

TRANSFORMING REGULATORY PROCESSES: KARUK PARTICIPATION IN THE
KLAMATH RIVER TOTAL MAXIMUM DAILY LOAD (TMDL) PROCESS

by

SHANNAN LENKE STOLL

A THESIS

Presented to the Environmental Studies Program
and the Graduate School of the University of Oregon
in partial fulfillment of the requirements
for the degree of
Master of Science

September 2016

THESIS APPROVAL PAGE

Student: Shannan Lenke Stoll

Title: Transforming Regulatory Processes: Karuk Participation in the Klamath River
Total Maximum Daily Load (TMDL) Process

This thesis has been accepted and approved in partial fulfillment of the
requirements for the Master of Science degree in the Environmental Studies
Program by:

Kari Norgaard	Chairperson
Daniel HoSang	Member

and

Scott L. Pratt	Dean of the Graduate School
----------------	-----------------------------

Original approval signatures are on file with the University of Oregon Graduate
School.

Degree awarded September 2016.

© 2016 Shannan Lenke Stoll

THESIS ABSTRACT

Shannan Lenke Stoll

Master of Science

Environmental Studies Program

September 2016

Title: Transforming Regulatory Processes: Karuk Participation in the Klamath River Total Maximum Daily Load (TMDL) Process

This thesis examines the extent to which the Karuk Tribe has participated in natural resource management regulatory processes, using the Klamath River Total Maximum Daily Load (TMDL) process as a particular case study for evaluation. One of the most effective ways that the Tribe participates in the TMDL process is through the rigorous adoption of the technical tools of regulatory science. Collaboration with nontribal organizations is also used to build capacity for participation. The Tribe's active participation in the TMDL process has in turn shaped the process, making it more inclusive of tribal values and traditional knowledge, improving overall scientific inquiry, and facilitating increased cooperation among tribal and non-tribal resource managers. At the same time, the Tribe's participation in the process remains "uneven," underscoring the ongoing challenge of making regulatory processes that recognize the legitimacy of tribal knowledge and values.

CURRICULUM VITAE

NAME OF AUTHOR: Shannan Lenke Stoll

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

University of Oregon, Eugene, Oregon
Gonzaga University, Spokane, Washington

DEGREES AWARDED:

Master of Science, Environmental Studies, 2016, University of Oregon
Bachelor of Arts, Biology and English, 2006, Gonzaga University

AREAS OF SPECIAL INTEREST:

Environmental Justice
Water Resource Management
Advocacy Journalism

PROFESSIONAL EXPERIENCE:

YES! Magazine
Consulting Editor, formerly Associate Editor
February 2012 – present

City of Portland
Urban Forestry Tree Regulation Specialist
June 2013 – January 2014; October 2015 – April 2016

City of Lake Oswego
Assistant Natural Resources Planner
December 2013 – December 2014

Columbia Riverkeeper
Water Quality Technician
April 2013 – December 2013

Northwest Energy for Economic Development
Program Coordinator
January 2008 – September 2008

Cape Hatteras National Seashore
Winter Biological Technician
September 2007 – December 2007

GRANTS, AWARDS, AND HONORS:

Graduate Teaching Fellowship
Environmental Studies
September 2009 – June 2010 and September 2010 – June 2011

Magna cum Laude
Gonzaga University
May 2006

ACKNOWLEDGMENTS

This thesis could not have been written without the help of Ron Reed (Karuk Tribe), Kari Norgaard (University of Oregon), and Daniel HoSang (University of Oregon). Thanks so much to Ron Reed for facilitating my trip to the Klamath Basin, and generously sharing your time and expertise; it was an honor to learn from you. Thanks to Kari Norgaard and Daniel HoSang for their feedback, support, and patience; it was an honor to engage with you throughout this process. Finally, thanks to the participants who shared their time and knowledge in the interviews contained in this thesis.

Dedicated to István (Steven) Gábor Stoll, who supported me in my academic pursuits and passed away during the creation of this thesis.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
Historical Background	3
Natural Resource Management and Environmental Justice	5
II. METHODS	11
III. CONCEPTUAL GROUNDING: REGULATORY SCIENCE AND TRADITIONAL KNOWLEDGE	16
Critiques of Science	16
Defining Traditional Knowledge	19
Describing Karuk Traditional Knowledge	23
IV. BARRIERS TO PARTICIPATION IN REGULATORY PROCESSES.....	25
Documenting Knowledge and Values	25
Translating Knowledge and Values	26
Legitimizing Knowledge and Values	28
Navigating Multiple Jurisdictions	33
Capacity	35
V. OVERCOMING BARRIERS: A CASE STUDY OF KARUK PARTICIPATION IN A WATER QUALITY REGULATORY PROCESS	37
Broad Overview of Karuk Participation in Regulatory Processes	37
Case Study: Karuk Participation in the Klamath River TMDL Process	42

Chapter	Page
Case Study: Remaining Barriers to Karuk Participation in the Klamath River TMDL Process	52
VI. TOWARD A MORE PARTICIPATORY REGULATORY PROCESS	55
VII. CONCLUSION	63
REFERENCES CITED	65

LIST OF FIGURES

Figure	Page
1. Boundaries of the Karuk ancestral territory. Map created by Scott Quinn for the Karuk Land Department, October 2006. See, http://www.dot.ca.gov/dist2/pdf/karukmap.pdf	12

CHAPTER I INTRODUCTION

In California, tribes have routinely been divested of their ancestral lands through the non-ratification of treaties, direct genocide initiated by the state, and other state-sanctioned policies (Heizer, 1993; Hoopes, 1975; Johnson-Dodds & Burton, 2002). At the federal and state level, the policies and institutions that govern the management of culturally important natural resources continue to extend the reach of colonialism and genocide into Native communities. Due to the history of direct genocide, forced relocation, and the non-ratification of treaties, many tribes in the U.S. maintain direct jurisdictional authority over just a fraction of their ancestral resources. California has a particularly fraught history in this regard, and California tribes hold just one half of one percent of the land area of California (Dolan & Middleton, 2015).

Dispossession of land and resources through colonialism has been particularly severe for the Karuk Tribe of California. The Karuk Tribe does not have a reservation or hunting and fishing rights (Hormel & Norgaard, 2009), and the United States Forest Service (USFS) maintains jurisdictional authority over 98 percent (1,023,452 acres) of Karuk ancestral land (Quinn, 2007). For the Karuk, tribal management of culturally important resources occurs almost entirely through participation in non-tribal regulatory processes. Today, Western management institutions govern the use of Karuk culturally important natural resources. To the extent that the natural resource policies and institutions that govern the management of tribal resources don't allow for the Karuk Tribe to participate in resource management processes, they continue the history of colonialism and genocide.

The regulatory structures that govern California water management provide an example of how Western management institutions can exclude tribal knowledge and interests. Under the federal Clean Water Act, states set water quality standards by limiting the amount of pollution (called Total Maximum Daily Loads or TMDLs) a given body of water may be exposed to without negatively affecting the so-called "beneficial uses" of that water. In California, the State Water Resources Control

Board (hereafter called the State Board) recognizes distinct beneficial uses for the appropriation of water (California Environmental Protection Agency [Cal/EPA], 2014). These uses do not include explicit reference to tribal uses of water, though uses by farmers, commercial fishers, and hydroelectric power companies are recognized (California Code of Regulations [CCR] §659-672). In this way, California water management regimes have served to perpetuate colonial interests while marginalizing Native people and culture, a trend that is reflected elsewhere in the literature (Agarwal, 1992; Wolfley, 1998).

Against this backdrop, this study will examine Karuk participation in regulatory processes through the close examination of one case in particular: the TMDL regulatory process¹ for the Klamath River. Participation is identified as the ability of the Tribe to insert tribal knowledge and values into the TMDL process. In other words, meaningful participation that involves tribal consultation but does not incorporate the Tribe's perspectives into the final products of the process is considered "tokenism," where participants are allowed to "hear and have a voice ...

