States. I'm here not merely as another interest group or an interested party. I would like to remind the Committee that the United States has a legal and moral obligation to preserve and protect the trust responsibility to the tribes. The Constitution of the United States refers to its treaties as the supreme law of the land. It is in this context that I direct my remarks to you, on a government-to-government basis (House Committee on Resources 2001, p. 76).

Foreman voiced justified displeasure at the way the tribes were being pigeon-holed as just another interest group or stakeholder. But few seemed to recognize this point publicly at this hearing or others. But even so, the Klamath tribal government would not be the main target of popular and official blame for long.

That place was reserved for the scientists.

Chapter Seven

Contesting a Truth-Claim

THE TURN TOWARD SCIENCE

On July 16, 2001, the House Committee on Resources held a field hearing at the Klamath County Fairgrounds (House Committee on Resources 2001). In a packed rodeo ring, hundreds of Upper Basin residents attended the hearing. Moral arguments about responsibility and betrayal anchored the testimony. Richard Pombo, Representative from California, opened the hearing, framing the Klamath Basin unequivocally as a grand struggle between rural economies and values and the Endangered Species Act of 1973 (ESA) run amok at the hands of environmentalists.

> Let me say this, though, after serving as Chairman of the House Resources Committee, Endangered Species Act working group, I have attended numerous hearings throughout the years around the country and heard testimony from people who have lost their homes, their jobs and their dignity due to questionable interpretations of the Act. It is clear to me that ESA has been misused for years by some advocacy groups to threaten the rights of private property owners.
>
> . . . We have sacrificed enough. I simply cannot stand by quietly as farmers, ranchers, families and businesses, especially those in the West who depend on natural resources for a living, suffer for no constructive purpose.
>
> It is time to take back our economic and constitutional rights. After all, the human species deserves the most important place in the ESA equation (House Committee on Resources 2001, p. 1).

Walley Herger, Representative from California, was similarly brisk in making his feelings about known about those who supported the shut-off.

> Ladies and gentlemen, we are at war with the extreme environmentalists. What they have done in the Klamath Basin is nothing short of a tragedy. I have never seen anything like it in my years of public office. The Endangered Species Act has been invoked to completely destroy an entire local economy under the pretense of saving a non-commercial sucker fish. . .
>
> There is something fundamentally wrong, and indeed, immoral about this, and it must be changed. Across the West the extremist environmentalists are using the Endangered Species Act to drive farmers, ranchers and land owners from their homes and from the lands that they have worked for generations. Their goal is not to protect the environment. It is to destroy local economies, bankrupt businesses and drive people from the land. This is exactly what is happening in the Klamath Basin. To the extreme environmentalist, there is no balance, there is no middle ground (House Committee on Resources 2001, p. 4-5)

In this chapter, I describe a shift in the 2001 conflict over the shutting off of irrigation water in the Klamath Project. Despite the similar themes invoked at the hearing—those of the betrayal of rural American way of life—an important shift in the strategy of those who hoped to overturn the shut-off began to reveal itself. Numerous moral and historical arguments against the shut-off had been made in the last months, and many more could no doubt be mustered. But morality was glaringly relative, and neither side seemed able to gain an upper hand. Just as irrigators could suggest that they were under siege by environmentalists, environmental activists could argue that irrigators had long ignored the warning signs of un-sustainability and had neglected to take action. Tribes could equally well point to a long string of broken promises.

Additionally, the Biological Opinions had held up well in attempts by critics stop the shut-off via the courts. In *Pacific Coast Federation of Fishermen's Associations v. United States Bureau of Reclamation*, the court ruled that the Bureau of Reclamation could not deliver irrigation water to the Project unless down-stream flow levels in the Klamath River were met. Adequate flows in the lower river were necessary for the migration of anadromous fish, mostly salmon, to their spawning grounds. In *Kandra v. United States*, Project irrigators sought a preliminary injunction against the shut-off. The

court denied the injunction, stating that, among other things, the Fish and Wildlife Service Biological Opinion on the sucker was not arbitrary and capricious.

Rather than dispute the legitimacy of the shut-off directly, the irrigators and their allies would instead challenge what Greg Walden, Representative from Oregon, called the "reliability of science and openness of the process" that had led to the water shut-off.[144] With this statement, Walden began to elaborate on a theme that would become more and more important as the July 16 hearing went on and would quickly become the dominant theme in the conflict as a whole. Something was flawed in the science that had led to the decision to shut off the irrigation water, he suggested. To critics of the shut-off, the most effective way to overturn that policy seemed to be to attack that legitimating foundation. This strategy honed in on the requirement of the ESA that the required actions outlined in the Biological Opinions be based on "the basis of the best scientific and commercial data available" (16 USC 1536 § (7)(a)(2)). By disputing whether the Biological Opinions did in fact contain "the best scientific and commercial data available"—or by suggesting that the claims in the Biological Opinions took other, non-scientific, considerations into account—the critics hoped to overturn a policy by overturning the policy's legitimating truth-claim.

• • •

This strategy had first been mentioned publicly on March 21, 2001, at a hearing of the Senate Subcommittee on Water and Power (Subcommittee on Water and Power of the Senate Committee on Energy and Natural Resources 2001). Just prior to that hearing, members of the United States Fish and Wildlife Service Klamath Falls office had briefed

144 Tomlinson, "One Water, One Basin, One People: Tears & Heroes, 2001 Revisited;" also in House Committee on Resources (2001, p. 3). It is interesting that Walden chose to omit the definite article before "science." Stating that his goal was to challenge the "reliability of [*the*] science" that led to the shut-off would have been targeted and deliberate, focused solely on the Klamath Basin Biological Opinions. Walden, however, did not use the definite article. He was setting his sights much more broadly. He planned to question the "reliability of science" writ large, suggesting that he had in mind a far broader program of critique focused on the ESA generally.

officials in Washington, DC, on the issues. They saw the meetings as "opportunity to make a succinct and strong case, based on our best science."[145] Already, there seemed to have been a strong feeling that the scientific underpinnings of the Biological Opinions would be greatly contested, and would be the wedge of choice for critics of the shut-off. And such was the case. Walden, testifying as a guest of the Senate Subcommittee in March, said

> It has been extremely frustrating the last few years to try to understand the basis for the Federal agencies' actions. I was dismayed when, on January 19 of this year, the staffs of Federal agencies signaled that they might require reservoir elevations and river flows to be maintained at levels that would devastate the Klamath Project.
>
> . . . Federal Government cannot continue its pattern of taking water away, based on guesswork, especially when those decisions will have such incredibly negative impacts to real people in that basin (Subcommittee on Water and Power of the Senate Committee on Energy and Natural Resources 2001, pp. 4 and 5).

Other than calling the naturally occurring Upper Klamath Lake a "reservoir"[146] in an attempt to denaturalize it and the fish's presence there, and other than leaving one to wonder what non-"real people in the basin" look like, Walden portrayed the water shut-off as based on "guesswork." It was not grounded in "science." More importantly, Walden suggested that there was scientific evidence that undermined these conclusions:

> Dr. Horne's study presents significant new information and poses new and unanswered questions about lake level science. I believe the draft bi-ops [Biological Opinions], both for the sucker fish and for the coho, must be put on hold until adequate time is available for the new Administration and the public, at large, to review those studies (Subcommittee on Water and Power of the Senate Committee on Energy and Natural Resources 2001, p. 6).

On June 16, 2001, in front of a much larger audience and with the stakes all the

145 "DC Trip and Briefings," March 15, 2001, "Administrative Record," (DAP, Doc. #F-71).

146 The defense in *Adair* similarly liked to put the word *marsh* in scare-quotes in an attempt to denaturalize it.

more clearly defined, Herger developed Walden's trope for all to hear:

> They used bogus science, misinformation and their political friends in the previous Clinton/Gore administration to bring an entire community to its knees, and nothing in the law prevented it. Nothing in the law required open decision-making, public involvement or public review. Nothing in the law required independent review of the science. Nothing in the law required that the needless social and economic suffering that were sure to result would be considered. . . .
>
> First, we must thoroughly examine the science, the decision-making and the process by which the biological opinions were developed so that we can uncover the political knots, undo them and rework them, based on, 1) independent peer-reviewed science, 2) actual historical evidence and, 3) balance. Not politics, speculation and guesswork (House Committee on Resources 2001, pp. 4-6).

Doc Hastings, Representative from Washington, reinforced the theme of challenging the scientific conclusions:

> We know that fish need water. That's self-evident. But no Federal agency or entity has ever determined with good science just how much water is enough. We know how much water is necessary for irrigation, for transportation, for power generation, but there is no agreement on how much water fish require. We must be able to quantify what constitutes recovery. Regulations and enforcement should not refer to pre-civilized conditions. How did fish survive when drought occurred before the West was inhabited? Are we to use pre-civilization alleged fish counts as goals for endangered species recovery? I think not (House Committee on Resources 2001, pp. 7-8).

To effectively dispute the science, irrigators and their supporters began to enlist scientific experts to conduct studies and to write reports that undermined the science used by the Fish and Wildlife Service and the Marine Fisheries Service. David Vogel was one of the principle experts for the irrigators, and he testified at the hearing.

> Mr. Chairman and members of the Committee, thank you for the opportunity to be here to testify. My name is David Vogel. I'm here to provide you with important information concerning the science, or more aptly stated, the lack of science behind the artificially created regulatory crisis that has been imposed in the Klamath Basin, and to recommend

> solutions to this major problem. I'm a fishery scientist with 26 years of experience. I have authored many technical reports, including restoration of Klamath Basin fishery resources. I have performed research on Coho salmon and the endangered suckers as well as many other fish species throughout the western United States.
>
> . . . My first point pertains to how the decision-making process went awry. . . . The constructive science-based processes I have experienced elsewhere used an honest and open dialogue. Hypotheses are developed and then tested against empirical evidence. Such are the accepted standards of science, but they have not been applied here.
>
> My second point pertains to the distortion of facts and the lack of science associated with the suckers and Coho salmon (House Committee on Resources 2001, p. 57).

In the hearing in general and in Vogel's testimony in particular, "science" was being built up as something that could be easily bounded from considerations that were "political," and science itself could be easily divided between that which was "good" and that which was "junk." With these statements, a general outline began to emerge of what constituted "good science" versus "bogus science" for these speakers. Good science was independent of politics, while bogus science was driven by political considerations. Furthermore, good science was characterized by agreement, while bogus science was characterized by disagreement or multiple interpretations. Good science was unitary because reality was seen as unitary; non-unitary accounts therefore could not be good science. Good science was based on "actual . . . evidence," while bogus science was based on a melange of "politics, speculation, and guesswork." Herger seemed to imply that "actual . . . evidence" would also be unitary, leading directly and uni-causally to a single agreed upon interpretation. According to this model of science, contradictory evidence was evidence of the presence of bogus science because the object of scientific study was unitary. In addition, seemingly contradictory evidence could not be evidence of variability, because the object of study was portrayed as uniform. This evidence, according to Vogel, would be "distort[ed]" in bogus science, while it would speak for

itself in good science. Finally, good science was peer-reviewed and openly produced, while bogus science was not.

Sue Ellen Wooldridge, Deputy Chief of Staff at the Department of Interior, summarized the ever more vocal criticism of the Biological Opinion.

> Let me turn to the science. One of the things that was a consistent theme, and we've heard it today as well, is that the science underlying the Biological Opinions which formed the basis for the decision that Project deliveries could not been made[147] was bad science, irresponsible, not credible, you name it. We were told that the science was not exposed to a public process or peer review, and is thus susceptible to these criticisms (House Committee on Resources 2001, p. 11).

We see the Department of the Interior starting to distance itself from the Biological Opinion, as if it had somehow been produced without the knowledge of department officials in Washington, DC.[148] Pombo asked Wooldridge how, exactly, the Fish and Wildlife Service determined what the "best" science was, and Wooldridge admitted this was quite difficult at times. Pombo, like others, suggested that the Biological Opinions had not been peer-reviewed, which for him was a mark of real science. "And when you are deciding between competing science, if it never goes out to peer review, if you never have an outside body look at that science, you are making political decisions," he said (House Committee on Resources 2001, p. 20).

Pombo's assertion that the Biological Opinions had not been peer-reviewed was a major part of the strategy of those attempting to undermine the legitimacy of the Biological Opinions. This strategy rested on the assertion that "good science" was characterized by peer review. However, Pombo's assertion must be regarded critically, and Wooldridge's acquiescence seems far too quick.[149] While Pombo and others

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147 Wooldridge's statement, "the decision that Project deliveries could not been made," refers to the decision to shut-off irrigation water, known as deliveries, to the Project.

148 The Administrative Record, which contains numerous correspondence with Washington, DC, contradicts this idea. U.S. Fish and Wildlife Service, "Index," n.d., "Administrative Record," (DAP).

149 In fact, in *Kandra v. United States*, a failed effort by Project irrigators to gain a

portrayed the Biological Opinions as having been written in secret isolation, the Biological Opinions had in fact been sent out for review several times, both in very preliminary and final draft forms. The Biological Opinions had been sent to the most direct "peers" of the Fish and Wildlife Service and Marine Fisheries Service—i.e., scientists at other government natural resource agencies, for example the Oregon Department of Fish and Wildlife, the California Department of Fish and Game, and the Natural Resources Department at the Klamath Tribes. The Biological Opinions had also gone to a wider circle of "peers," such as academic scientists, as well as to groups who would not easily be considered the professional "peers" of the Biological Opinions' authors—for example interested organizations, such as the Klamath Water Users Association.[150]

Pombo and other critics did not consider this to be peer review.[151] In this debate,

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preliminary injunction against the shut-off, the court noted that plaintiffs' contentions that the Biological Opinions had not been peer-reviewed were both irrelevant, since the ESA does not require public participation in the consultation process, and wrong, because the Fish and Wildlife Service had in fact made available draft and final versions of the Biological Opinion: "Plaintiffs complain that some of the evidence that FWS and NMFS relied upon was performed without public or independent scientific peer review, and that their representatives have not been included in the consultation process. . . . However, as the government correctly pointed out during oral argument, the ESA does not require public review or input during the consultation process. . . . Further, the government noted that it voluntarily made draft and final BiOps [Biological Opinions] and EAs [Environmental Assessments] available to plaintiffs and others through a Web site and other sources" ("Opinion," 145 F.Supp.2d. 1192, footnote 8).

150 As discussed in Part One, changes in endangered species regulation over time suggest that such organizations had been increasingly, and intentionally, excluded from the circle of legitimate participants in ESA decision-making.