¹ The term "TMDL process" will be used throughout this paper to refer to the Klamath River TMDL process, which broadly encompasses the following steps, throughout which public review and comment are solicited and incorporated by the Regional Board:

- 1) pollutants of concern are identified and acceptable levels (TMDLs) of each pollutant are determined for the Klamath River, such that identified beneficial uses are not negatively impacted; these are established by the North Coast Regional Water Control Board (hereafter referred to as the Regional Board) and subsequently must be approved by the State Board and the US Environmental Protection Agency (US/EPA);
- 2) an implementation plan is established and implemented to ensure that TMDLs are met for each identified pollutant; this is also established by the Regional Board and subsequently approved by the State Board and the United States Environmental Protection Agency (US/EPA);
- 3) a monitoring plan is established, describing what monitoring is necessary to assess whether standards are being met; and
- 4) the TMDLs, implementation, and monitoring plans are incorporated into the Regional Board's "Basin Plan." Subsequent implementation and monitoring are also a part of the TMDL process but are not included in the scope of this paper as the data from this paper were gathered prior to these activities.

[but] lack the power to ensure that their views will be heeded by the powerful. ... [T]he ground rules allow have-nots to advise, but retain for the powerholders the continued right to decide” (Arnstein, 1969). This paper provides an examination of the extent to which the Karuk Tribe—primarily through its Department of Natural Resources (Karuk DNR)—has participated in regulatory processes, using participation in the TMDL process as a specific case study for evaluation.

Historical Background²

Native peoples and native fish have lived in the region we now call the Klamath Basin for thousands of years. Before euro-American harvesting began after 1876, it is estimated that 880,000 Chinook and coho salmon returned to the Klamath to spawn every year, making the basin the site of the third largest historical salmon run in the United States (Kruse & Scholz, 2006). Alongside these incredible historic populations of salmon were the Native peoples who organized their cultures and subsistence lifestyles around the river systems that supported the salmon. Today, several tribes—the Klamath Tribes in the Upper Basin of Southern Oregon, and the Karuk, Hoopa, and Yurok in the Lower Basin in Northern California—inhabit the Klamath Basin. In the Lower Klamath Basin, which is the location of this paper’s analysis, the Yurok historically lived along the Klamath below its confluence with the Trinity; the Karuk lived farther up the Klamath in the region centered around the confluence of the Salmon and the Klamath; and the Hoopa lived in the Hoopa Valley, through which the Trinity flows to the Klamath (Doremus & Tarlock, 2008). These Lower Basin tribes were considered “the wealthiest of all California Indians in terms of disposable resources,” largely due to the abundance of food sources, especially salmon, available throughout the year (McEvoy, 1986).

² This section is largely drawn from the collaborative scholarship of Kari Norgaard and Ron Reed, who have gathered, synthesized, and produced information on the social, cultural, and historical context of the Karuk Tribe as it relates to resource management (Hormel & Norgaard, 2009; Norgaard, 2005; Reed & Norgaard, 2010).

The Karuk Tribe is presently one of the largest tribes in California, with a tribal enrollment of 4,110 enrolled descendent tribal members (as of September 2015, as reported in Karuk Tribe Department of Natural Resources, 2015, p. 2). The Tribe is self-described as “a fishing people,” and have been “since the beginning of time” (Reed & Norgaard, 2010). The Karuk have managed salmon and other resources on the Klamath River in coordination with neighboring tribes through ceremony and culturally embedded harvest techniques for thousands of years. Before euro-American contact, the Karuk consumed more than one pound of fish per person per day, or 450 pounds per year (Hewes, 1973). Klamath River resources, especially salmon, serve as the basis of the Tribe’s subsistence, cultural identity, and religion (Norgaard, 2005).

In California, tribes have routinely been divested of their ancestral lands through the non-ratification of treaties, direct genocide initiated by the state, and other state-sanctioned policies (Heizer, 1993; Hoopes, 1975; Johnson-Dodds & Burton, 2002). In the case of the Karuk Tribe, tribal members were violently forced to leave ancestral lands beginning in the 1850s; by the 1880s, 70-percent of the Tribe’s population had been killed (Bell, 1991; Norton, 1979). An 1851 treaty signed by the Karuk Tribe was not ratified by US Congress, and the Karuk Tribe currently has no reservation or fishing rights and was only federally recognized as a Tribe in 1979 (Hormel and Norgaard 2009).

Today, Karuk Tribe members are some of the poorest people in California (US Bureau of the Census, 2000, as cited by Hormel & Norgaard, 2009). Sociologist Kari Norgaard has linked resource degradation and associated decline in the availability of Karuk traditional foods to negative impacts on the physical, mental, social, cultural, and spiritual health and well-being of the Karuk Tribe and its members (Norgaard, 2005). One dramatic example of this is the decline in salmon populations as a result of euro-American settlement in the basin and the commodification of fish, water, and other watershed resources. Commercial overfishing and the construction of hydroelectric dams have impacted salmon populations, and dam construction has had a particularly devastating impact. Five dams built by the Bureau of Reclamation between 1917 and 1962—which are today

owned and operated by PacifiCorp—negatively impact water quality and block access to 90 percent of the spawning habitat of the Spring Chinook (Hormel & Norgaard, 2009; Reed & Norgaard, 2010). According to tribal member and cultural practitioner Ron Reed, this run is the most important for the Karuk Tribe, both in terms of culture and subsistence (Reed & Norgaard, 2010). Today, the run has been reduced, and where once tribal members ate one pound of salmon per day, they currently catch fewer than 100 fish in an entire year, as they did during the 2005 fishing season (Norgaard, 2005).

Natural Resource Management and Environmental Justice

Today, Western management institutions govern the use of Karuk culturally important natural resources. For example, the United States Forest Service (USFS) maintains jurisdictional authority over the terrestrial resources important to the Tribe—including acorns and other plants and plant products—that fall on USFS lands; the Fish and Wildlife Service manages federally-listed fish species under the Endangered Species Act, including coho salmon; the Bureau of Reclamation manages the distribution of water to federally subsidized farmers in the Upper Klamath Basin, which impacts the flow of rivers in the Lower Basin and affects the health of aquatic species, including coho and Chinook salmon runs important to the Tribe; the Federal Energy Regulatory Commission licenses the hydroelectric dams that control the flow of the Klamath River and block access to coho and Chinook salmon; and the State and regional water boards establish and enforce water quality standards for rivers—such as the Klamath River and its tributaries—under the federal Clean Water Act, which impacts aquatic resources such as salmon, lamprey, and riparian willows. For the Karuk, then, management of culturally important resources—including salmon, lamprey, oak, and willow resources, for example, all managed by the above jurisdictions—occurs almost entirely through participation in non-tribal regulatory processes.

The extent to which the Karuk people have been subjected to the negative impacts of resource degradation is clearly an issue that fits the environmental justice frame that has been developed by scholars and activists over the past several

decades (as demonstrated, for example, by Norgaard, 2005). In addition to the negative impacts that come from a denied access to traditional foods, Karuk people also experience environmental injustice when they are excluded from the environmental decision-making processes that govern their ancestral resources. Since environmental decision-making processes are made based on the “best available science,” participation in environmental decision-making often depends on the ability to participate in technical, expert-driven processes. Therefore, one of the aims of environmental justice movements is to “democratize science” to enable increased participation in regulatory processes by the groups that are impacted by those processes (Brown, 2007; Brulle & Pellow, 2006; Corburn, 2005).

In its environmental justice legislation, California has potentially opened the door to address centuries of discriminatory policies and injustices. Federal and state legislation in California requires agencies to address environmental justice. Federally, Executive Order 12898 requires agencies to avoid causing “disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations” (Executive Order No. 12898, 1994). In 1999, Governor Gray Davis signed into law Senate Bill (SB) 115 (Chapter 690, Statutes of 1999), California’s first piece of legislation enacting an environmental justice policy in California’s statutes. SB 115 (SB 115, Chapter 690, Statutes of 1999) established a definition of environmental justice in California Government Code³ and directed the California Environmental Protection Agency (Cal/EPA) to conduct its programs, policies, and activities—and promote enforcement of all environmental and health statutes—in ways that ensure “fair treatment of people of all races, cultures, and income levels, including minority populations and low-income populations of the state” (SB 115, Chapter 690, Statutes of 1999). Subsequently, California has passed over 20 laws addressing environmental justice (as cited in London, Sze, & Lievanos, 2008). In 2004, Cal/EPA adopted an Environmental Justice Action Plan to implement

³ SB 115 was authored by Senator Hilda Solis, and its provisions are codified in separate statutes, including California Government Code § 65040.12 and California Public Resources Code §§ 72000-01.

environmental justice legislation developed since 1999 (Cal/EPA, 2004). Since then, state boards, departments, and offices have developed their own environmental justice implementation plans.

The California regulatory agencies at the center of this study—the State Water Resources Control Board (State Board) and Regional Water Quality Control Boards (Regional Boards)—for example, formed an Environmental Justice Program that established goals reflecting California legislative mandates and associated strategies to meet these goals. These include the following goal:

Promoting meaningful public participation and community capacity building to allow communities to be effective participants in Board decision-making processes. (California Environmental Protection Agency State Water Resources Control Board [Cal/EPA SWRCB], 2016b)

and this associated strategy:

Reviewing existing public participation methods and recommend adjustments to ensure inclusion of all communities. (Cal/EPA SWRCB, 2016b)

Cal/EPA regulatory bodies also created pilot projects and small grants programs to launch their implementation plans (Cal/EPA, 2006). London, Sze, & Lievanos (2008) provide an analysis of these pilot projects and small grants programs. Among the small grants analyzed are several small grants by the State Board given to tribes along the Klamath River, including the Karuk Tribe. Overall, London et al. (2008) found that these pilot projects and small grant programs had limited success in improving communities' participation in public processes. In the specific case of the Klamath River tribes, pilot projects were intended to provide capacity to the tribes to perform human health and social impact analyses to inform regulatory processes (London et al., 2008). Based on review of project communications between tribal participants and agency staff, London et al. (2008) found that the project had an "uneven" impact on the tribes' participation in these processes. The study concluded that, "while the tribal members' 'resources' were incorporated into the decision making process, their knowledge and participation apparently was not" (London et al., 2008). Additionally, they found that projects were generally criticized by participants and environmental justice organizations and advocates for small grant

amounts and a failure to support smaller, grassroots organizations. The State Board small grants generally attempted to address calls by environmental justice scholars and activists to democratize regulatory science by increasing public participation in technical regulatory processes, but London et al.'s (2008) findings raised two important considerations: 1) participation must be *meaningful* to serve the cause of environmental justice, and 2) small, isolated projects may not do enough to change “the social, cultural and symbolic, and institutional conditions underlying poor distributions in the first place” (Schlosberg, 2004, p. 518). The study concluded that what are needed, then, are “proactive, programmatic strategies” and “new approaches to generate meaningful public participation” (Gordon & Harley, 2005, as cited by London et al., 2008, p. 263).

This study will evaluate the extent to which the Karuk Tribe—primarily through its Department of Natural Resources (Karuk DNR)—has been able to meaningfully participate in regulatory processes, using the Klamath River TMDL process⁴ as a particular case study for evaluation. This paper aims to identify and evaluate 1) barriers to participation, and 2) the extent to which meaningful participation is occurring in the TMDL process. Participation that stops at consultation will not be considered “meaningful” participation but rather “tokenism,” where participants are allowed to “hear and have a voice ... [but] lack the power to insure that their views will be heeded by the powerful. ... [T]he ground rules allow have-nots to advise, but retain for the powerholders the continued right to decide” (Arnstein, 1969). Meaningful participation, then, will be identified as the ability of the Tribe to insert knowledge, values, and interests into the TMDL process. Scholars have shown that social movements and social actors can transform regulatory systems to be more democratic and participatory (Liévanos, London, & Sze, 2011), and so an additional purpose of this study will be to explore how the Karuk Tribe’s efforts have transformed the TMDL regulatory process.

At the heart of this paper’s research question is the assumption that the cause of environmental justice can be served by making regulatory processes more

⁴ See footnote 1.

participatory. Participation by affected groups in the political processes that impact them is evaluated as a central aspect of environmental justice in the literature, and “the construction of inclusive, participatory decision-making institutions is at the centre of environmental justice demands ... [where] environmental justice activists call for policy-making procedures that encourage active community participation ... [and] recognize community knowledge” (Schlosberg, 2004, p. 524). The research question in this paper addresses the extent to which Karuk participation in regulatory processes (particularly the Klamath River TMDL process) is occurring. The Klamath River TMDL process was chosen as a case study precisely because the Tribe has actively invested in participating in this process. As will be discussed in the Chapter III of this paper (Conceptual Grounding), participation in regulatory processes is mediated through the negotiation of different types and sources of knowledge and expertise (Western science on the one hand, and traditional knowledge on the other). But there’s an inherent tension here that emerges throughout this paper. Because regulatory management institutions are rooted in Western science, participation in those management institutions must occur through the tools and language of Western science. To this extent, the literature often focuses on the idea of “integrating” traditional knowledge into Western scientific frameworks in order to make regulatory processes more participatory (see, for example, the extensive literature on co-management, such as in Berkes, 1999 or Pinkerton, 1994). But as noted by, for example, Paul Nadasdy,

the idea of integration ... contains the implicit assumption that the cultural beliefs and practices referred to as ‘traditional knowledge’ conform to Western conceptions about ‘knowledge.’ ... [and so] [a]boriginal people have been forced to express themselves in ways that conform to the institutions and practices of state management rather than to their own beliefs, values, and practices. (Nadasdy, 1999, p. 1)

In a sense, because they’re rooted in a fundamentally different worldview than the Karuk Tribe’s (as will be discussed in Chapter III), the regulatory processes that govern natural resource use could never be participatory enough to fully serve the cause of environmental justice. Rather, true environmental justice would be best served by the outright, formal recognition of traditional knowledge and traditional

management practices. The Karuk Tribe actively participates in regulatory processes such as the TMDL process, but they also engage in direct actions that advocate for an outright return to traditional management practices.⁵ In this light, participation in regulatory processes, then, should be seen throughout this paper as a strategy the Tribe uses to regain control of ancestral resources, and not an end in itself. This tension—between participation in existing regulatory frameworks and outright recognition of the Tribe’s right to resource management sovereignty—is occasionally referred to throughout this paper.

This paper will proceed in seven main chapters, with this introduction being the first. Next, Chapter II contains a description of the methods used. Chapter III then provides a conceptual grounding in the role of Western science in regulatory processes, and the differences between Karuk knowledge about resource management and Western regulatory science, is provided. In Chapter IV, barriers to participation in regulatory processes are broadly outlined. In Chapter V, a case study of participation in the Klamath River TMDL process is provided. Specifically, this chapter of the paper begins with a broad overview of the Karuk Department of Natural Resources’ (Karuk DNR) approach to engaging with regulatory processes. After this broad overview, Chapter V contains a specific case study analysis of how the Karuk DNR has been able to meaningfully participate in the Klamath River TMDL water regulatory process. Chapter V concludes with examples where barriers were not overcome in this case study. Finally, Chapter VI provides analysis of the how the Tribe’s participation in regulatory processes has helped transform them, and conclusions and next steps are provided in Chapter VII.

⁵ As of the writing of this paper, for example, the Tribe had recently engaged in a direct action campaign protesting a United States Forest Service’s management plan for Karuk ancestral forest lands (called the Westside Fire Recovery Project), and advocating for the use of an alternative Karuk forest management plan (see, for example, Hoffman, 2016).

CHAPTER II

METHODS

The geographic region at the center of this study is the Lower Klamath Basin in Northern California, where Karuk ancestral lands are located, and the Klamath River, which runs through the Karuk ancestral territory (Figure 1). This paper uses a case study approach to understand the question: *To what extent has the Karuk Tribe been able to meaningfully participate in regulatory processes?* The case study approach has been argued to have a distinct advantage in research that involves *how* or *why* questions (Yin, 2014, p. 14). Here, the case study is useful because it provides “thick description, is grounded, is holistic and lifelike, simplifies data to be considered, illuminates meanings, and can communicate tacit knowledge” (Guba & Lincoln, 1981, as paraphrased by Merriam, 2014, p. 49). The research question at the heart of this study seeks to identify and describe when, how, and why meaningful participation occurs.