151 In August 2001, four faculty members from the University of California reviewed the Fish and Wildlife Service Biological Opinion on the suckers. They concluded that, although it was impossible to say whether increasing water levels would increase the likelihood of fish's surviving, "The Biological Opinion uses available data, some of it unpublished, which generally supports its recommendations." Further, "Data to support specific water levels in Upper Klamath Lake and in other components of the project, and their relationship to long-term survival of the

then, peer review is revealed to be not a clearly defined institution as it was often portrayed by critics of the shut-off, nor an easily applicable metric with which the "good"-ness of science can be judged. Instead, it was revealed to have a highly mutable institution and metric. For example, as discussed later, the National Research Council Committee's report was held up by the same group of people as being peer-reviewed. It was. But the Committee's writing and review process was far less transparent and open than the review process followed by the Biological Opinions. The federal government is ultimately subject to the Freedom of Information Act, while the National Research Council, as a non-governmental organization, is exempt. The National Research Council is also largely exempt from the main provisions of the Federal Advisory Committee Act, which governs the openness of groups established to advise the government. Therefore, simply conducting a peer review is not sufficient to gain legitimacy for one's claim. Such a review must be properly framed in the public debate, as well, and Fish and Wildlife Service and Marine Fisheries Service seem not to have done this. Wooldridge's comments suggested a fairly quick, and incorrect, concession of this important point.

In all of this, the legitimacy of the shut-off was being framed as the logical extension of the veracity of the underlying scientific truth-claim, the Biological Opinions. And in a way, the legitimacy of the shut-off *was* dependent on the veracity of the claims made in the Biological Opinions. Because the ESA had a "statutory mandate" (in Wooldridge's words) to consider only the best available scientific data, any decision that did not would instantly be in violation of that mandate. Such decisions could not legitimately regulate state intervention because the procedures of law had not been followed. The strategy that suggested itself was that rather than supporting or opposing the shut-off *policy*, the focus might more effectively be placed on supporting or opposing

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suckers are limited and in some cases not available. . . . The reviewers are in general agreement that higher lake levels need to be maintained, but there is concern that maintaining higher lake levels will not significantly improve water quality because of the nutritional loading from runoff in the Klamath Basin . . ." "University of California Review," (WRCA, F289 P1-2 Review), pp. 2, 1.

the *truth-claim* that legitimate the shut-off. Such a strategy is not uncommon in conflicts over science-justified policies, where arguing over the "science has become a surrogate for arguing over the policies themselves" (Rushefsky 1986, p. 5, discussed by Jasanoff 1990, p. 6). To dispute the shut-off, then, critics of the policy needed to apply these seemingly clear boundaries to the Biological Opinions, thus delegitimating them.

This was a deliberate strategy, and in 2007, the *Washington Post* published an article that outlined the direct involvement of Vice President Dick Cheney in orchestrating this strategy (Becker and Gellman 2007). According to Becker and Gellman, "A few months after Inauguration Day 2001," Cheney contacted Wooldridge at the Department of the Interior. "This is Dick Cheney. I understand you are the person handling this Klamath situation. Please call me at—hmm, I guess I don't know my own number. I'm over at the White House."

Cheney's office contacted the Klamath Falls Fish and Wildlife Service office as early as March 27, 2001. On March 27, the Fish and Wildlife Service office in Klamath Falls returned a call from the Cheney's office.

> Today, I responded to a call from the Office of the Vice President. Maria ?? [sic] Said she had gotten a call from someone regarding the draft BO and wanted to get a better understanding of the issues. I explained the section 7 consultation process, provided background information about the sucker status and how they were affected by project operations and explained the rationale for higher lake levels in UKL. She asked about how the new lake levels would affect agriculture and I explained that it would not affect agriculture when inflows to the lake were normal and above and would only stop deliveries in droughts such as is currently being experienced. She wanted to know if the draft was available and I gave her the web site address. She seemed pleased with the information I gave her and she said she would call back if she needed additional information.[152]

Upon learning of the Biological Opinions, Cheney began strategizing. Becker and

152 "Call from the Office of the Vice President," March 27, 2001, "Administrative Record," (DAP, Doc. #F-81). This interaction is not reported in Becker and Gellman (2007).

Gellman have suggested that concern for gaining the solidly Republican vote in rural Oregon for the upcoming midterm elections, in addition to a strong ideological position against environmental regulation, led Cheney to become involved in the Klamath Basin. "'What does the law say?' [Ron] Christie, the former aide, recalled the vice president asking. 'Isn't there some way around it?' It was at this point that Cheney called Wooldridge. Wooldridge said that Cheney "was coming from the perspective that the farmers had to be able to farm—that was his concern. The fact that the vice president was interested meant that everyone paid attention." Cheney then ruled out the possibility of forming an Endangered Species Committee, or "God Squad," a cabinet-level committee with the authority to allow projects that jeopardize endangered species to proceed. According to Becker and Gellman, Cheney did not like this option since he would rather "not put the administration on record as advocating the extinction of endangered or threatened species." Relying on the God Squad would also validate the Biological Opinions in the process: in essence it would be an admission that the Biological Opinions were correct, but that the administration did not want to abide by them. Instead, "The thing to do, Cheney told [Robert F.] Smith [a former Representative from Oregon], was to get science on the side of the farmers. And the way to do that was to ask the National Academy of Sciences to scrutinize the work of the federal biologists who wanted to protect the fish." Cheney was confident that the National Research Council would side with the farmers. "He called them and said, 'Please look at this, it's important,'" Smith said. "'Everyone just went flying at it.'"

THE NATIONAL ACADEMIES AND THE RESEARCH COUNCIL

In response to the increasingly-expressed skepticism of the scientific truth-claims in the Biological Opinions, Secretary of the Interior Gale Norton officially commissioned a National Research Council Committee to review the scientific underpinnings of the Biological Opinions. The National Research Council is the operational arm of the National Academies of Science, Medicine, and Engineering, and is one of the most

prestigious expert advisory bodies in the United States (Hilgartner 2000). The National Research Council regularly offers scientific, medical, and technical advice on a variety of topics, both directly related to a policy question (for example, the safety of proposed nuclear waste depositories) and more academic in nature (for example, the history of computing) (National Research Council 1995b; National Research Council 1999).

The National Research Council's study was funded by the Fish and Wildlife Service, the Bureau of Reclamation, and the Marine Fisheries Service. In response to the request, the National Research Council Committee on Endangered and Threatened Fishes in the Klamath River Basin was formed. It was charged with a variety of tasks (National Research Council 2002, p. xi). First, it would review "the government's opinions regarding the effect of the Klamath Project operations on species in the Klamath River Basin listed under the Endangered Species Act, including the coho salmon and the shortnose and Lost River suckers." The Committee would then "assess whether the biological opinions are consistent with the available scientific information" and would write a report that would "provide a preliminary assessment of the scientific information used by the [agencies] . . . and will consider to what degree the analysis of effects on the biological opinions . . . is consistent with that scientific information." In its final report, the Committee would expand on its initial review and would also "provide an assessment of scientific considerations relevant to strategies for promoting the recovery of [endangered and threatened] species in the Klamath Basin" (National Research Council 2002, pp. 32-33; National Research Council 2004, pp. 378-379).[153] The Committee would hold three public meetings to gather information, one before the interim report, and two following its release.

The Committee consisted of twelve members, chosen to represent the variety of applicable expertise. The chair of the Committee, William Lewis, was Professor of Limnology at the University of Colorado, and a "veteran" of the National Research

153 The "Statement of Task" appears in slightly different forms throughout the Committee's publications.

Council process (National Research Council 2004, p. 24). Other members of the Committee covered other areas of expertise, including agricultural and resource economics, forest biology, the interaction of land-use and aquatic ecosystems, water resources and planning, zoology, environmental history, geology, conservation biology, salmonid ecology, aquatic ecology, and environmental law.

Not everyone was happy with the membership. While most acknowledged the Committee's authority as a whole, criticism focused on individual members. This is often the case with National Research Council committees, whose general authority is acknowledged, even as the specific committee membership is disputed (Hilgartner 2000). Groups find it easier to contest the relevance, potential biases, or conflicts of interests of a specific individual member and his or her expertise, rather than to contest the historical institutional authority of the National Research Council. Foreman, Chairman of the Klamath Tribes, for instance, wrote to Lewis regarding his concern over the inclusion of Richard Adams, a resource economist, on the Committee. "This suggests to us that the Committee might include in its review not only the biology, ecology and limnology of the situation here, but also certain of the economic aspects as well." Foreman was attempting to challenge the Committee by suggesting that it had overstepped its "Statement of Task," which charged the committee with a purely scientific review. By including an economist, Foreman suggested its disciplinary composition biased it towards a certain type of analysis, one that would consider the economic reverberations of the shut-off for agriculture.[154]

Here, Foreman echoed an earlier worry he voiced that a review of the Biological Opinions would by its very nature tend to find weakness in it, rather than strengths:

> Concerning the Biological Opinion, if a peer review is going to happen, which appears to be likely, it should review both the science that supports the withdrawal from the natural system as well as the science that supports keeping the water in the system, should be reviewed equally. First, we believe that the biological opinion incorporates the best available science. Second, we're concerned about the objectivity of any review simply

154 Allen Foreman to Lewis, November 6, 2001 (NAS), DN 591, p. 1.

because many influential people have already committed to a negative position (House Committee on Resources 2001, p. 77).

The first of the scheduled open meetings was held on November 6, 2001 in Sacramento, California. The program included introductory presentations on "the NRC [National Research Council] process," a discussion of the Committee's charge by its Department of the Interior sponsors, presentations on the Fish and Wildlife Service and the Marine Fisheries Service Biological Opinions, two "Stakeholders Panel Discussions" (one on the suckers, one on the salmon), followed by one hour of open microphones. In addition to the presentations, participants and the public could submit written material to the Committee for consideration.

Groups took advantage of the limited opportunity offered by the Committee for public input. Presenters offered a wide variety of scientific evidence in support of or in opposition to the Biological Opinions.[155] The Fish and Wildlife Service presented its findings on the water level of Upper Klamath Lake, its temperature, its quality, its hydrology, and the declining populations of suckers.[156] The Marine Fisheries Service presented on the slowing flows and warming water in the lower branches of the Klamath River and on the negative impacts it was having on salmon reproduction.[157] During the "Stakeholders Panel," the Klamath Water Users Association contradicted the two agencies, offering instead a report that located the cause of the suckers' decline in habitat loss, not water level, and suggested that in order to save the fish, extensive habitat restoration was necessary.[158] Raising the water level alone was unjustified, they claimed.

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155 For the complete program, see National Research Council (2001) The State of Oregon also presented, see Paul R. Cleary, "[Statement of the State of Oregon]," November 6, 2001 (NAS, DN 12).

156 Fish and Wildlife Service, "Presentation to National Academy of Science," November 6, 2001 (NAS, DN 20).

157 Thomas Hardy and Reck, "National Marine Fisheries Service: 2001 Klamath Project ESA Section 7 Consultation," November 6, 2001 (NAS, DN 17).

158 Klamath Water Users Association, "Protecting the Beneficial Uses of Waters of Upper Klamath Lake: A Plan to Accelerate Recovery of the Lost River and Shortnose Sucker," March 2001, WRCA, G289 P1-1.

They also suggested that the claims of the Marine Fisheries Service for more water were based on an imprecise and inaccurate river flow model, and were therefore unsupportable. Representatives of the Yurok and Klamath Tribes presented results from their own tribal biologists, both supporting the science of the Biological Opinions.[159] Other experts submitted unsolicited reports.[160]

THE INTERIM REPORT

In January 2002, the Committee released its interim report (National Research Council 2002). In an unusual move, the Committee released a "prepublication" copy, to be followed by a final version at a later date. A slim booklet, the report made its point quickly:

> The NRC [National Research Council] committee concludes that all components of the biological opinions issued by the USFWS [Fish and Wildlife Service] on the endangered suckers have substantial scientific support *except* for the recommendations concerning minimum water level for Upper Klamath Lake. A substantial data-collection and analytical effort by multiple agencies, tribes, and other parties has not shown a clear connection between water level in Upper Klamath Lake and conditions that are adverse to the welfare of the suckers (National Research Council 2002, p. 3).

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159 For the Yurok, Troy Fletcher, "Presentation and Testimony for the First Meeting of the Committee on Endangered and Threatened Fishes in the Klamath Basin," November 6, 2001 (NAS, DN 9); for the Klamath, The Klamath Tribes, "A Critique of the Klamath Water Users Association's Report Entitled: Protecting the Beneficial Uses of Waters of Upper Klamath Lake: A Plan to Accelerate Recovery of the Lost River and Shortnose Sucker," November 6, 2001 (NAS, DN 15); The Klamath Tribes, "Klamath Basin in Crisis: Degraded Ecosystems a Major Cause, Restored Ecosystems a Key Solution," September 2001 (NAS, DN 13); Larry Dunsmoor, "Early Lake History of Endangered Suckers in Upper Klamath Lake: Importance of Water Level," November [6,] 2001 (NAS, DN 14). Problematically, the Klamath River American Indian tribes were classified by the committee as "stakeholders" as opposed to recognized tribal governments.

160 See, e.g., Kenneth A. Rykbost, "Review of Biological Opinions Affecting Klamath Project Operations," November 6, 2001 (NAS, DN 23). Rykbost was Professor of Crop and Soil Science at Oregon State University.

In essence, this translated into a statement that the Committee supported everything stated in the Biological Opinions except their central and most important conclusion, the one on which the shut-off had been based: the need for maintaining specific water levels in Upper Klamath Lake. As for the coho, the Committee concluded that, while many threats no doubt existed, the Committee "did not find clear scientific or technical support for increased minimum flows in the Klamath main stem" (National Research Council 2002, p. 4).

To arrive at these conclusions, the Committee had compared a table of lake levels to a table of fish mortality, and found that years with low water did not correspond to years of fish die-offs. In fact, "The absence of notable adult mortality in any year of low water during the 1990s might in fact suggest an association the reverse of the one postulated in the biological opinion, although the evidence is statistically inconclusive" (National Research Council 2002, p. 17). Therefore, according to the Committee, shutting off water to the Klamath Project to protect the suckers was not a scientifically justified policy. Similarly, the Committee suggested that "Higher flows might work to the disadvantage of the coho population" because the water necessary to achieve these flows would have to come from the reservoir behind Iron Gate Dam on the Klamath River, and would therefore be too warm for the salmon (National Research Council 2002, p. 25). "On the whole, there is no convincing scientific justification at present for deviating from flows derived from operational practices in place between 1990 and 2000" (National Research Council 2002, p. 27). The Committee wrote that the Biological Opinions' conclusions had "no sound scientific basis" (National Research Council 2002, p. 3).