Karuk participation in the Klamath River TMDL process is a valuable case study for a number of reasons. First, this case study was selected for its uniqueness. As Sharan Merriam notes, “a case study might be selected for its very uniqueness, for what it can reveal about a phenomenon, knowledge to which we would not otherwise have access” (Merriam, 2009, p. 46). This case study is a unique one because the Karuk Tribe Department of Natural Resources has been particularly involved in the TMDL process and has dedicated staff resources to participate in and collect monitoring data for water quality regulatory processes (the Tribe participates in many regulatory processes, but its water quality program is unique in that it has been particularly involved in systematically collecting data for use in regulatory processes for years, since 2000). The Tribe has also had some important successes over the course of participating in the TMDL process, and understanding these successes make this case a particularly useful one in understanding how and why participation occurs. Second, this case was selected because it provides a clearly bounded unit for analysis. While the implementation and monitoring phase

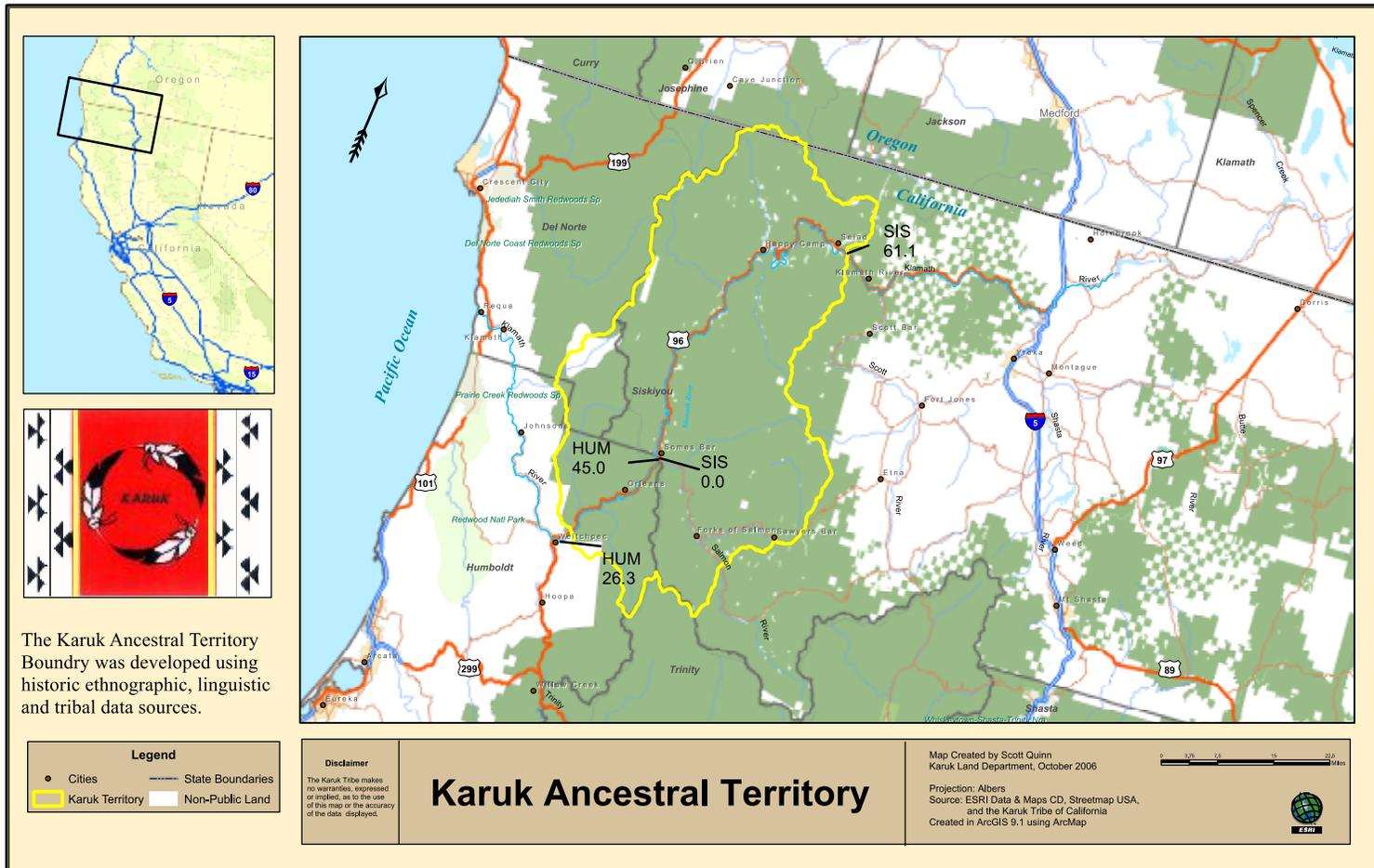


Figure 1: Boundaries of the Karuk ancestral territory. Map created by Scott Quinn for the Karuk Land Department, October 2006. See <http://www.dot.ca.gov/dist2/pdf/karukmap.pdf>.

of the Klamath River TMDL process⁶ is ongoing, the first three steps of the process⁷ are complete: toxins have been identified, acceptable load targets for toxins have also been identified, and the implementation and monitoring plans have been created. These steps are represented by the creation of the Klamath River TMDL regulatory document—titled “Final Staff Report for the Klamath River TMDL Addressing Temperature, Dissolved Oxygen, Nutrient, and Microcystin in California the Proposed Site Specific Dissolved Oxygen Objectives for the Klamath River in California, and the Klamath River and Lost River Implementation Plans”—which was adopted by the Regional Board in March 2010, the California State Water Resources Control Board on September 7, 2010, and by the US/EPA on December 28, 2010 (see NCRWQCB, 2012). Third, this case was selected because it emerged out of the process of conducting initial participant interviews. The introductory questions asked of interview participants were about Karuk participation in water regulation processes generally, and Karuk participation in the TMDL process emerged as a case that participants referred to in discussing this topic.

This study drew on two primary research methods. First, semi-structured, in-depth interviews were conducted with eight individuals who directly participate in regulatory processes either on behalf of the Tribe or collaboratively with the Tribe. Most interviews were conducted one-on-one (six individuals were interviewed this way), and one group interview was conducted with three participants, two of whom were only interviewed in this group setting. Individuals interviewed included both tribal and non-tribal members of the Karuk Department of Natural Resources staff (four individuals total, including two Karuk Tribe members and two non-tribal members) and individuals who work for non-tribal organizations that collaborate directly with the Tribe to reach resource management goals (four individuals total, including three non-tribal members and one Karuk Tribe member). These interviews were conducted on-site in the Karuk ancestral territory along the Klamath River from February 13, 2012 through February 17, 2012. Interviews were

⁶ See footnote 1.

⁷ See footnote 1.

transcribed and coded using “descriptive codes” (Hay, 2005, p. 224). All participants cited in this paper reviewed and approved the use of quotes and attribution. Quotes from the interview process are attributed within the text of this paper using the following format: (interviewee name[s], [group] interview date, in location). For example, the following sample quote uses this format: “And so once Kari [Norgaard] was able to come in and unravel the cultural mystery of Western science is when I started getting traction in the natural resource management world” (Ron Reed, interview 2/13/2012, Happy Camp, California).

Second, textual analysis was performed on public records documents. These documents included comments submitted by the Karuk Tribe during the TMDL process; State Water Resources Control Board (State Board) and the North Coast Regional Water Quality Control Board (Regional Board) staff reports for the Klamath River TMDL process; Klamath River Basin Fisheries Task Force meeting minutes; press releases by the Karuk Tribe in response to TMDL-related issues; language from mission statements of the Karuk DNR, Klamath Basin Tribal Water Quality Work Group, and State Water Resources Control Board Environmental Justice Program; newspaper articles; and other technical reports and documents produced by the Karuk DNR.

This study was facilitated the efforts of a key informant, Ron Reed, a Karuk Tribe member, traditional fisherman, and Karuk Department of Resources Cultural Biologist who has actively participated—as an activist, expert knowledge holder, and facilitator—in regulatory processes that impact the Karuk Tribe for years. Key informants are “interviewed intensively over an extensive period of time for the purpose of providing a relatively complete ethnographical description of the social and cultural patterns of their group. In that particular fashion, a few informants are interviewed with the aim of securing the total patterning of a culture” (Tremblay, 1957, p. 688). Reed has been instrumental in establishing research collaboratives with academic institutions, and has worked, for example, with Sociologist Kari Norgaard as a co-author and expert key informant on a number of reports (see, for example, Norgaard, 2005 and Reed & Norgaard, 2010). Norgaard is the faculty advisor on this paper, and connected this paper’s author to Reed in 2011. Many

informal interviews were conducted with Reed over the course of the February 2012 research trip. These interviews were largely unstructured, where Reed provided detailed, narrative description and insight into his experience participating in regulatory processes. Reed served as the guide and facilitator throughout this trip, and he identified individuals to interview, introduced the researcher to these individuals, and helped schedule interviews.

CHAPTER III
CONCEPTUAL GROUNDING: REGULATORY SCIENCE AND
TRADITIONAL KNOWLEDGE

One mechanism by which tribes can be excluded from participating in the regulatory processes of resource management is through the privileging of Western science in the decision-making processes of environmental management. In the United States, a risk paradigm using Western scientific methods shapes how environmental decisions are made (National Research Council Staff, 1982; O'Brien, 2000a). This framework tends to value certain kinds of expertise—particularly technical and quantitative evidence derived from formal, scientific training—over others (Corburn, 2005, p. 27; O'Brien, 2000a). This position of Western science in the regulatory management paradigm has implications for assigning power in regulatory processes. Knowledge that lies outside the purview of scientific experts, knowledge that often comes from those directly affected by particular environmental problems, is often ignored or devalued in this risk frame. For example, Bina Agarwal (1992) argues that technology and science serve to privilege commercial interests, marginalizing indigenous knowledge in the process. As will be discussed, professional expertise—i.e. scientific expertise—may be made more robust with the use of participatory or even action-oriented research processes that bring local knowledge into the research process. Additionally, these participatory methods are important in order to address environmental justice concerns that arise when professional expertise is privileged over local knowledge.

Critiques of Science

The authority given to technical experts—to scientists who assess risk, in the above example—has become a site of some scrutiny among academics, activists, and professionals in and outside of environmental fields. This concern centers on a critique of the assumptions that characterize orthodox, positivistic science. These assumptions are summarized well by Stephen Small:

- a) the [assumption of the] existence of a single, tangible reality that can be divided and reduced to independent parts, any of which can be studied, independently of others;
- b) the belief that every action or effect can be explained as resulting from a cause...;
- c) the view that research is a value-free endeavor and that the researcher is able to maintain objectivity and distance from the phenomenon under study; and
- d) the belief that the goal of research is to develop a nomothetic body of knowledge that is highly generalizable across settings, people, and time. (Small, 1995, p. 949)

In other words, there exist in the traditional scientific paradigm the assumptions that complex systems can be reduced and explained using cause-effect relationships, and that science produces general, objective, or universalizable knowledge. Critics of scientific experts' privileged role in society (in, for example, environmental health policy) have scrutinized these assumptions.

First, there is a problem in the assumption that complex systems can be best understood through reduction (which is what science does), which produces general kinds of information about cause-effect relationships. In fact, general, scientific ideas—when applied to particular, local contexts—tend to lose their relevancy, a phenomenon that Lotfi Zagedh calls “fuzzy logic” (Reiners & Lockwood, 2009, p. 53). As Rolf Lidskog puts it,

a high degree of validity and reliability of scientific findings within the laboratory context is not enough when facing the complex conditions of the real world. Thus, when science leaves the laboratory, when it makes knowledge claims about conditions outside the closed laboratory world, it tends to lose its reliability. (Lidskog, 2008, p. 76)

This phenomenon is one that's seen often in the field of environmental health, where experts determine that a particular environmental toxin is not hazardous for the health of individuals. Academic and popular literature and media are filled with examples of this. What Lidskog is describing is, essentially, the phenomenon of fuzzy logic, where particularly complex systems cannot be easily reduced to component pieces and still be “relevant” to the real world. In cases like these, critics have suggested that local knowledge may provide the kind of “contextual intelligence” needed to ground science (Corburn, 2005, p. 4). There are many examples of

popular epidemiology, for example, where lay people feel the effects of hazardous toxins and draw conclusions that—once scientists have redefined their research questions to reflect this new knowledge, or after enough time passes to gather sufficient data—are later “validated” by science (Lidskog, 2008, p. 70).

Second, the ideal of scientific objectivity—its culturally constructed place of privileged authority—is contested by scholars, and also on a broader social scale, in activist communities and among the public (Bäckstrand, 2004; Leach & Fairhead, 2002; Lidskog, 2008; Wolfley, 1998). As identified by Donna Haraway in “Situated Knowledges”—and certainly others since—Western science is, like all knowledge, situated in a specific cultural context that precludes this kind of objectivity (Haraway, 1988). Haraway specifically calls into question the idea of science as a disinterested, purely objective enterprise that gets at “absolute truth,” arguing instead that scientific knowledge is produced in a cultural context of power relationships that shape the kinds of research questions asked, the way data are analyzed, etc. More recently, Jason Corburn (2005) argues that Western scientific knowledge is “always ‘co-produced’; science and politics are interdependent, each drawing from the other in a dynamic iterative process” (p. 4). The most basic example of the way that social and political influences shape scientific findings is the setting of research agendas, which are often set by those with the resources to fund research. This second critique of science, then, raises important issues of environmental justice and the need to include individuals affected by management decisions directly in the technical processes that inform environmental decision-making processes.

The solution is not, however, to discard technical, scientific processes in environmental decision-making processes. Richard York (p. 86) distinguishes between “the logic of science”—which produces useful information for making environmental decisions—and “the establishment of science”—in which “science and scientists cannot be seen as disinterested parties seeking truth for its own sake” (York, 2009, pp. 86 and 88). Environmental problems are, after all, objectively real problems (as opposed to being socially constructed problems), and so empirical evidence about the environment is critical to understanding environmental

problems. Rather than discarding science, then, many scholars instead suggest that scientific expertise should be negotiated or “co-produced” with local knowledge to inform environmental decisions (Corburn, 2005, p. 8) or “democratized” (Lidskog, 2008). In theory and in practice, there is a burgeoning list of frameworks for increasing citizen participation and control of the scientific process, a list that includes, for example, adaptive co-management, participatory action research (PAR), Community-Based Participatory Research (CBPR), what Jason Corburn calls “street science,” and citizen science. Interest in so-called “action-oriented” research, in particular, is growing, and frameworks like the ones just listed address some of the limitations of technical science by showing ways that the scientific process can be made more inclusive of other types of knowledge, such as local knowledge and traditional knowledge. By making research participatory at all stages of the research process, these frameworks seek to address some of the problems of lack of relevancy, robustness, and justice raised by critiques of science.

Defining Traditional Knowledge

To understand how processes based on regulatory science can marginalize tribes’ interests and knowledge, it’s helpful to have some grounding in what is alternately called traditional knowledge, indigenous knowledge, Native science, Traditional Ecological Knowledge (TEK), or the Indigenous Stewardship Method (ISM). Traditional knowledge is a type of local knowledge that has received a good deal of academic attention. Its role addressing “wicked problems” (Rittel & Webber, 1973) that are characterized by uncertainty, high stakes, and disputing values (Funtowicz & Ravetz, 1991) is recognized in the academic literature. For example, Western scientists, academics, and natural resource managers are increasingly recognizing the importance of traditional knowledge in addressing perhaps the most challenging wicked environmental problem today: climate change (Agrawal, 2002; Leonetti, 2010; Whyte, 2013a). Philosopher Kyle Powys Whyte, a Potawatomi citizen, provides an excellent review of the ways that traditional knowledge has been defined by indigenous and non-indigenous academics, scientists, planners, and policy professionals (Whyte, 2013b). Traditional knowledge has been defined by

non-Native academics as a “cumulative body of knowledge ... handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with one another and their environment” (Berkes, 1999, p.7); and as knowledge embedded in the “physical, spiritual, mental, emotional, and intuitive relationship of indigenous peoples [and] their environment” (Leonetti, 2010, p. 13). Here, traditional knowledge is seen as a body of knowledge gained through the collective experiences of Native societies, transmitted through cultural and spiritual beliefs that may be added to or modified as societies adapt to environmental change. Whyte (2013b) notes that this definition sees traditional knowledge as “an archive” of knowledge that can be accessed by Western scientists—perhaps through research or through working with communities, and ultimately incorporated into Western scientific research and used in policy, planning, and regulatory processes (p. 3-4).