The report unleashed a maelstrom of controversy. At a House Committee on Resources hearing following its publication, political explanations for the difference between the Committee's findings and the Biological Opinions shot back and forth. Representative James Hansen opened the meeting by suggesting that the Fish and Wildlife Service had committed a fraud against the public in the Biological Opinions

(House Committee on Resources 2002, p. 1). The Fish and Wildlife Service researchers, he suggested, were not environmental scientists but environmentalist scientists who had transgressed the boundary between science and policy. It is worth quoting at length, as it captures the animus that was expressed widely as a result of the interim report.

> Last week, this Committee held a hearing concerning the submission of false samples of Canadian lynx hair by scientists participating in an interagency survey. Prior to that, we conducted a field hearing that dealt with questionable policy decisions with regard to endangered species along the Platte River in Nebraska. These oversight hearings have strengthened my belief in the need for sound science. Unless policy decisions are based on sound science, good decisions are possibly only by chance.
>
> Hardly a better example exists of the need for sound science than the recent controversies at the Klamath Basin. In 2001, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service issued Biological Opinions stating that the series of dams and diversions known as the Klamath project was harming three endangered species of fish, the lost river sucker, the short nose sucker, and the coho salmon. These opinions called for higher lake and stream flows to protect these species. Based on these opinions, on April 7, 2001, the Secretary of Interior was forced to close the head gates that supplied the primary source of water to approximately 1,400 farmers and more than 200,000 acres of cropland in California and Oregon. The same government who promised full water rights to worthy veterans of the armed services in the Klamath Basin over a half-century ago was now taking them away.
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> . . .
>
> Upon the request of Secretary Norton, the National Academy of Sciences conducted an independent review of this data used by the Fish and Wildlife and National Marine Fisheries Service in their biological opinions. The report concluded that there was no substantial scientific foundation for changing the operation of the Klamath project to maintain higher water levels. The report also found that higher water levels could actually be lethal to the coho salmon in the Klamath River by increasing the water temperature to equal or exceed lethal temperatures during the warmest months of the year.

> Some people say the agency used junk science or bad science. I am not here to debate that point, but this I do know. The science was incomplete and incomplete science leads to poor decisions. Sound science is independently verifiable. It is not policy disguised as science.
>
> . . .
>
> My point is not that lake and river levels should be high or low. My point is that the decisions made regarding these levels must be made based on science. Without such a foundation, we are merely guessing and blindly implementing policy in response to threatened or impending lawsuits. We can do better than that. We must do better than that. I will look forward to hearing from the panel (House Committee on Resources 2002, pp. 1-3).

In contrast to these partisan activists, he and others who opposed the shut-off extolled the Research Council Committee:

> We would also like to thank the National Academy of Sciences for the interim report we have before us today. We appreciate their quick and objective research and insight they have given us on this important matter. Their professionalism and commitment to excellence justifies the confidence that we have in this organization (House Committee on Resources 2002, p. 1).

The Committee's interim report was quickly pushing the Biological Opinions aside. But how did it achieve this? It would be overly simplistic to suggest that the National Research Council Committee's report was supplanting the Biological Opinions simply because the Biological Opinions were *wrong* while the interim report was *right.* Both were competing to be promoted from the status of claim to the status of fact. At the time of its publication, there was considerable controversy about the correctness of the interim report, its evidence, and its interpretations, just as they had been with the Biological Opinions. The interim report's version of nature was not, as many critics of the shut-off tried to present it, self-evident and uncontested. When the interim report was published, it was not known whether it would supplant the Biological Opinions as the operational representation of nature on which policy was being based. Both natures were in a state of flux, and it had yet to be decided which nature was to trump the other. The

nature that was ultimately settled upon did not solidify entirely or even primarily due to internal reasons, i.e., that it was most mimetic of a unitary natural reality. Rather, "explanations for the stability of scientific belief involve, at least in part, elements that are external to the content of science" (Hacking 1999, p. 92).

One of the most important external factors by which the interim report gained its authority over the Biological Opinions was the way it appealed to the idea that unity and agreement, not disunity and debate, characterized "good" science in contrast to "bogus" science.[161] The interim report did indeed *appear* to be unified and undisputed—especially when juxtaposed to the raging debate that had prompted the National Research Council review in the first place. Unlike the scientists working for the Fish and Wildlife Service, the Marine Fisheries Service, the Bureau of Reclamation, the irrigators, environmental groups, and the American Indian tribes along the Klamath River, the Committee projected an image of agreement, unity, simplicity, and certainty. Stephen Hilgartner, in his book *Science on Stage*, has suggested that this performance of unity amid discord is a central device used in establishing the authority of National Research Council committees. Such committees have specific practices by which they present a unified face. Following Erving Goffman's *The Presentation of the Self in Everyday Life* (Goffman 1990), Hilgartner has employed the metaphor of a theater production to explain the National Research Council process. Like a theater, the National Research Council has two parts, a backstage and a front stage. Between the front stage, which is presented to the public in the form of open committee meetings and reports, and the backstage, which is kept secret and includes closed meetings and other communications among the

161 The appeal of unity and straight-forward answers is foundational in many scientific fields and the public understanding of science. Take, for example, Occam's Razor, or the idea that all other things being equal, the simplest explanation is most likely the true. While this principle has guided many scientific models and explanations of the natural world, there is little evidence that nature is simple, and there is considerable evidence that it is not. Far from a natural law, Occam's Razor is instead an aesthetic preference that expresses a wide-spread desire for simple explanations for complex situations (see, e.g., Oreskes, Shrader-Frechette, and Belitz 1994).

committee member, is a thick curtain that obscures the public's view of the inner workings of National Research Council committees. The National Research Council, therefore, literally puts on a performance with its meetings and advisory reports. This performance insures that any internal disagreements within committees are not visible to the public (Hilgartner 2000, ch. 1).

In public meetings, committees allow disagreeing sides to argue with each other, while the committee itself does not take a particular stand. As a result, the uncertainty and disagreement that characterizes the situation is highlighted and put on display for all to see. Only in private meetings do committees discuss among itself the merits of particular viewpoints, and only in these meetings do committee members express individual opinions. The discussion and disagreement of a committee, in other words, is kept to the back stage of the National Research Council process, while in the front stage, the committee presents itself as an impartial judge simply witnessing the disagreements of others.

Yet another powerful image of unity is the fact that National Research Council committees containing a variety of experts are able to publish a single statement. Reports and communications are officially authored by the committee as a unit, and never by individuals. Individual authorship, even of particular sections in a report, is never acknowledged. The unanimity of a committee's report stands in stark contrast to the disagreement consuming others. In the Klamath conflict, it was clear that the Fish and Wildlife Service, the Marine Fisheries Service, and the Bureau of Reclamation had internal conflicts, often with the Washington, DC, offices that were trying to separate themselves from the work performed by field offices. In stark contrast, the front stage performance of the Committee appeared incredibly unified, and without internal dissent, thus further strengthening its singularity, and therefore authority.

In sum, the National Research Council process obscures any and all debate and disagreement among committee members themselves. At the same time, the same process highlights the disagreement and debate among all others experts. This portrayal

of unanimity is then placed in direct comparison to the lack of unity among other scientists and helps the National Research Council construct the idea that it has produced a single, uncontested, and self-evident truth from the discord.

To maintain this, confidentiality is key. By keeping the committee proceedings confidential, the National Research Council is able to keep disagreement between individual committee members from public view. As a result, one strategy to chip away at the disembodied and singular authority of the Committee's interim report on the Klamath Basin was to attempt to reembody the individual committee *members*, to emphasize that they were individual people with limited points of view facing a complex situation with a myriad of pressures. Doing so was an attempt to disrupt the authority of the *Committee* by focusing on the fact that the committee was internally divided. Representative Nick Rashall:

> I do not envy the National Academy for the task it was presented with. In a two month period, in the midst of their daily responsibilities, the NAS [National Academy of Science] Committee *members* had to review more than 10 years of data and a very complex ecosystem. Then, without being able to review all the evidence, they were forced to issue a preliminarily report that was less than favorable to the decisions chosen by the Federal agencies with protecting our endangered species (House Committee on Resources 2002, p. 4, emphasis added)

Rashall paints a picture of overworked and over-stressed individuals operating in a political pressure-cooker. Later, this critique was expanded with the suggestion that:

> The uncritical high regard for the National Research Council [National Research Council] Interim Report is surprising to us, especially given the speed with which it was prepared. The volunteer NRC committee was formed on 22 October 2001, conducted its first meeting on 6 November 2001, released a draft on 14 December 2001 for peer review by 31 December 2001, and released a public document on 6 February 2002. One problem is that the BiOps [Biological Opinions] are huge, ponderous documents that reference dozens of agency reports and other grey literature. Almost five months after the committee formed, its Chair repeatedly made reference in a public forum to the problems of shortnose and longnose suckers (*Catostomus catostomus*) in Klamath Basin (Medford, OR, 7 March 2002, personal observation), humorous testimony

> to one of the many problems in getting "up to speed." More seriously, the NRC Interim Report has numerous shortcomings, suggesting the committee had insufficient time to adequately assimilate available information (Cooperman and Markle 2003, p. 11).

Here, Cooperman and Markle, two academic scientists, suggest time and experience were necessary components of the ability to understand the ecology of the Klamath Basin. Experience was two-fold. First, the Klamath Basin's ecology was complex enough that familiarity and experience with it took time to develop. Second, they suggested that the landscape of *research* into that ecology was complex enough that one also required long experience with the logistics of research in order to make authoritative statements. Without this two-fold experience, individual committee members would have been overwhelmed, unable to clearly review the situation.[162]

At the March 13, 2002 hearing, Representative Tom Udall also attempted to uncover dissent. Just as the critics of the Biological Opinions had originally attempted to undermine the Biological Opinions credibility by claiming that they were not peer-reviewed,[163] as well as claiming that they had been authored in a closed process, those at the hearing who supported the shut-off used peer review and openness as a wedge. Udall asked if the comments of those who had reviewed the report had been released. Lewis answered no. "Is it fair to say," Udall responded,

> in the peer review process that there are probably scientific comments from scientists that disagreed with the conclusions you have come to? . . .

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162 In an unusually personal response, Lewis wrote: "Cooperman and Markle illustrate their doubts about the competence of the committee to evaluate data on listed fishes by referencing a verbal error made by [me,] the NRC committee chair. The chair does not recall referencing the longnose sucker in place of the Lost River sucker in an oral presentation, but admits to a certain fallibility of this type. The chair even admits to having sometimes mixed up the names of his two retrievers at the end of a long day, but also notes that he is aware of the distinct identities of these creatures" (William M. Lewis 2003, pp. 20-21).

163 Although, as mentioned, this claim is not entirely accurate, since the report was sent out for review both by direct "peers" of the Fish and Wildlife Service scientists and "peers" more generally—fisheries scientists in academic, public, and private employ.

> UDALL: But when you are dealing with a public process, would it not be fair to tell what the bias is of that third party so that the public can know that?
>
> LEWIS: Well, you are getting into the traditions and conventions of the National Academy of Sciences and National Research Council. The reviewers' comments, I understand from a note a staff member passed me here, are not made public because that might inhibit reviewers from giving candid or unpopular comments, and some of them are quite candid (House Committee on Resources 2002, p. 46).

The policies of confidential review, said Lewis, were part of the "traditions and conventions of the National Academy of Sciences and the National Research Council" (House Committee on Resources 2002, p. 46). These traditions, however, were actually the product of a relatively recent struggle between the National Academy of Sciences, Congress, and the public over the organization's policy of confidentiality, given its position as an expert advisory institution. As a non-governmental organization, the National Research Council is not subject to the Freedom of Information Act, which allows access to government information. Instead, National Research Council committees are advisory committees to the federal government. The transparency of such advisory committees is governed by the Federal Advisory Committee Act (FACA), which requires that groups established by federal agencies for the purpose of providing advice must maintain a certain level of openness.

In 1997, the National Academies fought for and won exemption from the majority of Federal Advisory Committee Act (FACA) regulations. The National Academies claimed that confidentiality was necessary to ensure objectivity and independence (which, interestingly, was precisely the opposite of the Act's motivating assumption, that openness assures objectivity and independence). Bruce Alberts, then the president of the National Academy of Sciences noted:

> We are gratified that the President today signed legislation that exempts the National Academy of Sciences from procedures of the Federal Advisory Committee Act of 1972 which would have placed our work under government control and made it subject to political and special-

> interest pressures. We recognize the importance of keeping the nation informed about our studies and satisfying the openness and public disclosure requirements of the Act. I want to assure the President, Congress, and the public that we will take all steps necessary to comply with the law and to provide substantial public access. Methods to achieve this are now being designed and tested. We are confident that we can accommodate the new provisions without jeopardizing our crucial role as independent adviser to the government, and we believe that the increased transparency of our processes will benefit both the Academy and the nation" (Alberts 1997).[164]

In winning an exemption from FACA, the National Research Council was able to substantially sequester from public view internal communications that might reveal cracks in a committee's unanimity, and thus present opportunities for critics to question a committee's authority.[165]

The ritual of peer review, then, was "simply part of the process of construction" of authoritative scientific claims (Jasanoff 1990, p. 62). Because the reviews themselves were unavailable, there was no way of knowing whether or not they had been generally

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164 Although exempt from FACA's general provisions, the National Research Council is required to do several things in the interests of openness under section 15 of FACA. These include the obligation to "Make public the names and biographies of reviewer who critique Academy reports[;] Provide public notice of committee meetings open to the public[;] Make available its final report at a reasonable cost, unless it would disclose matters described in section 552(b) of the U.S. code, in which case the Academy will make available an abbreviated version of the report that does not disclose such matters[;] Make brief summaries of closed meetings available to the public" (Shewey and Applegate 1998).

However, as a researcher, I found that the summaries offered for closed meetings were less than useful in understanding what transpired in them, and they certainly did not seem in the spirit of the above requirement. For example: "The following topics were discussed in the closed sessions: The Committee met in closed session on August 27-29, 2002. The Committee discussed the draft final report" (Current Projects system entry for August 2002 closed meeting in Boulder CO).

165 This exemption from FACA makes the job of researching the activities of Research Council Committees very difficult. Records produced by the committees are essentially unavailable to the public or to researchers. Only documents produced by third parties and sent to the committee are available.

positive, generally negative, or whether or not they had been incorporated into the committee's final product at all. However, given the published list of reviewers, which included a reviewer from many of the major interested parties in the dispute, it is likely that the reviews reflected the disagreements that have dominated the conflict. Evidence for this is suggested by the fact that the Committee's interim report was highly, but unsuccessfully, contested outside confidential peer review. At the hearing, Walden asked Lewis if any of the comments they had heard at public meetings might cause him or others on the Committee to rethink some of the conclusions they had made in the interim report.

> WALDEN: All right. Have you heard anything yet from people who testified before the Committee out in Medford and elsewhere that would cause you to have serious questions about your initial findings?
>
> LEWIS: No. The Committee stands behind its report, notwithstanding the fact that a number of people, some with good qualifications, would have us rewrite parts of it. We stand behind it anyway (House Committee on Resources 2002).

Walden and Lewis were referring to a public meeting in Medford, Oregon on March 7, 2002. Lewis' brief dismissal of the meeting stands in stark contrast to accounts given by scientists in the Klamath Basin who had attended it. In several interviews, people spoke unprompted and strongly about it. At the meeting, researchers whose data was cited by the Committee pointed out several factual errors in the representations of that data in the Committee's report. These included the central use of preliminary data (that had been specifically labeled as preliminary and not suitable for analysis), as well as data that had been retracted and replaced with revised data by the United States Geological Survey. In this case, the Committee's interpretation was not being questioned, but rather the fact that it had used data that was known to be incorrect by researchers. At one point, the meeting became incredibly heated. A National Research Council staff member (not a committee member but rather an employee of the National Research Council) stood and said, "we're the National Research council, we don't make

mistakes." The Klamath Falls *Herald and News* also reported on a similar comment made by this staff member to a reporter: "'We've never got a conclusion wrong, and never released what we knew was wrong.'" (Burke 2002). The meeting is spoken of as an example of the egotism of the National Research Council Committee. For many Upper Basin scientists, who had spent numerous years of working on projects related to the suckers, the Committee represented outsiders who had swooped in and not properly consulted with the experts on the ground.

The authority of the Committee's interim report, however, stood, and its publication marked a crucial turning point in the conflict. The Department of the Interior accepted the Committee's interim report as more authoritative than the Biological Opinions, and Norton ordered the floodgates reopened. Meanwhile, scientists at the Fish and Wildlife Service and Marine Fisheries Service returned to the drawing board under the cloud of alleged misconduct and fraud. The interim report also signaled a shift in the operational scientific truth-claim—the claim on which policy action was based—from the Biological Opinions to the interim report. In this transition, the operational scientific truth-claim went from supporting a shut-off to suggesting it was not a legitimate policy, under the ESA. And with this shift, the operational truth-claim in the conflict went from being decried by irrigators and supported by environmentalists to the exact opposite. Suddenly, each side found themselves in a very different position relative to the central scientific assertions in the conflict.

Chapter Eight

Useful Uncertainties

The hearing on March 13, 2002 made explicit a question that had been underlying the conflict since it first began to focus on the scientific claims of the Biological Opinions: how does one explain the expert disagreement that characterized the conflict? In this chapter, I discuss some of the popular narratives for explaining expert disagreement, and suggest other possible causes, primarily the inherent uncertainty of knowledge about complex and open environmental systems.

Many understood the vastly different expert claims in the conflict—between the National Research Council Committee and the Biological Opinions, as well as between supporters of the shut-off and its critics—as evidence of a direct relationship between the political allegiances of an expert and that expert's interpretation and presentation of scientific results. An expert's opinion could be predicted by the box he or she checked on a voter registration card or, perhaps more directly, by who funded the expert's study.

This "partisan" or "junk science" narrative is a popular explanation for expert disagreement in general. David Faigman, one of the chief proponents of this school of thought, who has written extensively on the matter, has argued that expert disagreement can be understood as a clash between "real" science produced by unbiased experts and "partisan" or "junk" science produced by economically or politically biased experts (Faigman 2000). For Faigman and others (Huber 1993; Foster and Huber 1997), real science has certain characteristics. First, as defined by Robert Merton, science is governed by norms of universalism, communism, disinterestedness, and organized skepticism (Merton 1973). Second, all science follows a definable method of

falsification and organized verification (through, for example, peer review), as outlined by Karl Popper (Popper 1959). According to Faigman, disagreement occurs when good science, produced in accordance to these norms and methods, is confronted by junk science, which is the product of partisan actors whose goal it is to obfuscate anything that seems unfavorable to their particular cause. This explanation enjoys a considerable amount of popular and official recognition, and is often used to help explain the occurrence of expert disagreement between expert witnesses in the court (see, e.g., Huber 1993), as well as disagreement in the policy sphere, for example over climate change (see, e.g., Gillis 2010).

The narrative was clearly present in the Klamath conflict. For instance, the Klamath Water Users Association wrote that "federal agencies have collaborated with activists." The Association attacked one of the creators of a computer model that undergirded the Marine Fishery Service's claim:

> We have since learned that Dr. Hardy was under contract to the Department of Justice, apparently including [sic] as an expert witness for the BIA [Bureau of Indian Affairs] in the Klamath River Adjudication. It appears the work was directed to a great degree by the branch of the Solicitor's Office representing the BIA, and thus advocating the positions of the tribes.[166]

The Klamath Water Users Association, in essence, suggested that Hardy had literally encoded an American Indian bias into his models, and that this bias was clear given who had funded his work. The fact that he had been funded by a particular organization, in this case the Bureau of Indian Affairs, suggested the Association, meant that his conclusions would necessarily support that organization's position.

Some reports submitted to the Committee were indeed stand-up examples of "science in the private interest" (Krimsky 2003).[167] Even those who portray expertise as a completely socially defined phenomenon must acknowledge, as Myanna Lahsen has

166 Klamath Water Users Association, "Issue Brief: Klamath River Flow Studies," February 2, 2001 (NAS, DN 68), pp. 1, 3.

167 There is no evidence that the Committee gave such reports credence.

argued, that certain studies are more reliable and professionally produced than others (Lahsen 2005). In reports such as these, a distinct political agenda could easily be seen. A report filed with the Committee by the Resource Conservancy, Inc. (whose name—not incidentally—closely resembled the Nature Conservancy, one of the largest conservation land trusts in the world) serves as an example for the genre.[168] The report argued that increases in agricultural activities had actually encouraged the expansion of sucker populations; it claimed, moreover, that "the dramatic decline in agricultural activity above the lake has mirrored the asserted decline in Sucker populations." If suckers were dying, according to the report, it was because agriculture was declining. Profligate and wasteful fishing practices by the Klamath Indians on their reservation, as well as their construction (between 1880-1920) of dams without fish ladders or screens, were actually the cause of the suckers' endangerment.[169] The report made no apparent attempt to hide the fact that it was designed for the sole purpose of shifting all the blame to the Klamath Tribes.

However, while evidence for a link between politics and expert opinions was clear in some cases, in other cases, the association between science, politics, and funding was not so clear-cut. Here, the political explanation for the expert disagreement becomes more tenuous for two reasons. First, the validity of the political explanation rested in a large part on the popular myth conflating ecology and environmentalism—that any scientist who studies the environment is necessarily biased towards the political project of environmentalism. While the science of ecology and the environmental movement rose

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168 Such a misleading name is a common strategy for organizations attempting to gain access to expert disputes (Lahsen 2005). Edward Bartell, "History of Lands above Klamath Lake Prepared for the May 15, 2002 Klamath Basin Meeting and Field Trip," May 15, 2002 (NAS, DN 678).

169 The Chiloquin Dam, built in 1920 by the Bureau of Indian Affairs, was indeed widely identified as an impediment to the annual spawning run of the sucker. In this assertion, the Resource Conservancy was correct. It is important to note, however, that most other organizations, including the Klamath Tribes, both knew this to be the case, and were advocating for the dam's removal. In fact, in 2009, the dam was removed.

to prominence during the same historical period, and while the environmental movement has adopted ecology as its primary metaphor for the natural world, the history of ecology as a science seems to suggest a more complex and autonomous relationship (Worster 1994; Bocking 1997). In fact, ecologist have at times purposefully distanced themselves from environmental politics in efforts establish an independent disciplinary and institutional identity.

Second and perhaps most importantly, political explanations of expert disagreement seemed to discount the possibility that scientific experts could legitimately have multiple interpretations of data, that data itself could be contradictory, and that there are rarely simple explanations for ecological dynamics. The belief that expert disagreement could not legitimately occur relied heavily on the presumption of a singular scientific truth being both extant and accessible through well-defined and agreed upon methods. It further imagined a stasis and simplicity in the system under consideration. Under these assumptions, those experts who did not speak to this singular, static truth were obviously obfuscating it. This positivist notion of science shut down the possibility that different people might legitimately perceive and interpret the world in different ways, for the simple reason that the world is rather complex and that one's view of it is necessarily partial.

Lack of unity among the experts is not necessarily a result of fraud. Despite the popularity of Mertonian and Popperian harmonies, the processes by which competing claims solidify into singular facts is a far more messy and varied one (Latour 1987; Oreskes 1999). Disunity among scientists is a rather characteristic feature of scientific inquiry. As two fisheries biologists in the conflict attempted to point out:

> The 2001 Biological Opinion and the Interim Report illustrate the lack of consensus typical of scientists in the early stages of exploring a complex system (Cooperman and Markle 2003, p. 10).

What Cooperman and Markle were pointing to is a process by which debates are "black boxed" into facts, the process of science-in-action as opposed to science-in-the-text-book

(Latour 1987). Before a claim becomes a fact, it is often intensely and hotly debated, and it is usually one among many other claims competing for the status of fact. In addition, the ratification of one claim as a fact above other claims has everything to do with the social wrangling of supporters into a network of allies, and the simultaneous shedding of dissenters. These social processes, however, are obscured when facts are presented to the public in text books or papers, much like the National Research Council Committee attempted to obscure the dissent behind its claims. Facts are not things that stand uncontested because they are true, but instead are true because people no longer choose to, or can, contest them.

All claims that have achieved factual status contain in their past intense disagreement. When scientists and their debates encounter the world of policy making—the courts, advisory panels, administrative agencies, and the legislature—they becomes embedded in an adversarial decision-making process.[170] Incredibly normal, but to the public eye often invisible, scientific disagreement is forced into the public spotlight and made visible. "If scientific claims are constructed, then it follows that they can equally be *deconstructed*, thereby losing their factual status through re-identification of their social origin" (Jasanoff 1990, p. 13).

COMPLEXITY BREEDS UNCERTAINTY

In addition to stemming from the normality of disagreement in scientific professions, expert disagreement in the conflict arose from other, non-political sources, as well. These sources centered around the practical constraints of producing knowledge about complex natural systems, such as Upper Klamath Lake and the Upper Klamath Basin. Several aspects of the practice of ecological science, as well as its object of study—the natural world—make the production of certain and universal claims difficult and problematic. Most participants in the conflict did not explicitly identify these sources of uncertainty.

170 Inquisitorial systems seem to have different dynamics but may still embody many similar tensions (Bal 2005).

Generally, participants in the conflict attempted to make their claims seem as certain as possible. However, I argue that these unavoidable uncertainties increased the likelihood of expert disagreement.

In the Shadow of the Laboratory

The idea that there exists a singular "real" science emerged as a common theme in discussions about expert disagreement during the conflict. The imagined uniformity of scientific cultures and practices led many critics of the Biological Opinions to apply their understandings of laboratory sciences to the practice of ecological field sciences. Critics labeled practices that did not meet these idealized metrics as "junk" or "unsound," as opposed to acknowledging that scientific practices are diverse across different fields of research. For instance, the Klamath Water Users Association wrote to the National Research Council as the membership of the Committee was being decided upon. They requested the inclusion of an expert of "hypothesis testing and experimental design."[171] This request revealed an underlying perception that there is a single unified scientific practice, characterized by idealizations of the laboratory experimentation, and that the scientific claims in the Biological Opinion did not meet this metric. Such a specific expert was not appointed to the Committee. In addition, such an expert, as described by the Association, would not have been much help anyway. The sciences that contributed to the Biological Opinion were, by and large, not experimental; instead, they were observational. In this request, the Association revealed both a misunderstanding of the kind of claims made in the Biological Opinion, as well as their underlying understanding of what constituted "real" science.

In general, field sciences do not mesh easily with images of scientific practice based on classical laboratory sciences, such as physics or chemistry. The ability of laboratory scientists to control conditions, isolate variables through experimentation, and repeat experiments are popular hallmarks of scientific inquiry. Similarly, the predictive

171 James L. Moore to Keys, August 23, 2001 (NAS, DN 109).

intent of many laboratory sciences contrasted to the descriptive, explanatory nature of ecological sciences in the Klamath Basin. However, we would be

> wrong to use prediction as a *criterion for*, rather than a *goal of*, ecological theorizing. Not all sciences are equally predictive . . . yet it is not obvious that they are nonscientific by virtue of being so. . . . many geological phenomena—such as whether a given rock formation will be intact in 100,000 years—are not susceptible to precise, long-term prediction. We conclude from this predictive imprecision neither that geology is unscientific nor that we should reject the goal of precise geological prediction, but rather than geology probably deals with long-term phenomena that are less deterministic than those in other sciences. In overemphasizing the importance of prediction in ecology and science generally, [one] errs in underemphasizing the role of explanation (Shrader-Frechette 1995, pp. 623-624).