In contrast, Native scientists define traditional knowledge as a “*process of participating fully and responsibly*” in the relationships between “knowledge, people, and all Creation (the ‘natural’ world as well as the spiritual)” (emphasis mine; McGregor, 2008, p. 145). This definition is based on a cosmology that sees humans not as stewards or managers that are separate from the natural world, but humans as a part of the natural world and therefore responsible to it (Pierotti & Wildcat, 2000). This suggests that TEK cannot be easily accessed and incorporated by non-Native scientists or policy makers, unless those people “also learn the systems of responsibilities and character traits [of the Native community whose knowledge is being used]. Such learning entails complete cultural immersion” (p. 5). Similarly, Paul Nadasdy (1999) describes what he sees as the “absurdity” of the idea that TEK can be incorporated for use in regulatory processes by non-Native managers. It’s common, he notes, for non-Native managers to ask to Native people to “‘tell us what traditional knowledge is, so we can use it,’” but if a “First Nation elder were to stand up ... and ask a biologist to teach him/her ... the principles of conservation biology ‘so we can use it,’ these [non-Native managers] would probably chuckle at the absurdity of the request and [explain] how many years of training are required before one can ... master and use that kind of knowledge” (p.

12-13). The distinction between these two categories of definitions—where traditional knowledge is defined on the one hand as an archival body of knowledge that can be accessed, updated, and incorporated and, on the other, defined as a system of participation in and responsibility to the natural world—has critical implications for the use of traditional knowledge in resource management processes. Whyte (2013b) says the implication here is that:

In terms of the former [definition], TEK can be extracted from its society and fit into policy-relevant science. But definitions based on the assumption that TEK is a system of responsibilities suggest that for TEK to be genuinely included, *the people who participate fully in it must be at the table equally with non-indigenous scientists and policy makers.* (emphasis mine; p. 5)

In order for tribes to be able to participate fully in regulatory processes, then, their system of knowledge must be viewed equally alongside Western science through the shared, equal participation of Native resource managers. This perspective highlights the tension between participation in existing regulatory frameworks on the one hand, and formal recognition of a Tribe's equal, sovereign right to manage culturally important natural resources on the other.

There is also a good deal of attention paid in the literature to delineating the differences between Western science and traditional knowledge. Here, scholars often focus on Western science as quantitative, compartmentalized, reductive, and objective, on the one hand, and traditional knowledge as qualitative, holistic, and embedded in spiritual and cultural values, on the other (Kimmerer, 2002). While Western science is seen as abstract from its cultural and social context and does not deal with the “why” questions explained by spiritual and cultural values, traditional knowledge integrates social, cultural, ecological, and spiritual knowledge. In contrast to this view of Western science and traditional knowledge as necessarily distinct, Arun Agrawal (1995) sees such delineation as problematic and even reinforcing of power hierarchies. Agrawal (1995) says:

It is only when we move away from the sterile dichotomy between indigenous and western, when we begin to recognize intra-group differentiation; and when we seek out bridges across the constructed chasm between the traditional and the scientific, that we will initiate a productive dialogue to safeguard the interests of those who are disadvantaged. (p. 433)

This view is consistent with the previously discussed critiques of science by Haraway (1988) and others in which Western science is viewed as no different from other types of knowledge in that it is value-laden and produced from a specific cultural context. To this critique of scientific objectivity, Whyte (2013b) adds, “[i]n the case of scientific disciplines, values of objectivity are based on cosmological assumptions about there being subjects and objects in the world and which beings, entities, and phenomena fall under one or the other” (p. 7). Whyte also notes that Agrawal’s perspective reveals the problem of assuming that all traditional knowledge can be defined as having similar characteristics that are distinct from Western science. This, however, “misses the realities of indigenous environmental governance today,” where “it is hard to imagine a rigid separation between TEK and science and technology because TEK systems can incorporate scientific techniques” (Whyte, 2013b, p. 7; see Woodward, 2005 and Reo & Whyte, 2012 for examples). At the same time, traditional knowledge *does* often refer to a radically different cultural paradigm with a cosmology that is very distinct from the cosmology underlying the assumptions of Western science. It is critical, therefore, that no single definition of traditional knowledge is assumed to apply to traditional knowledge originating from distinct communities. Rather, traditional knowledge must be viewed from within the context of the particular communities that produce it. What can be said generally about traditional knowledge and Western science, however, is that one cannot assume that they necessarily share the same cosmological assumptions, nor is it valid to hold up Western science as the more legitimate type of knowledge. The implication here is, again, that in order to facilitate meaningful participation of Native knowledge holders in resource management, their knowledge perspective must be fully and equally represented as valid knowledge at the management table. Whyte (2013b) notes that this level of participation will require Native and non-Native resource managers “to become a part of a long term process whereby cross-cultural and cross-situation divides are better bridged through mutual respect and learning, and relationships among collaborators are given the opportunity to mature” (p. 10). This view of participatory resource management is similar to how some scholars describe participatory action research as taking place, where the

research process may be seen “not only as a process of creating knowledge, but simultaneously, as education and development of consciousness, and of mobilization for action” (Small, 1995, p. 243). Education, in other words, is an integral piece in collaborative or participatory research processes. The process of education that occurs in a participatory research framework is reciprocal as multiple “experts” (e.g. traditional experts and Western science experts) interact in order to co-produce a more complete picture of the problem being studied.

Describing Karuk Traditional Knowledge

According to traditional knowledge holders in the Karuk Tribe, the Karuk are “Fix the World People.” As the director of the Karuk Department of Natural Resources, also a Karuk Tribe member and cultural practitioner, puts it,

We don't have a word for religion. We don't have a word for ecosystem management. All of those things are combined with our daily lives. The basis of our science is also the basis of our religion. Our religious practices and our religious beliefs are tied to the management of this landscape. That's where they originated from. The ritual practices that people might say, ‘that's your religion,’ they're really a part of everyday life, and that everyday life is really all connected to survival. And to survive in this place they had to manage the resources in a way that they didn't go away. ... So you can't really separate your daily walking, talking and breathing life from your religion or from your resource management. (Leaf Hillman, interview February 17, 2012, in Happy Camp, California)

From this perspective, Karuk traditional knowledge is understood as embedded in a spiritual and cultural framework that is rooted in the lived experience of surviving in a place, dependent on that place, for thousands of years. The Karuk have managed the Klamath River fishery on which their Tribe has subsisted for tens of thousands of years (Reed & Norgaard, 2010). This management has taken place through religious ceremony and harvest techniques conducted in coordination with neighboring tribes (Hillman & Salter, 1997).

The transmission of Karuk traditional knowledge and management practices has been impacted by direct genocide and discriminatory practices on the part of regulatory agencies, but the Karuk have retained knowledge and traditions and are undergoing “a political, economic, and ethnic renewal” (Bell, 1991, Nagel, 1996, as

cited by Norgaard, 2009). The specific content of Karuk traditional knowledge has been documented and discussed by scholars over the past two decades (Anderson, 2005; Kimmerer & Lake, 2001; Lake, 2007; Lake, Tripp, & Reed, 2010). Recently, the Karuk DNR undertook the creation of a comprehensive and detailed report that synthesizes and combines this work. The report, which is in draft form, is called the “Eco-Cultural Resources Management Plan” (Draft ECRMP) (Karuk Department of Natural Resources, 2010). In the Draft ECRMP, the Tribe’s resource management perspective is described as:

adaptive, holistic, and sustainable for people and place. Ecosystem management should take care of the land, addresses people’s needs, use resources wisely, and practice ecologically balanced stewardship. (Karuk DNR, 2010, p. 6)

This perspective was also cited in the Tribe’s recently completed “Karuk Department of Natural Resources Strategic Plan for Organizational Development” (Karuk Department of Natural Resources, 2015). The traditional Karuk stewardship perspective emphasizes holistic management of the watershed, from in-stream to upslope resources; is adaptive, having been learned through trial and error over thousands of years; and is inseparable from Karuk cultural and religious beliefs.