Still, however, for many, such characteristics have become prerequisites for defining what does or does not constitute "Science." It is important to note that laboratory scientific practices themselves do not match well with popular imaginaries of them. As Shapin and Schaffer have shown, rhetorical portrayals of laboratory often obscure the labor necessary to control conditions in the laboratory and to achieve results. Their doing so is an attempt to make the controlled environment of the laboratory look natural, rather than the reality —that controlling conditions is a continual uphill battle that is never really won (Shapin and Schaffer 1989).[172]

Nevertheless, these perceptions about non-laboratory sciences are widely shared, and the field sciences, such as those that are practiced in the Upper Klamath Basin and that figured so heavily in the Biological Opinions have often been viewed as less authoritative than laboratory sciences (Kohler 2002). The epistemic hierarchy of laboratory sciences over field sciences is not a new phenomenon. According to Robert Kohler, "Since the mid-nineteenth century, field biologists have lived in a world where lab disciplines have the greater credibility and authority, and they still do" (Kohler 2002, p. 307). The move towards the laboratory began in the mid-nineteenth century in the

172 Similarly, the idea that experiments are repeatable is also idealized (Hacking 1999).

United States, motivated by

> the desire for greater standardization, the hope that new instruments would lead to new insights and new potential for power and control, and the reductionist impulse to trade generality for specificity and comprehensiveness for precision—all these were implicated in the changes that occurred in biology in the early twentieth century . . .

specifically the move from field to laboratory (Oreskes 1999, p. 300). Not all scientific disciplines saw field methodologies as being lesser, however. In American geology, these field-oriented methodologies were in fact seen as a symbol of strength and authority. They were seen by their practitioners as democratic, in that they were far more open to participation than laboratories were, and grounded in the pragmatic traditions of inductive reasoning, rather than grand theorizing (Oreskes 1999). Nevertheless, many scientists in traditionally field-based disciplines hoped to "emulate physicists and chemists, and thereby, they hoped, to share in their successes" (p. 302). However, despite the allure of increased credibility, not all questions are answerable in a laboratory, driving home the point that field science can never be replaced by laboratory inquiry in certain cases. After all, the question of whether a particular species of fish spawn at site A or B is answerable only by observing those fish at sites A and B. This question cannot be answered in a laboratory.[173] And it is questions such as these—questions about particular attributes of particular places in nature—that are the most relevant to environmental management. Nevertheless, imaginaries of laboratory scientists ability to control conditions, conduct experiments, and replicate studies—however idealized they were—dominated perceptions of "Science" in the controversy over the Biological Opinions. Where commentators erred was in their suggestions that these differences impeached the authority of ecological claims.

Ecological researchers operate in situations that highlight uncertainty and complexity. For the most part, for example, it is impossible for the ecological researcher

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173 And, since spring A and B cannot be duplicated, it cannot be answered experimentally.

in the field to control the conditions under which samples are taken or observations are made. Field data is gathered under ever-changing and uncontrollable circumstances. Variations in wind, humidity, and temperature, to name just a few factors, are uncontrollable. As a result, numerous uncontrollable variables can disguise causal relationships between variables and the object of study, or produce the appearance of causal relationships that are not actually there. There are ways to account for this variability; one example would be to measure as many other environmental conditions as possible, such that their impact on the sample can be better determined. However, it is impossible for the researcher to know or measure every possible influencing variable, simply because every single aspect of the environment *could* have a potential impact.

The difficulty of controlling conditions under which observations are made is closely related to another difference between ecological field sciences and laboratory sciences: the impossibility, or at the very least difficulty, of running an experiment. Ecological field sciences, at least of the sort at issue in the Biological Opinions, are primarily observational. In principle, an experiment allows for the isolation of variables to test the existence of relationships, but this is something that for a field scientist can be difficult, if not impossible, to do. As one supporter of the Fish and Wildlife Service policy on the suckers noted:

> It is also important to understand that natural resource science in general, and Upper Klamath Lake biological science in particular, are not based on "common garden experiments," in which one variable, such as fertilizer, is applied at different rates to several identical plots, and a response is measured. This type of controlled experiment is not possible in Upper Klamath Lake because there is only one lake. Instead, each year of observation gives one sample with a "response" (for example, whether or not there was a fish kill) and many possible "predictors" (for example, air temperature in August or lake elevation in June) (Braunworth, Welch, and Hathaway 2002, p. 94).

Variables cannot necessarily be experimentally disentangled because it is impossible to create two experimental systems across which researchers can adjust variables. Instead of experimentally testing relationships, ecological field scientists rely on large time-series

data-sets of numerous environmental conditions and the use of statistical techniques to detect underlying relationships in that data.

Finally one of the hallmarks of laboratory practice in the popular imagination is the ability to replicate studies to confirm results. However, repeatability of observational field studies is difficult if not logically impossible. Even in a seemingly simple situation, such as taking two samples of lake water, one immediately following the other, in an effort to get redundant samples, the two samples are not actually redundancies or reproductions of each other. And at any point in time, the object of study is unique because it is dynamic and changing in ways beyond a researcher's control or ability to know. As a result, the exact condition of the first sample can never be recreated. Two measurements will always be distinct in time and space from each other. For example, one sample taken three minutes following another at the same point in space will necessarily sample the lake at 1:07 and not 1:04, and will therefore be sampling a changed lake. Rather than a replication or duplication, the two samples instead create a times-series data set of two unique measurements. Two measurements taken simultaneously will necessarily be spatially distinct, since no two instruments can be in the same place at the same time. The instruments, strictly speaking, are measuring two distinct and different places in the lake. The standard practice in water quality monitoring of splitting a single sample taken from from a water body into two samples to be analyzed separately in the laboratory provides a chance to reproduce and check the laboratory practices used to analyze the sample. However, the practice does not reproduce the sample itself, rather the analysis of it. Additionally, field scientists cannot replicate entire studies, since these studies often consist of time-series observations, and one cannot return to the time the observations were made. Even a researcher returning to the exact spot where a measurement was taken at the same day a year later would not be replicating the observation but rather adding another data point to the time-series. While the location may be the same, the original measurement and the context it was taken in were unique.

In general, field scientists must contend with a pervasive constraint, namely the uniqueness of the sample in the ecological sciences.

> Every event is unique in some respects, and repetition of unique events is in principle impossible. Although [attempting to replicate] initial conditions might be able to capture some of the uniqueness of an event, ecologists often do not have the historical information either to specify the relevant initial conditions or to know *what counts as* the unique event (Shrader-Frechette and McCoy 1994, p. 229).

Far from being an issue with which only the field sciences must contend, however, the logical problem of uniqueness also exists in laboratory sciences. The issue is simply more visible in the field, while the laboratory itself is in fact an elaborate instrument designed to minimize uniqueness by maintaining conditions as constantly as possible. However, an experiment initially conducted in laboratory A can never be completely replicated in laboratory B simply because laboratory B is not laboratory A. Experiments are not self-contained units that exists separately from the instruments, including the laboratory, with which they were initially conducted (Hacking 1999); the laboratory itself is an instrument relevant to the experimental outcome. Similarly, two experiments conducted in laboratory A one month apart are not replicates because time-dependent factors will have changed. Even if all known factors are held constant, this only means that known factors are held constant. There is an implicit judgement being made about the boundary between relevant and irrelevant independent variables and the effects of these conditions on the experimental outcome.[174]

In sum, some of the critics of the Biological Opinion asserted that field sciences were not methodologically rigorous. This is not the case. Rather, field sciences were being falsely compared to imaginaries of laboratory science. These images of laboratory science, themselves, were not accurate, and overestimated the ability of scientific practices in general to provide unfettered access to the natural world. Observation versus

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174 Again, the presence of judgement does not necessarily impeach claims of objectivity (Shrader-Frechette 1996). Every choice in scientific inquiry, from the choice of method to the choice of instrument involves judgement.

experimentation is not a metric for what "real" science is, nor is the fact that the work was done in a laboratory or in the field. However, these images of classical laboratory sciences hold a powerful grip on the public understanding of science, and they provided a convenient means for critics to suggest that the claims in the Biological Opinion were not certain enough to be a basis for policy-making.

Practical Constraints

Ecological scientists in the field also face a number of constraints imposed by the logic of making generalizations and the realities of conducting research. The ecological sciences practiced in the Upper Klamath Basin are explanatory, local sciences. They are primarily concerned with a single system—that of Upper Klamath Lake watershed and with particular aspects of that system in particular, namely suckers. They do not, on balance, attempt to formulate generalized principles to be applied outside the Basin, or predictive rules for forecasting within the Basin. Instead, they attempt to characterize and explain the dynamics of the system. They attempt, in other words, to produce generalized explanations within a particular context, but not generalized predictions or universal laws.

Research in the Klamath Basin are case-studies of particular times and places in the environment (Shrader-Frechette and McCoy 1994). From these case studies, researchers formulate general characterizations or explanations regarding the functioning of the system as a whole. An example would be the statement: Based on these samples (i.e., specific cases), the population of fish in the lake (i.e., generalizations) has changed in these ways (i.e., generalizations).[175] These broader principles that are produced,

175 The Fish and Wildlife Service Biological Opinion noted the difficulties of estimating population based on samples, and the caution with which these generalities should be treated. "This is because catches are biased by many factors, especially sampling biases, timing and sensitivity to weather and water conditions that may vary spatially and temporally. Also, fish are patchily distributed in space and time, with many individual collections yielding low numbers of fish or none" (U.S. Fish and Wildlife Service 2001b, Section III, Part

therefore, are inextricably linked to the cases from which scientists derived them. This linkage creates logical consequences. If the environment were uniform and constant, this linkage between case study and broader principles would not pose an epistemological issue—the case study, in essence, would *be* the broader principle. However, the environment is variable and non-uniform, meaning that the conditions in one part of the system do not necessarily match conditions elsewhere. Because natural systems are open systems, in which the boundary conditions, relevant components, and relevant linkages between components are not entirely known (discussed below), it is impossible to quantify the non-uniformity of a case study. As a result, data from case studies contains within it an inevitable source of uncertainty when researchers attempt to extrapolate from it: to what extent do the sample's unknowable non-uniformities and uniquenesses make it different from the system as a whole?[176] This question of the representativeness of cases creates a paradox. In order to move from a case study to a more general characterization of the environment, a judgement must be made about the representativeness of the case study or sample. However, while the generalizability of a case study is dependent on its representativeness, representativeness is a quality that is only definable *post hoc* in relation to the generalized situation, which in turn is only known through samples deemed to be representative.

Beyond the difficulties inherent in generalizing from specific cases, ecological field scientists face practical constraint when choosing cases or sampling sites. An

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2, p. 45).

176 Non-uniformity, however, is not always a source of uncertainty. At times, it is exactly what scientists in the Basin are trying to study. For example, the question of "spawning fidelity" is an important one for managing suckers in Upper Klamath Lake (Braunworth, Welch, and Hathaway 2002). Do suckers return to spawn at the same place throughout their life? This is an important question because of its implications for habitat management. If a sucker's spawning ground were rendered unfit for spawning, would the sucker unproblematically go to another spawning area, or would it no longer spawn? In this case, the variability within the population of suckers, and the variability within the environment, is the subject of study, not a source of potential uncertainty.

ecological scientist's ability to select or randomly assign sites for sampling are far from unrestrained. The times and places that one can make observations can often be limited by factors outside the scientist's control. One of the most pervasive constraints is private property rights. If a researcher is trying to sample a river, for example, private property rights can make both random and intentional sampling of that river impossible, since not all points on the river are legally accessible to the researcher.[177] In such a case, the researcher may be limited to sampling from public right of ways, such as roads. Samples, therefore, are located out of necessity at road crossings because of limited access to private land. Another constraint to sampling is simply the scale of the area being studied. It may simply be impossible to get to either the ideal or the random sample site. While scientists in the Basin continually push against such restrictions, it is impossible to select sample sites for purely analytical reasons. Instead, they are selected based on a series of constraints.

An example from my field work serves to illustrate both the difficulties inherent in sampling and the lengths to which researchers go to overcome them.[178] A Klamath Tribes Natural Resource Department employee and I were tasked with placing thermographs, or automated temperature recording devices, in the tributaries of Upper Klamath Lake on and around the tribes' former reservation. These devices were set to record river surface temperatures at regular intervals, and would be retrieved and downloaded later. This data would be used to calibrate an aerial infra-red survey of the tributary system. Because the aircraft conducting the survey could only record *relative*

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177 While a river is technically "waters of the state" under Oregon law and therefore public property, even if it flows through private land, the non-submerged shore itself is private. A landowner cannot technically, therefore, prevent someone from navigating a boat down the river, so long as the shores are not touched, although I observed numerous barriers to doing this during my fieldwork (such as fences across rivers, which are arguably necessary to keep cattle contained). Therefore, obtaining river access on private lands requires a long period of relationship building between researchers and landowners, and even with friendly relationships, expressed permission is always advisable.

178 This study was not part of the Biological Opinions.

surface temperatures on the tributaries, it was necessary to have simultaneous measurements of absolute temperature at known locations. These measurements would allow researchers to assign absolute values to the airborne data. Approximately thirty sites were located along the Sprague River and its forks and tributaries.

The bulk of the project data was gathered, in other words, by aircraft, a method that would seem to leapfrog the sampling constraints discussed above.[179] Nevertheless, this data would be meaningless without associated on-the-ground measurements at numerous and dispersed sites. These sites were selected, in part, under constraints discussed above. Public access was key, and although the tribes asked for and obtained permission from several landowners (both tribal members and not) to place thermographs in the river reaches that crossed their land, most were on public land. Simply being on public property was insufficient, however, since road access to the sites was also essential. The term "road access" ranged greatly in meaning from a direct, paved road crossing, such as a ford or a bridge, to a recreation area parking lot that provided access to the river after a few minutes walk, to improved dirt roads that dead-ended over a mile from the chosen site, to unimproved "roads."[180] In one instance, it took a full day and

179 However, despite the legality of flying an aircraft over private property, the tribes' habitat biologist went to great lengths to announce to property owners that an aircraft would be flying above their properties and to explain the purpose of the aircraft. Many landowners in the area are particularly sensitive to perceived invasions of privacy, especially the possibility that the government might be observing them. Such suspicions are reinforced by stories of "government agents" surveilling bridges late at night, as well as "unmarked" helicopters flying over the region. Interestingly, both these stories turn out to be true to a certain extent. Because suckers move in the river at night, when temperatures are lower, United States Geological Survey scientists tend to conduct some of their research at night. They often do so from bridges because of easier access to the river. The "government agents" seen at night on the bridges were in fact government employed scientists. The "unmarked" helicopter in question was most likely carrying members of the Bush administration, perhaps even President George W. Bush or Karl Rove, who both visited the Upper Basin in 2002.

180 I was continually astonished by what Upper Basin residents considered a usable "road" in the forest. Thanks to the long history of commercial logging on the former reservation, the road network in the forest is extensive. Not all are well

several attempts to reach a portion of the Sprague River and place a single thermograph. The most direct route was blocked by geology: the river was located in a canyon, and therefore accessible only from the less shear side. On our first attempt, private property prevented our reaching the river. The most direct dirt road to the site terminated at a parcel of private property and a "No Trespassing" sign, which prevented our reaching the river via this route. Our next attempt ended when the "road" we were following became untenable, characterized as it was by the presence of large stones. Eventually, we approached the site via an extended driving over unimproved "roads." We then hiked to the site. While the site was eventually reached, the resources expended to do so—labor, time, and fuel costs—were high. This particular site was considered necessary—and this expenditure of resources was seen as justifiable—because it captured the influence of geology and physiography—rocky, shaded canyons—that had a large influence on local water temperature, and were thus necessary to calibrate that portion of the aerial data.

But even if researchers in the Klamath Basin had vastly expanded logistical capabilities, field ecologists ultimately face the difficulties of characterizing open and complex systems. Such open and complex systems are impossible to know completely and representations of them inherently uncertain (Oreskes, Shrader-Frechette, and Belitz 1994). Because the most basic characteristic of an open system is that the system is not bounded or that the bounds are not known, it is impossible to know if all relevant inputs to or influences on the system have been considered. Even if the relevant independent variables in an ecological system were finite (something which cannot be know with certainty), then it is still impossible to know the size of that finite number. Moreover, because researchers cannot say with certainty that they have defined the boundaries of the system, they cannot say for certain that all internal components of the system are known or understood (Shrader-Frechette 1997). Additionally, the open and complex character of the Upper Klamath Lake system, and ecological systems in general, mean that not all

(or at all) maintained. Several times during field work, I assumed a "road" had ended, only to have a vehicle's driver identify two faint, parallel lines of slightly shorter than average sage or grass as the continuation of the "road."

linkages between components are known. As ecologists have moved away portrayals of nature as progressing towards a "climax" condition, and have instead adopted understandings of ecological interactions that are non-linear and chaotic (Barbour 1996), the difficulties of characterizing the interactions of system components has become even more pronounced. Because the interaction of components is not solely binary but instead multivariate, the problem is compounded.

These characteristics of open systems always create the possibility that characterizations, however elaborate, are incomplete. More importantly, suggestions that characterizations are complete, or that they are certain, are easily impeached by pointing to unavoidable uncertainties created by the open nature of the system. These sources of uncertainty were often identified by critics of the Biological Opinion as reasons why the report was not "good" science. However, these critics' claims were made based on unjustified comparisons between imaginaries of laboratory sciences, misunderstandings of the kind of claims ecological field scientists make, and the constraints they operate under when making these claims. Additionally, they were made against an idealized notion about laboratory practice. However, ecological field sciences are concerned with open and complex systems that are, by their very nature, impossible to describe with certainty. The inherent uncertainty of these systems opened up an opportunity to contest these claims.

COMMUNICATING AND MANAGING COMPLEXITY

The task of communicating this complexity introduced another source of expert disagreement in the conflict. The Biological Opinions attempted to outline these complex and uncertain relationships in great detail.[181] As a result the document was

181 Biological Opinions are not intended to be original research, but rather reviews of existing research., although this risks understating the difficulty of creating a meaningful synthetic narrative out of disconnected reports and publications. While a Biological Opinion can order more research as part of the action agency's responsibilities under the Biological Opinion, or while the Fish and Wildlife Service or Marine Fisheries Service can initiate their own projects, authors of

incredibly difficult to understand, even for those technically versed in the field, and often contained gaps between evidence and conclusion that required tacit knowledge about the Upper Klamath Basin's research landscape, as several reviewers noted.[182]

The Fish and Wildlife Service response to the complexity of the situation in front of them seems to have been similar to the tendency of numeric model builders described by Naomi Oreskes *et al.* (Oreskes, Shrader-Frechette, and Belitz 1994). In an effort to better capture a complex system, model builders often include ever more variables and functions in the model. Similarly, the Fish and Wildlife Service seemed to have responded to the complexity of the situation it had to synthesize and communicate by including ever more variables and relationships in its narrative representation. As this occurred, each new piece of data or environmental linkage introduced yet another source of potential error or uncertainty. Thus, in an effort to create a more accurate representation of the environment, an increasing degree of uncertainty was also introduced into that representation. Each time, in the interests of completeness, the authors of the Biological Opinion introduced another environmental interaction or variable related to sucker ecology, they inadvertently opened up an opportunity for critics to point out mistakes, uncertainties, or unknowns. In an effort to highlight the extensive amount that was known about sucker ecology, the Biological Opinion also succeeded in highlighting how much was not known, uncertain, or contradictory.

In addition to characterizing the complexity of the Upper Klamath Basin, the Fish and Wildlife Service was ultimately responsible for outlining a management solution for it. Given the multitude of interrelated factors involved in the welfare of the suckers, a solution for dealing comprehensively with all of them would be exceedingly difficult to formulate, let alone put into action. In the Biological Opinion, in fact, the Fish and

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Biological Opinions are left with sorting out contradictions and gaps within existing literature given time constraints.

182 "Draft Comments on FWS on the Draft BO," March 23, 2001, "Administrative Record," (DAP, Doc. #C-16); "Comments on BO (Transmits comments following review of sections of early draft Biological Opinion)," March 20, 2001, "Administrative Record," (DAP, Doc. #F-78).

Wildlife Service acknowledged this fact. For example, the Biological Opinion stated clearly that fish die-offs were historically unrelated to lake level (U.S. Fish and Wildlife Service 2001, Section III, Part 2, p. 70). In essence, the Biological Opinion acknowledged the main critique of the National Research Council Committee, before that critique had even been made. The Biological Opinion offered an explanation:

> Based on the currently available data, it appears that no obvious correlation exists between UKL elevations and fish die-off events. This is not unexpected since many complex factors, for example, size and timing of bloom initiation and duration, weather conditions (especially wind and temperature), presence of disease organisms of differing virulence, exposure to stress, and other factors, are involved in the complex series of events leading to and causing the die-offs. Low lake levels per se do not cause fish kills; they can however, contribute to conditions that cause fish kills (U.S. Fish and Wildlife Service 2001b, Section III, Part 2, p. 71).

The Biological Opinion proceeded to note that the factor that seemed most related to fish die-offs was the weather. Die-offs tended to occur during periods with both high temperatures and low winds (U.S. Fish and Wildlife Service 2001b, Section III, Part 2, pp. 70-71). The reason for this seemed to be that in a shallow lake system like Upper Klamath Lake, water could quickly heat to levels unhealthy for the sucker, while the wind could effectively mix areas of bad water quality with areas of better, thus reducing the impact of localized declines in water quality. If the wind were not blowing, and the temperature were high, water quality problems would not be dispersed. However, the Fish and Wildlife Service then stated the obvious problem for a management agency: weather management was not an option. It must instead focus on factors that could be managed. "The dominant factors controlling water quality in UKL [Upper Klamath Lake] are weather and climate which are not controllable, whereas lake levels can be managed" (U.S. Fish and Wildlife Service 2001b, Section III, Part 2, p. 87). The Fish and Wildlife Service's underlying assumption was that, given than weather could not be managed while water level could be, it was better to have more water in the system than less in order to provide the greatest possible buffer against the effects of unmanageable

hazards.

The Fish and Wildlife Service then focused on the Klamath Project as the source of this water. During the shut-off, only Project were forced to stop using water; other irrigators who were not associated with the Project continued to divert water. This produced substantial tensions in the agricultural community in the Upper Klamath Basin. The Fish and Wildlife Service focused on the Bureau of Reclamation for a number of reasons. First, the Fish and Wildlife Service was consulting on a specific project proposal by the Bureau of Reclamation—the continued operation of the Klamath Project. In general, the consultation process is focused on one proposed project and its impacts on endangered and threatened species. The consultation process is not designed to formulate general plans for the recovery of listed species. It's focus, therefore, on the Bureau of Reclamation was a due to the scope of the consultation process. Second, the Fish and Wildlife Service had legal justification for choosing to focus on the United States Bureau of Reclamation as the primary water manager in the Upper Klamath Basin.[183] Third, the Fish and Wildlife Service may have also focused on the Bureau of Reclamation in part out of management expediency. The Bureau of Reclamation drew water from a single point on the Upper Klamath Lake, while other irrigators not associated with the Klamath Project drew water from hundreds of points, not only directly on the lake but also from its tributaries. Shutting off these hundreds of pumps would have been nearly impossible, and would have met with substantial resistance, likely on a scale far greater than was experienced in the months following April 2001. By focusing on the Bureau of Reclamation, the Fish and Wildlife Service was able to deal with a single federal agency through a well-defined inter-agency process, in contrast to a situation in which it would

183 "Briefing Document: Klamath River, Klamath Project Operations, and Klamath Area Refuges," March 1, 2001, "Administrative Record," (DAP, Doc. #G-5). Regional United States solicitors had issued memos stating that the primary water management obligation of the Bureau of Reclamation and the Klamath Project was *not to deliver* irrigation water to project farmers, but instead to "meet requirements of the Endangered Species Act." As discussed, the Fish and Wildlife Service clearly did not believe that the Bureau of Reclamation was doing this.

have had to deal with numerous private landowners directly.

Additionally, the Bureau of Reclamation had failed to implement the measures required of it in the 1992 Biological Opinion, primarily the installation of a fish screen designed to reduce the number of suckers entrained in the main water intake for the Project on Upper Klamath Lake. In the 2001 Biological Opinion, the Fish and Wildlife Service wrote:

> The fact that adequate screening has not been provided anywhere within the Klamath Project after nearly a century of operation is considered by the Service to be a major factor imperiling and retarding the recovery of the two endangered suckers (U.S. Fish and Wildlife Service 2001b, Section III, Part 2, p. 126).

A heavy focus on the Project may have seemed reasonable given the fact that the Bureau of Reclamation had failed to comply with the requirements of previous Biological Opinions.

In essence, water level was the simplest component of a complex ecological system, and the Bureau of Reclamation Project was the simplest component of a complex social system. In the process of coming up with a management solution for a problem that had numerous aspects that in fact could not be managed, the Fish and Wildlife Service chose to focus on two components relevant to, but not wholly responsible for, the endangerment of the suckers. But most importantly, these components, unlike others, were both known and manageable.

DEPLOYING UNCERTAINTIES

The issues of uncertainty inherent in the ecological study and communication of complex and open systems such as the Klamath Basin are of more than academic concern. In addition to being a door to potentially paralyzing expert disagreement, uncertainty is a powerful tool for manipulating the terms of the dispute itself. As Bruno Latour has noted with an example from the *New York Times*, the political utility of uncertainty and expert disagreement is widely known (Latour 2004b). Quoting a Republican party strategist:

"Should the public come to believe that the scientific issues are settled . . . their views about global warming will change accordingly. Therefore, you need to continue to make the *lack of scientific certainty* a primary issue." Focusing on scientific uncertainty allows parties to prevent the closure of a policy debate by focusing attention on a supposed lack of closure in related scientific debates. It accomplishes this by preventing the solidification of a truth-claim that might be counter to their desired outcome.

Emphasizing uncertainty is especially useful for groups who are trying to prevent the solidification of a particular claim into factual status. At the start of the conflict, critics of the shut-off attempted to cast doubt on the certainty of the scientific claims made in the Biological Opinions. They focused on these claims because they were the operational claims on which policy was being based. Should these claims solidify into fact, then the policy would not be overturned. However, in 2002, with the publication of the National Research Council Committee's interim report, the truth-claim on which policy was based suddenly shifted away from the Biological Opinions. With the publication of the interim report, critics of the shut-off suddenly found that the operational claim supported their desired policy outcome (i.e., the status quo). When this happened, it was no longer advantageous to critics of the shut-off to challenge the operative truth-claim. Quite the opposite, they tried to bolster it and to facilitate as quickly as possible the claim's solidification into fact. Supporters of the shut-off, however, found themselves in the opposite situation. When the Biological Opinion was the scientific claim on which policy action was based, supporters attempted to bolster the Biological Opinion in an effort to bolster the policy which it supported. When the interim report was published, supporters of the shut-off suddenly found the operational claim to no longer be in support of their desired policy outcome (i.e., the protection of the sucker via the shut-off). In this situation, those who supported the shut-off reversed their strategy and began emphasizing uncertainty in an effort to prevent the interim report's claims from obtaining factual status. Uncertainty, in other words, was the friend of those wishing to undermine the operational claim in the dispute. This claim changed

dramatically in the middle of the conflict, and groups reoriented themselves around this change accordingly.

Prior to the release of the interim report, those who supported the Biological Opinions held them up as examples of objective, certain, and disinterested science. The Yurok Tribe, for example, had "established a major fisheries department, one of the largest in the basin, to address the management and recovery of the fisheries resources of the Klamath Basin." This in-house expert advisory program had participated in the Biological Opinion issued by the Marine Fisheries Service. They had provided calibration for the computer models used in the Biological Opinion and thousands of data points on river flow and fish populations. Indeed, "quality of data has been a primary concern and focus of our program." The Biological Opinions were "credible, objective science," claimed the tribe.[184] This rhetoric was reinforced by the production of new scientific reports and presentations that supported the Biological Opinions. If this strategy to establish the Biological Opinions as fact succeeded, debate would end, the controversy would stop, and the water would flow down the river, not onto fields.

At that particular moment, an end to the controversy was exactly what critics of the Biological Opinions feared the most, and groups who resisted the water shut-off attempted to maintain a state of unbalance in the conflict. Continuing controversy bought time for new reports, court actions, and political maneuvering. The primary method for maintaining unbalance was to emphasize the uncertainty of the science in the Biological Opinions. Paul Cleary, Director of the Department of Water Resources for the State of Oregon, told the Committee, "You undoubtedly have already discerned that many of the challenges facing the Basin are complicated by scientific uncertainty and controversy."[185] Another person opposed to the shut-off emphasized that historical and natural conditions were unknowable to any degree of certainty: "Recently, various reports (Trihey Study,

184 Mike Belchick, T. Fletcher, "Presentation and Testimony for the First Meeting of the Committee on Endangered and Threatened Fishes in the Klamath Basin," November 6, 2001 (NAS, DN 9), pp. 1-2.

185 Cleary, "[Statement of the State of Oregon]," p. 1.

Hardy Phase I) have provided Klamath River flow 'recommendations' based on assumptions or calculations regarding natural or historical flows. There are a great many problems with those reports from a scientific perspective."[186] Similarly, others drew attention to the limited records used in calibrating these models and as base lines for recommendations.[187] "As this report will show, there is complexity, uncertainty, and lack of knowledge concerning many issues related to the controversy."[188]

In addition to emphasizing directly the existence of uncertainty within the Biological Opinion, critics attempted to construct uncertainty by producing reports that contradicted the two Biological Opinions. Horne, for example, analyzed the data in the Fish and Wildlife Service's report and offered a counter-narrative of fish death. "Following certain kinds of weather patterns, temporary [thermal] stratification produces a layer of warmer buoyant water that floats on top of a cooler denser layer," he concluded. When the two layers suddenly mix, fish die. "I believe that others concur," he announced. "In my opinion [this] is the most probable cause, direct and indirect of fish kills in Upper Klamath Lake."[189]

The production of uncertainty had the desired effect: the conflict was maintained and a new group—the National Research Council Committee—was introduced, changing the dynamics of authority in the conflict. With the release of the Committee's interim report, a new claim replaced the Biological Opinions as the operational claim in the conflict. When this switch in the operational claim occurred, the strategies of different groups changed as well. Those who had originally been in the position of disputing the operational claim suddenly found themselves in its favor, while those who had been in its favor now had to resist. Those originally in opposition to the Biological Opinions hailed the interim report as an example of a certain, disembodied, and objective science, for

186 Marshal Staunton to Wirkus, February 28, 2001 (NAS, DN 84), pp. 1-2.
187 Rykbost, "Reviews of Biological Opinions Affecting Klamath Project Operations," p. 1.
188 "Draft," December 14, 2001 (NAS, DN 655), p. 2.
189 Horne, "Testimony of Alex J. Horne, Ph.D.," p. 2.

which the Committee was the conduit. Groups in support of the shut-off, now finding themselves opposed to the operational truth-claim, began to invoke uncertainty.