CHAPTER IV
BARRIERS TO PARTICIPATION IN REGULATORY PROCESSES

Documenting Knowledge and Values

One barrier to Karuk participation in management policies is the prerequisite that traditional knowledge be documented in some way before it may be used in regulatory processes. Undocumented traditional knowledge may preclude tribes from participating in regulatory processes, yet documentation presents an array of challenges. For example, there are cultural barriers to documenting—i.e. physically recording or writing down—traditional knowledge that is transmitted orally (Huntington, 2000). Additionally, there are examples of non-tribal groups using documented traditional knowledge against knowledge holders once the information is made public (Ristroph, 2012). In a report prepared for the Karuk Tribe Department of Natural Resources, titled “Karuk Traditional Ecological Knowledge and the Need for Knowledge Sovereignty: Social, Cultural, and Economic Impacts of Denied Access to Traditional Management,” Kari Norgaard (2014) writes, “often knowledge cannot or should not be shared because it imposes unique risks on Karuk traditional practitioners (e.g. risks that scientists do not have to bear). Sharing knowledge could for example disclose a sacred place or hunting ground that should not go public” (p. 19-20). Issues of intellectual property rights are also a concern: Once knowledge becomes public, it can be exploited without compensation to tribes (Ristroph, 2012), and as Norgaard (2014) notes, this is increasingly problematic “[i]n the context of recent aggressive University copyright practices [where] the risks to traditional practitioners from sharing traditional knowledge are even greater” (p. 20). In short, there are many reasons why traditional knowledge holders might be wary of disclosing traditional knowledge in a formal regulatory process.

In the case of the Karuk Tribe, cases where documenting traditional knowledge is required by a regulatory process may present particular challenges because it requires a break with years of cultural survival practices. These survival practices were a response to the state-sanctioned genocide throughout the

nineteenth century, forced relocation, and ensuing years of racism and human rights violations (Heizer 1993; Norton 1979). Yet through these atrocities, Karuk culture persisted. A cultural practitioner, spiritual leader, and Director of the Department of Natural Resources explains:

That's the way that it's been for our people for several generations now, is the people who keep the traditions alive, who are responsible for us still having the culture and the language and the tradition today, that's how they did it: by blending in, not being noticed, and going underground. (Leaf Hillman, interview February 17, 2012, in Happy Camp, California)

To adapt to a social climate that discriminated severely against Klamath Basin tribes, the Karuk Tribe hid its cultural practices from non-Native people. Documenting traditional knowledge for regulatory processes, then, requires a break with years of learned cultural and social norms that emerged as a response to genocide. Hillman goes on:

It was very unnatural to me to talk about things, let alone to write down those kind of things, those things I know are important and critical to our survival but the reason why they're there today is we've managed to continue them outside of people's knowledge and awareness. (Leaf Hillman, interview February 17, 2012, in Happy Camp, California)

Karuk cultural practices persisted despite extreme discrimination precisely because they were hidden, and definitely *not* documented. Physical and cultural survival—and, by extension, the survival of traditional knowledge—quite literally required that Karuk culture become invisible to non-Native individuals. This makes documentation of cultural practices in regulatory processes an understandably thorny proposition for tribal members.

Translating Knowledge and Values

Translation of Karuk cultural knowledge into scientific terms can also be a challenge to using traditional knowledge to inform natural resource management. Cultural practitioner and Karuk DNR Cultural Biologist Ron Reed notes a specific example of how this task is difficult:

One of the issues that has some big problems is how do we define the level of importance of a resource. You know, society [works with] merchantable species or merchantable resources. And the Tribe, we don't put money on a

fish. It's kinda like everything is quantified in these economic models, either by how much money you're making or how much money you're losing. And the tribes can't really play that game because we don't utilize that kind of level of importance to identify the resources for prioritization processes. (Ron Reed, group interview February 14, 2012, in Orleans, California)

In this view, translating the value the Tribe places on natural resources in a way that can be understood and used in regulatory processes presents a fundamental difficulty. This is difficult, Reed notes, because the Tribe and non-Native resource managers have fundamentally different worldviews: while Western society often views natural resources as monetary commodities, the Tribe does not. The valuation of resources as commodities reflects a broader Western cosmology where humans are viewed as separate from nature, and resources are viewed as objects to be managed. When the Tribe is asked to “quantify” the value they place on resources, then, this is difficult. Regulatory processes that prioritize management goals according to economic models favor a fundamentally Western understanding of the world, and because the Tribe doesn't share that worldview, they “can't really play that [regulatory] game.” The difficulty in translation that arises from a difference in worldviews is described by another Karuk Tribe member:

Can you compare a quantitative value with a qualitative, internal, spiritual component? It's like apples and oranges. They can't understand. They don't have that kind of tie. Their tie to the resource is through how much money they can make per year to provide food for family. Our tie to the resource is for our families to survive, period. Our culture to survive, period. (Josh Saxon, group interview February 14, 2012, in Orleans, California)

The traditional perspective noted here is that resources are valuable because they, quite literally, provide life for people and culture. In this perspective, humans are not separate from nature, but rather individual and cultural survival is seen as inseparable from and dependent upon natural resources. Spirituality, culture, and natural resource management are inseparable in the Karuk traditional management perspective. The difficulty in getting this perspective inserted into Western regulatory processes lies in the difficulty, in part, of untangling these values and quantifying them for insertion into management processes.

The regulatory structures that govern California water management provide an example of how compartmentalization, commodification, and quantification can exclude tribal knowledge and interests. States set water quality standards by limiting the amount of pollution (called Total Maximum Daily Loads or TMDLs) a given body of water may be exposed to without negatively affecting the beneficial uses of that water. In California, the State Water Resources Control Board (State Board) recognizes distinct beneficial uses for the appropriation of water (Cal/EPA, 2014). These beneficial uses may include domestic, irrigation; power; municipal; mining; industrial; fish and wildlife preservation and enhancement; aquaculture; recreational; stockwatering; water quality; frost protection; and heat control (CCR §659-672). Water quality standards are set according to beneficial uses that fall within these categories. There are many challenges with this regulatory model when it comes to inclusion of tribal knowledge and values. First, this list distinguishes discrete uses, and this compartmentalization doesn't fit easily with Karuk traditional values, where human health, habitat quality, spiritual practice, and cultural vitality, for example, are all connected to one healthy, well-functioning watershed. Additionally, this list is inclusive of commodified resource use—such as irrigation, power generation, and mining—while explicit reference to tribes is noticeably absent. This underscores the fact that the natural resource regulations of federal, state, and regional agencies can serve to perpetuate colonial interests while marginalizing Native people and culture (Agarwal, 1992; Wolfley, 1998). Where farmers, commercial fishers, and hydroelectric power companies all fit easily into the California state water management model, tribes in California are given the far more challenging task of fitting cultural and spiritual values into a model that privileges values that are easily parsed and quantified.

Legitimizing Knowledge and Values

A barrier that is very closely related to translation is the issue of how legitimacy is assigned to knowledge. Spiritual and cultural values don't fit easily into a regulatory science paradigm, and information that doesn't fit easily into this

paradigm is often not considered legitimate (Colorado, 1988). This was reflected in interviews, as in the following comment by Director of Karuk DNR Leaf Hillman:

And the fact that one of your staff says some shit like that in a meeting, well you lost half the people in the meeting already. "Oh, they're backwards, believe in witchcraft, hocus pocus," [or] whatever. So explaining practices to Western scientists, you know, if we explain things from our terms, those things get dismissed because they're based on myth, because they have to do with spirituality and those things that we can't separate from everything else in the world, from walking, talking, breathing, to religion, to resource management. The interconnections are undeniable to us and inseparable to us, but yet we're forced into this place where we have to separate them. And it just doesn't translate very well. (Leaf Hillman, interview February 17, 2012, in Happy Camp, California)

Myths, practices, and cultural values are not treated as legitimate sources of information because they cannot be treated with Western scientific methods (Pierotti & Wildcat, 1997). This de-legitimization of cultural knowledge curtails the ability of tribal members to participate in regulatory processes, and examples of traditional knowledge not being viewed as legitimate testimony exists in the literature (Bielawski 2003; Ellis, 2005; Nadasdy, 1999).

The issue of legitimacy is further described in the following exchange between Ron Reed and a staff member of a non-profit that often collaborates with the Tribe. The exchange is in reference to tribal and, more broadly, local participation in the public hearing process for establishment of TMDLs:

Erica Terence: A lot of what people are able to provide in a hearing like that comes across to a manager as anecdotal. [...]

Ron Reed: We have the best science. We're trying to prove that.

Erica Terence: And it's just a matter of getting it packaged up right, basically, sometimes.