Finding themselves on the defensive, supporters of the now-overturned Biological Opinions began to employ a rhetoric remarkably similar to that employed by their critics just months before. The statement presented by WaterWatch, an environmental group, provided the clearest example of this reversal. Their statement stressed that knowledge was still in flux. "WaterWatch is very concerned that the committee's interim report is being misused to undermine the good work of federal scientists and as a reason to roll back protection of endangered species," they wrote.

> We urge you to stress to the public that this is a *preliminary* report and that there is still a great deal of work to do over the next year before it is final.
>
> . . . Science is never complete and is rarely conclusive when dealing with complex ecosystems affected by many variables.
>
> . . . You indicate that the levels and flows should not be lowered any further because of the uncertainty and risk posed to the listed species. Using this same reasoning doesn't it make sense *in light of scientific uncertainty* to use levels and flows that more closely approximate natural conditions . . . until more is known . . . ?
>
> . . . [the lack of a simple correlation between water level and fish mortality] is not surprising given the complexity of natural systems.[190]

The Karuk Tribe echoed these sentiments about the "preliminary" and "limited" nature of the Committee's review.[191]

THE FINAL REPORT

Following the release of the National Research Council Committee's interim report, the

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190 Robert G. Hunter, "WaterWatch Statement to the National Research Council," March 7, 2002 (NAS, DN 603), pp. 1-2, emphasis added.

191 Leaf Hillman, "[Karuk Tribe's] Comments on BOR Project Impacts on the Klamath River and Prepublication Evaluation of the Klamath River Basin," March 7, 2002 (NAS, DN 606), p. 1.

scientists at the Fish and Wildlife Service and Marine Fisheries Service began the process of redrafting their Biological Opinions to take into account the Committee's findings. Each produced new reports (Fish and Wildlife Service 2002; National Marine Fisheries Board 2002). These new Biological Opinions replaced those from 2001, which, in addition to having lost their epistemological authority, had also expired. The new Biological Opinions, noted the Committee in its final report "were influenced to some extent by [our] interim report" (National Research Council 2004, p. 38). This was, to say the least, an understatement, since the interim report had eliminated as a possible strategy one of the most direct and obvious mechanisms for managing water and species in Upper Klamath Lake and the Klamath River.

In September 2002, a major fish kill occurred in the Lower Klamath River. Initial estimates put the number of salmon that died at approximately ten thousand (Egan 2002), but later estimates ranged from nearly thirty-four thousand (California Department of Fish and Game 2004) to seventy-seven thousand fish (Becker and Gellman 2007). Most of the dead fish were chinook salmon (i.e., not the coho salmon covered under the Marine Fisheries Service Biological Opinion). The fish died in the first thirty-six miles upstream of the Klamath River's mouth. The proximate cause of the fish kill was infection, but this infection was facilitated by very low water levels in the lake, higher than normal water temperatures, and higher than normal densities of fish in the river (California Department of Fish and Game 2004). The timing of the fish kills, just months after the National Research Council Committee had leveled its devastating criticism against the Marine Fisheries Service Biological Opinion, which drew connections between water level in the river and fish survivorship, was seized upon by critics of the interim report as evidence of its error (Murphy 2002).[192]

The Committee continued to hold public meetings and review studies. In the summer of 2004, the Committee released its final report (National Research Council 2004). Just as with the interim report, the final report displayed itself as a remarkably

192 See numerous letters in the NAS, DNN 745, 746, 747, and 748.

coherent, certain voice far above a contentious debate. Again, in contrast with the expert disagreement that raged throughout the conflict, the Committee was an island of calm. At the same time, the final report bore the marks of the long and protracted struggle that had transpired in the Klamath Basin. In the final version, the Committee affirmed its interim conclusions that there was no "causal connection between water levels and water quality or fish mortality . . . in the 1990s . . ." (National Research Council 2004, p. 6). The Committee also discussed other reasons behind the decline of the suckers. Water quality, loss of riparian and wetland spawning habitat, dams blocking access to spawning grounds, increasing incidence of parasitism, and anoxic conditions brought on by annual algal blooms had endangered the sucker. For the coho, high water temperatures, dams along the river, spawning ground degradation, deforestation, and competition with hatchery spawn were multiple causes of endangerment. All this was compounded by the coho's life cycle were responsible. Unlike the Chinook salmon that also spawn in the Klamath River, coho fry spend a full year in the river before entering its estuary and then the ocean. The report's list of contributing factors to the sucker's endangerment mirrored closely those published in the original Federal Register listing, as well as many of the factors that were cited in the original Biological Opinions. However once again, the Committee impeached the management tool hat Fish and Wildlife Service and Marine Fisheries Service had identified.

The Committee attempted damage control for the political backlash its interim report had released upon the Fish and Wildlife Service and Marine Fisheries Service. "The committee's interim report proved controversial," it understated. But this controversy, it claimed, was not the Committee's fault:

> The committee, in drawing conclusions for its interim report, was bound by its charge to evaluate and comment on the scientific strength of evidence underlying various proposals. Its charge kept it from weighing economic concerns or weighing the advisability of minimizing risk by using professional judgment in place of scientific evidence to support particular recommendations. . . . Agencies charged with ESA responsibilities can be expected to use professional judgment when no

> scientifically supportable basis is available for a decision, or where they judge the scientific support to be inadequate. Thus, the agencies may recommend practices for which the committee would find virtually no direct scientific support (National Research Council 2004, p. 35).

In other words, the Committee wrote that what many in the public viewed as equivalent to an accusation of fraud was actually a result of the applications of two different metrics —science on the one hand, and professional judgment on the other—for knowing the world.

The Committee suggested that its statement of tasks had forced it to review the Biological Opinions based on a narrow set of epistemological criteria that was *different* from the criteria the Fish and Wildlife Service and Marine Fisheries Service had used to write them. While agencies sometimes had to rely on professional judgment, and indeed could legitimately rely on professional judgement when necessary, the Committee claimed it could not take this into account in its review. Its statement of tasks had been written in such a way as to preclude the Committee from taking into account something that it now claimed it knew about the realities of environmental management: that often data is incomplete, interpretations are divergent, and professional judgment must be used to fill in the many, sometimes large blanks. And when that professional judgement was called for, the Fish and Wildlife Service and Marine Fisheries Service had a policy obligation to err on the side of caution. However, the Committee had worked to the rule of its statement of tasks.[193] In doing so, it had applied a standard of critique to the

193 A work-to-rule strike is a labor strategy for disrupting productive operations at a work place. Instead of walking off the job or refusing to work, laborers do *exactly* what they are supposed to do. Factory operations usually slow considerably as a result. The strategy works because the workers recognize that they must do many things not specifically stated in their job descriptions or work instructions in order for the final outcome to be achieved. For example, a forklift driver's specific instructions might state "move boxes from point A to B with a forklift," but may not include the explicit instruction to refuel the forklift when it runs empty. The management probably assumed that he or she would and in most cases, the driver would do so. But in a work-to-rule situation, the driver would simply not do so because the instruction was not explicitly given. The forklift would sit useless until management came and filled its tank. Work would be

Biological Opinions that the documents had no hope of surviving, and that virtually no management document would have been able to withstand. The Committee, by doing exactly what it was supposed to do, had discredited a management document for doing what the management document was supposed to do: evaluate incomplete and messy evidence and make a policy decision that was based on evidence, was supplemented with professional judgement, and was within the agency's ability to carry out.[194]

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slowed or stopped until this happened. Stated more generally, someone working-to-rule refuses to apply tacit knowledge to their job (see, e.g., Scott 1998).

194 The Biological Opinions had in fact stood another test of their scientific claims, prior to Cheney's decision to involve the National Research Council. In *Kandra v. United States*, Project irrigators sought a preliminary injunction against the shut-off. The plaintiffs claimed, among other things, that the scientific evidence in the Fish and Wildlife Service and Marine Fisheries Service Biological Opinions were contradicted by other scientific evidence, and that the Biological Opinions' conclusions, namely required minimum lake levels, were therefore arbitrary and capricious. The court offered the following analysis of the responsibilities of federal regulators in regard to scientific information, as well as the meaning of expert disagreement: "The opposing views and supporting evidence of the parties demonstrate that plaintiffs simply disagree with the scientific conclusions reached by FWS [Fish and Wildlife Service] and NMFS [Marine Fisheries Service]. . . . The fact that such disagreement exists, however, does not render the BiOps [Biological Opinions] arbitrary and capricious. See *Aluminum Co. v. Bonneville Power Admin.*, 175 F.3d 1156, 1162 (9th Cir. 1999), cert. denied, 528 U.S. 1138, 145 L. Ed. 2d 933, 120 S. Ct. 983 (2000) (NMFS' BiOp was not arbitrary and capricious where differing scientific views were resolved through expert choices and plans for further studies). An agency is not required to rely on evidence that is conclusive or certain; rather, an agency must utilize the best evidence available when preparing BiOps. . . . The BiOps are supported by voluminous administrative records, rendering it unlikely that they have no rational basis" ("Opinion," 145 F.Supp.2d. 1192, p. 1210). The court denied the injunction.

In its Opinion, the court took into account the normality of scientific disagreement, the realization that if agencies were only allowed to base decisions on "evidence that is conclusive or certain" that there would likely be *little or no* evidence on which to base decisions, and the context in which scientific evidence is translated into policy. The National Research Council Committee's statement of task specifically constrained the Committee to consider only the scientific claims devoid of the context in which they were made and used. Unsurprisingly, the two different metrics of review resulted in two different outcomes.

The report offered a complex solution to the complex environmental problems of the Klamath Basin. Many of these were generally acknowledged by resource managers in the Klamath Basin as important proposals for addressing the systemic barriers to endangered fish survival, including dam removal, deepening of silted waterways, the reinvigoration of wetlands and fish habitat through ecological restoration. In general, the Committee advocated the management of the ecosystem as a whole, as opposed to the management of the ecosystem for specific species, such as the sucker and the salmon. If a more systemic approach were taken, then the pitfalls of an approached tightly focused on single species could be avoided. This ecosystem management approach, wrote the Committee, should be adaptive, to be flexible enough to accommodate new and changing scientific knowledge. Adaptive management, in general, advocates management based on the idea that managers must remain flexible enough to incorporate new and changing understandings of the environment into their management strategies (Bocking 2004; Langston 2003).

In support of this, the Committee proposed the expansion of scientific monitoring programs along the river, and suggested that government natural resource agencies should do more to coordinate these monitoring efforts. Results from these efforts, the Committee wrote, should be certified through peer review. Doing so would endow the results with a legitimacy that was lacking in the 2001 Biological Opinions. While generally acknowledged as productive suggestions, these proposals were expensive. Monitoring programs were already under way, but expanding them required new grants and more staff time. In addition, scientists in the Basin were already overwhelmed by a large amount of raw data. The pressure to gather data often pushed the analysis of this data into a secondary position. In addition, if these analyses had to be peer-reviewed and published before they could be used in decision-making, then time, which was already in short supply, would likely grow as a problem.

The Klamath conflict had highlighted the fact that expert disagreement can be a powerful political tool for stalling decision-making processes. The conflict was framed

as one in which the causes and dynamics of environmental change had to be accurately and precisely known before legitimate management could take place. This framing offered a compelling logic (Ellis 1996). It was appealing in terms of justice—focusing management policies on the groups actually responsible—and in terms of management efficacy—aiming resources squarely at the ultimate cause of the problem. However, the conflict over the management of the suckers also suggests that the seductiveness of this logic may lead to inaction. This can result from the fact that environmental dynamics and causes of environmental change are not fully knowable to a desired degree of certainty. It can also result from the contesting of claims about causes or ecological dynamics. If expert disagreement can be provoked and maintained, then the opportunity to affect the ultimate course of policies remains open.

In the Klamath Basin, the uncertainties and complexities of the environment opened numerous opportunities for groups to point out facets of scientific claims that were not certain or that were contradictory, and to frame these uncertainties—incorrectly but effectively—as evidence of the "unsound" nature of those claims. Beneath this political strategy lay a link made within the ESA: that the legitimacy of a policy was a direct extension of the authority of the scientific truth-claim that undergirded the policy. Critics of the Biological Opinions had skillfully used this link, originally designed as a way to shield the ESA decision-making process from political or commercial manipulation, to control the trajectory of the conflict and maintain the status quo.

Conclusion

KNOWLEDGE INTO ACTION

Around the meeting-room table sat people representing five groups: The United States Fish and Wildlife Service, the United States Bureau of Reclamation, Klamath County, Oregon State University Extension Services, and a Klamath Falls-based non-governmental ecological restoration organization. The Klamath Tribes' representatives had not been able to make it, but people from tribal government, the Culture and Heritage Department, and the Natural Resources Departments were involved in the project that was on the day's agenda. The Oregon Department of Water Resources Water Master for the Upper Basin, in charge of enforcing Oregon water law, and a staff member of the Oregon Department of Fish and Wildlife, were unable to come but had spoken with other meeting participants before-hand. Some of the groups had several staff members there. The Bureau of Reclamation, for instance, had a fisheries biologist, a hydrologist, and an engineer at the meeting. The Fish and Wildlife Service had a fisheries biologist and a restoration hydrologist present.

On the agenda that day in May 2007 was an ecological restoration project that was being coordinated by the non-governmental organization, but that involved in one way or another all of these groups, either through funding, expertise, or jurisdiction at the project site. The meeting was called to discuss a redesign of the project, the goal of which was the restoration of a spring on the shore of Upper Klamath Lake. I had been invited to attend and observe because the project was a prime example of numerous groups in the Upper Klamath Basin working cooperatively on an ecological restoration project.

Relationships clearly had progressed considerably in the Upper Basin since the water shut-off in 2001. Indeed, groups who had been at odds with each other now sat around a single table and productively discussed ways to push forward a project of mutual interest: all agreed that the spring had once been a spawning ground for endangered suckers, but that the fish no longer returned.

The project was envisioned as a way to address intensive anthropogenic environmental change at the spring over the past century.[195] Early in the twentieth century, the spring's original outlets to Upper Klamath Lake had been reduced in number and relocated by the construction of a railroad between the spring and the lake. A highway had also been build next to the railroad, and the adjacent wetlands were leveed off and reclaimed for agriculture. The spring's cold waters now had to pass through series of warm, shallow pools and then through a single culvert into the lake. In times of low lake-level, the culvert was above the water line, creating an obvious obstacle to fish attempting to return to the spring to spawn. Following the construction of the highway, a county park with a picnic area, lawn, and parking lot were built on the site. Aerial photographs from the nineteen-forties, the earliest available, revealed historic conditions that were very different than today.[196] Then, the spring looked like a series of creek channels, draining to the lake. With all these changes, suckers rarely, if ever, returned to the spring to spawn. The spring now looked like a series of interconnected ponds. Water would slow in these ponds and warm in the sun, rather than running more directly to the lake as it once did.

In 1994, gravel of the sort that spawning suckers prefer was added to the spring in an attempt to create spawning habitat. But this "gravel of dreams" approach (if you build a gravel patch in a water body, the fish will come and spawn on it), as one fisheries biologist at the meeting called it, did not address the other issues with the site—such as the warm pools and higher-than-water-level culvert—and was unsuccessful at bringing

195 "[Lakeside Spring] Enhancement Project," March 23, 2007, (DAP).
196 "Conceptual restoration at [Lakeside Spring]," December 2006, (DAP).

the fish back to the spring. A new, more systematic approach to the whole site was needed. A private ecological restoration consultancy had been retained, and they had produced a plan. However, the appropriateness of the plan was doubted by some, and a meeting was called to restart the effort.

Numerous groups were involved because the jurisdictions at the spring was complicated. Parts of the site were owned by the county and used as a park, others by the United States Forest Service. In addition, suckers at the spring were the jurisdiction of the Fish and Wildlife Service, there was an irrigation diversion at the site controlled by the Oregon Department of Water Resources, the Bureau of Reclamation was the water manager of Upper Klamath Lake, and the Oregon Department of Fish and Wildlife had jurisdiction over the trout that also inhabited the spring. A private railroad company owned the culvert that was the spring's one outlet to the lake. And finally the site was within the former reservation, so the Klamath Tribes had water, hunting, and fishing rights at the site. It was also a major cultural site for the tribes. The federal agencies, therefore, all had a trust responsibility to consult with the tribes on the project.

Despite the fact that the project was described as "restoring" the spring, it soon became clear that it would be difficult if not impossible to actually restore anything resembling the spring's form prior to 1900. The railroad and the highway removed any illusion of restoring, or returning, the spring to what it was. These could not be moved or removed. Instead, the participants were creating a new spring that could serve some of the functions of the old. But what, precisely, was the function of the spring? The meeting began and each person talked about their perspective on the spring, based on their particular professional background and the mandate of the agency or organization for which they worked. Each person at the meeting knew and talked about the spring differently, and each person attempted to inscribe his or her agency's or organization's understanding of the spring into the spring's new design. As each person spoke, they were negotiating the future of nature in one small corner of the Upper Klamath Basin.

Each participant saw the physical spring as something quite different. For the

Fish and Wildlife Service, the spring was primarily spawning habitat for an endangered species. The restoration of the spring was in the interest of their duties to recover listed species under the Endangered Species Act of 1973 (ESA). For the Klamath Tribes, it was a cultural site and the spawning ground of a tribal trust animal. The restoration of the spring was an advancement in their struggle at cultural continuation. For Klamath County, it was a popular recreational site, and for the Oregon State University Extension Services, it was an education site, where school groups could learn about the region's environment and culture. For the Oregon Water Resources Department, it was a tangle of overlapping and un-adjudicated water rights claims. For the Oregon Department of Fish and Wildlife, the spring was potential trout habitat. For the Bureau of Reclamation, it was an opportunity to improve water quality, address endangered species populations in waters they manage, and a technical engineering problem.

Based on these priorities, each group focused on particular physical aspects of the project. A Bureau of Reclamation scientist gave a short presentation on the idea of "chemical refugia"—that springs and wetlands produced areas of higher water quality with distinctive trace-chemical signatures. The Fish and Wildlife Service's comments focused mainly on the problem of creating suitable spawning areas for the fish. The Klamath Tribes fisheries biologist (who was not there) had told another meeting participant that he agreed with the Fish and Wildlife Service, but was concerned about how the fish would get past the culvert and warm pools to the spring in the first place. Fish passage, in other words, was the main issue for him. Klamath County requested that the park facilities be maintained, and the Oregon State University Extension Services staff member discussed the possibility of an interpretive kiosk. The Oregon Water Resources Department had suggested, in a conversation prior to the meeting, moving the irrigation pump for one water user from the spring to the lake, and adjusting his permits accordingly. The Oregon Department of Fish and Wildlife wanted to make sure that there was suitable habitat for trout in the upper parts of the spring to promote recreational fishing.

The future spring began to take shape as a pastiche of these priorities and the practical strategies for implementing them. As in any negotiation, even a friendly one such as this meeting, achieving each goal required some give-and-take. "You could tune the channel to the life stages of the fish, or to seasonal cycles," said the Bureau of Reclamation hydrologist. "Is it spawning or chemical refugia you're interested in?" he asked. It would be difficult to design, or "tune," for both, since each perspective on the spring implied a different design for the channel. Spawning habitat implied a channel that remained submerged throughout the year, while a chemical refugia implied one that cycled from wet to dry.

"Spawning is the primary objective," said a Fish and Wildlife Service fisheries biologist, "but it's a small area, and we may not have lots of flexibility if the County Parks are not willing to let us go beyond the current banks, which would reduce the lawn size."

"There's the educational value of seasonal wetlands and meadows," said the Bureau of Reclamation scientist, nudging back towards his perception of the spring as a chemical refugia.

"That's certainly one of our objectives," replied the Fish and Wildlife Service fisheries biologist.

"But the size of the parking lot is determined by the turning radius of a school bus," acknowledged the restoration hydrologist. In other words, having education as a project goal meant a certain sized parking lot and a maximum limit on the size of the spring. The discussion continued for several minutes, when the Fish and Wildlife Service restoration hydrologist said, "Oh, Oregon Department of Fish and Wildlife asked for the big pool at the north end to be kept open for trout. And if the irrigation diversion is changed [by Oregon Department of Water Resources] we have more flexibility."

The discussion continued. "We need to address the tribes' concern about access for fish at all water levels."

A Bureau of Reclamation employee said, "There a six-foot fluctuation possible in

water level. We don't want a mud flat, and the state wants the upper pond for trout. We need to carefully control the grade of the spring" to make that possible.

The meeting continued and a design for what nature *would become* began to emerge from people's perceptions about *what nature was.* Just as with the *c'waam* at the ceremony the winter before, the spring was a boundary object—a shared physical thing, that was also multiple different things to different people. The spring was a cultural site, and educational opportunity, a collection of chemicals, a water law tangle, a place for trout, a place for suckers, a solution to compliance issues under the ESA, and an engineering challenge. But in addition to being known and talked about in different ways, the spring itself was being *changed* based on these ideas and perspectives. The spring was becoming a place where different views of nature were being literally negotiated, hybridized, and built into the landscape itself.

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This dissertation has focused on the ways that people know and communicate nature, and struggles over knowledge and authority; this meeting was a microcosm of just these negotiations. Far from occurring only on the abstract level of discourse, these struggles over environmental knowledge and narrative are essential for understanding environmental disputes because neither knowledge or narrative are passive or divorced from the tangible world. The underlying significance of these disputes over knowledge lies in the ultimate performativity of knowledge. In each case discussed in the dissertation, including the meeting about the spring, competing claims about environmental dynamics and human-environmental relationships were advanced and disputed. Ultimately, certain claims emerged above others and were used as the basis for management action. These operational claims become performative when they legitimated state intervention to manage the environment according to these claims.

Narratives are the "stories people tell about themselves and their lives [that] both constitute and interpret those lives" (Ewick and Silbey 1995, p. 198). In this sense, narratives not only communicate the speaker's knowledge of the world but also

contribute to the construction of that world as these narratives become the basis of action. In this dialectical process, "Narratives are not just stories told within social contexts; rather, narratives are social practices, part of the constitution of their own context" (p. 211). People's knowledge and the ways they communicate this knowledge directly affect action, and that action directly affects the tangible world of animals, plants, lakes, springs, and people. Arthur McEvoy has noted that scientific claims, through law, become performative, and they ". . . create the world in their own image as they structure people's perceptions and guide people's actions as they transform the world through their work" (McEvoy 1988, p. 214). This work is accomplished through the legal processes by which these claims legitimate state intervention in the lives of people.

In 2001, the management of endangered and threatened species led the Fish and Wildlife Service and the National Marine Fisheries Service to make scientific claims in Biological Opinions that required the Bureau of Reclamation to shut off irrigation water to the Klamath Project, sparking intense controversy. The overt dispute over the policy quickly transitioned into a dispute over the operational truth-claim legitimating the policy. Critics of the shut-off began to produce expert narratives that cast doubt on the shut-off. These critics focused on the uncertainty and "incompleteness" of the claims made in the Biological Opinions, and they compared the practices of laboratory scientists with those of ecological field scientists, all of which began to weaken the authority of the reports. When the National Research Council Committee produced its counter-narrative of fish death in the Klamath Basin, the Biological Opinions were displaced as the operational truth-claim. A narrative of environmental dynamics, in which water level was not associated with fish survivorship, and associated narrative of social dynamics, in which irrigation deliveries were not primarily responsible for declining fish populations, became the operational claim, and policy was rewritten based upon it. The water was turned back on. Critics of the National Research Council Committee would later point to the death, several months later, of thirty- to seventy-seven thousand fish in the Lower Klamath Basin as evidence of the incorrectness of the Committee's narratives (Murphy

2002).

In *United States v. Adair et al.*, a dispute in 1975 over water rights led the plaintiff United States government and the plaintiff-intervenor Klamath Tribe to advance a narrative of the tribe's environmental and cultural history. The defendant landowners and defendant-intervenor state of Oregon responded with a counter-narrative. Each narrative legitimated a very different potential outcome, with one aimed at endowing the United States and the tribe with considerable water rights, while the other aimed at establishing the private landowners as the primary right holders and the state of Oregon as the government in charge of those rights. Each narrative had the associated effect of reconfiguring in different ways the historical agency of the Klamath Tribe in relation to their environments and the colonial process. At the same time, both had the combined effect of circumscribing the tribe as an author of its own history, and regarding the tribe's ability to define its own relationship to the environment. In *Adair*, the plaintiffs' narrative ultimately transitioned from claim to fact. When this happened, water rights in the Upper Klamath Basin were rearranged according to the version of environmental and cultural history that the court had chosen as true.

Both cases were framed by what I have called "scientific legality." In both cases, the legal legitimacy of a particular group in the dispute was dependent on that group's ability to martial scientific expertise to its cause. And in both cases, the legitimacy of the legal outcome—the management of suckers and salmon or the reorganization of water rights—was based on the authority of the truth-claim that undergirded them. This legal and popular authorization of science in environmental disputes has been accompanied by a shifting locus of decision-making authority. Because environmental laws such as the ESA explicitly mandate that only scientific information be taken into account in certain aspects of the decision-making process, scientists now play a central role in the legal processes that regulate the force of the state. The authority of scientists is further bolstered by a general scientization of the environment, in which nature and the natural sciences have become synonymous.

The effects of scientific legality are double-sided, to say the least. On the one hand, they have opened up environmental disputes to groups who have previously had little access. Today, groups with the ability to martial scientific expertise have a powerful tool for demanding the right to participate in environmental decision-making. At the same time, the authorized speakers in environmental debates have narrowed along with the narrowing of the discourses considered legitimate within those conflicts. The dual effects are apparent in the experiences of the Klamath Tribes. Understanding the legal authority of scientific narratives about the environment, the tribes have turned heavily towards the ecological sciences in making their claims. In doing so, they have gained authority in the Upper Klamath Basin as scientists and as legal actors. At the same time, this turn has highlighted tensions over the relationships among the environmental knowledge of ecological scientists and tribal hunters, fishers, gatherers, and elders. The tribes' experience suggests that while tensions are real, they are often based on essentializations of both "indigenous" and "scientific" knowledge. These essentializations have become strained in a world in which roles are increasingly blurred and in which individuals draw on numerous knowledge claims in the course of narrating aspects of the environment.

Even so, not all people draw equally on all knowledge, and not all knowledge is considered to be equally legitimate in all situations. Legal mandates about what constitutes legitimate knowledge in a certain situation, and popular conceptions about who possesses particular "types" of knowledge, constrain the ability of a speaker to participate in environmental decision-making. In this regard, a dramatic change has occurred in the Upper Klamath Basin since the nineteen-seventies. In *Adair*, Klamath tribal members were largely excluded from those whom the court considered to be legitimate knowers of Klamath tribal history. The Klamath were unable to establish themselves as expert witnesses who testified not based on experience but instead on abstract principles. By 2001, the Klamath tribal government had established itself as a legitimate producer of expert knowledge about the Upper Basin's environment, and along

with that role came a more central spot in negotiations over management of the sucker, the mule deer, and other tribal resources.

Negotiations about environmental knowledge and associated disputes about who can participate in environmental decision-making are important because the words of participants direct actions. Over time, the nature that we can smell and feel and taste and hear starts to resemble more and more closely our ideas of what nature should be. This performativity of environmental knowledge occurs because people manage the environment based on what they know about it. As environmental managers debate what they know—sometimes in a friendly atmosphere, sometime in an adversarial situation—they create a negotiated image of nature, one that may become through law, a blueprint for action. With the restoration project at the spring, if nature is *understood* as a collection of trace chemicals, then engineers will design the spring channels to best promote the vegetation that release these chemicals. If nature is understood to be trout ponds, then the pool at the upper end of the spring will be left open, and nature becomes a trout pool. If nature is understood to be spawning habitat for endangered fish, then the corresponding channel depths and gravel sizes will specified along with improved access for the fish, and nature becomes spawning grounds for endangered fish. If nature is about families picnicking in nature, then the tables will remain in the park. Meanwhile, school children will learn about the spring at a nearby educational kiosk. For the pupils, the nature they come to know will be one that was negotiated.

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