Ron Reed: Put it in their language. And I mean that's what I was alluding to, that maybe you guys [NGOs] are able to put these things into language that people, or other managers, are able to hear. (Erica Terence and Ron Reed, group interview February 14, 2012, in Orleans, California)

This exchange raises a couple of points about the ways that managers legitimize knowledge in regulatory processes. First, as noted above, traditional knowledge—and, more broadly, local knowledge in general—is often treated as anecdotal in

regulatory processes and, therefore, as not universal, replicable, or legitimate (Usher, 2000). But Karuk knowledge about resource management is far from anecdotal. Indeed, Hillman says, “[Karuk] science has been around for a long time, but it has the same basis as their science. It’s based on trial and error over time. That’s why ours is better. It’s a lot more trial and error over a lot longer period of time” (Leaf Hillman, interview February 17, 2012, in Happy Camp, California). Karuk traditional knowledge represents tens of thousands of years of collective experience with resource management. In this way, Karuk knowledge may be seen as transmitted through cultural, spiritual, and social practices and values that, though often related through personal experience, convey cumulative and collective experience (Berkes, 1999). Yet, when traditional knowledge is expressed as contextual, personal experience, story-telling, or spiritually embedded knowledge (Usher, 2000), it is often dismissed by scientists and administrators.

Secondly, the above exchange shows that, in order to present knowledge that managers “are able to hear,” or treat as legitimate, it must get “packaged up right” and “put in their language.” That is, traditional knowledge is only considered legitimate when it can be put into Western scientific terms. The process by which traditional knowledge is legitimized by being translated into Western scientific terms is called “scientization” (Agrawal, 2002). This process describes the practice of adapting traditional knowledge to the specialized language of Western science. Traditional knowledge is often considered legitimate only when it is adapted to the Western science narrative (Agrawal, 2002; Raffles, 2002). This means that traditional knowledge corroborated by Western science is incorporated into regulatory processes, while traditional knowledge not corroborated is often discarded by managers (Raffles, 2002). Nadasdy argues that when scientific experts describe and record traditional knowledge for the purpose of integrating it into Western management processes, they are further “extending the social and conceptual networks of scientific resource management into local communities,” which works against the direct participation of Native people in management processes (Nadasdy, 1999, p. 12). This warning is an important one to seriously consider whenever traditional knowledge is being incorporated into management

processes, and steps must be taken to increase direct participation in regulatory processes and, ultimately, move toward outright recognition of traditional knowledge and management practices.

Even when local, traditional knowledge is corroborated with scientific evidence, however, it may still not be considered legitimate. This was reflected in interviews with current and former staff members of the Karuk DNR, who mentioned what they perceived as a tendency of regulatory bodies to treat Western scientific evidence—specifically, water quality monitoring data—provided by the Tribe to a higher level of scrutiny than other scientific evidence. This is seen in a specific example where the Tribe’s water quality monitoring program⁸ found toxic levels of microcystin, or *Microcystis aeruginosa*, a toxic blue-green algae, in two reservoirs (Copco and Iron Gate) behind two dams on the Klamath River. This toxin had previously not been identified as a toxin of concern by the State of California under the Clean Water Act. The Karuk water quality program collected monitoring data that documented the toxicity of *Microcystis aeruginosa* in the reservoirs, a scientific activity that was certainly motivated by a cultural perspective that values clean water as necessary to cultural survival. Karuk DNR staff went to Siskiyou County Health Board (County Health Board) with the information, requesting that Copco Lake be closed (Tucker, 2005). The County Health Board did not close the lake, and rather argued that the Tribe’s monitoring data were not credible⁹ (Klamath River Basin Fisheries Task Force, 2005, p. 6). According to Hillman,¹⁰ the

⁸ The Tribe’s water quality monitoring program is an arm of the Karuk DNR that conducts routine monitoring in order to contribute baseline water quality monitoring data to the TMDL process. This program will be discussed in greater depth later in this paper.

⁹ From the meeting minutes: “[Siskiyou County Representative] Marcia Armstrong referenced two letters from the Public Health Officer regarding sampling protocols and other issues [s]he has with the ongoing studies. [Sh]e isn’t finding the science behind the conclusions that are drawn, and is concerned that people are jumping to conclusions” (Klamath River Basin Fisheries Task Force, 2005, p. 6).

¹⁰ “Siskiyou County is still going to question the science because of where it came from. ... In public meetings, in the newspapers, our science was belittled and not

County's perspective reflected public and media voices that attacked the Tribe's science—and questioned its legitimacy—for being politically motivated by dam removal.¹¹ In response, Karuk DNR staff brought the issue to other agencies with jurisdictional authority over the issue—including the State Water Board and the EPA—and these agencies subsequently released public health warnings (Bacher, 2007). In 2008, the EPA issued a determination to include *Microcystis aeruginosa* in the 303(d) toxins listings for the segment of the Klamath River that includes the Copco and Iron Gate Reservoirs, citing the Karuk Tribe's technical reports in their determination (United States Environmental Protection Agency, 2008). The fact that Karuk monitoring data were questioned by one agency but cited and used in a regulatory action by another underscores the fact that politics and power, and not just robust research practices, play into how agencies treat scientific data. If the process of producing scientific knowledge is not value-free, as has been shown in the literature (see for example Haraway, 1988; Biagioli, 1999; and Turnbull, 2000), then it makes sense that the process of assessing scientific knowledge is not value-free either. A history of racism and human rights violations in the Lower Klamath Basin is something that could certainly play into agency perspectives of the Tribe's research practices, as could conflicting perspectives of the purpose for which resources should be managed (as a commodity for hydroelectric power, for example, rather than as a resource with intrinsic value necessary for cultural survival). Or it may be that overt hostility toward the Tribe and its staff simply led to a lack of political will on the part of regulating agencies who might not have wanted to oppose such hostility. Susan Corum, who was the Karuk DNR Water Quality Coordinator at the time of the events examined in this paper (but was not in this

taken seriously. Turns out the Tribe is making up this shit because it's part of our strategy to get rid of dams" (Leaf Hillman, interview February 17, 2012, in Happy Camp, California).

¹¹ As, for example, in this article, which notes that "additional to possible health risks associated with the algae, the conversation about this embattled subject grew to include dam relicensing, testing protocol and media coverage issues" and quotes one Copco resident as saying, "I think it's all a political thing to get the dams removed" (Clayton & Rios, 2006).

role at the time of her February 2012 interview for this paper), describes attending a North Coast Regional Water Quality Control Board (the jurisdiction of which includes Karuk Ancestral Territory; called the “Regional Board” hereafter) meeting on microcystin:

I went to a public meeting to talk about that stuff in Yreka and I felt ambushed. It wasn't tribal folks, it was mostly white farmer types. I had people coming in and screaming at me because I was collecting these data. And I had people from EPA and Regional Board standing there and watching it happen, and letting it happen. ... I had people in my face yelling at me because I was presenting a report on data I collected. (Susan Corum, interview 2/16/2012, in Somes Bar, California)

Whatever the reason, Karuk DNR staff perceive that technical documents produced by the Tribe will be heavily scrutinized. Hillman says that he tells the following to Karuk DNR water quality staff:

Turns out that our water quality program, the research that you guys do at water quality, monitoring, sampling, whatever it is, you gotta do it better, you have to be better. Your protocols, your chain of custody, all that stuff, it needs to be better than anyone else's, because it's gonna be questioned. It's gonna be questioned because you work for an Indian Tribe. So automatically your credibility, your professional and scientific [credibility], is going to be questioned more than anybody else. (Leaf Hillman, interview February 17, 2012, in Happy Camp, California)

Navigating Multiple Jurisdictions

One of the major barriers to inserting Karuk traditional knowledge and values in regulatory processes is the difficulty of navigating multiple jurisdictions. In the Lower Klamath Basin, resource management occurs under the oversight of multiple, overlapping agency jurisdictions, each governing a discrete resource according to a distinct set of goals. For example, the Fish and Wildlife Service manages federally-listed endangered fish species under the Endangered Species Act; the Bureau of Reclamation manages the distribution of water to federally subsidized farmers in the upper basin, which impacts the flow of rivers in the Lower Basin; the USFS manages the terrestrial resources on federal forest lands that are upslope of the Klamath River [indeed, 97% of the Karuk Tribe's Ancestral Territory is held in trust by the USFS, including lands in the Klamath, Six Rivers, and Siskiyou National

Forests (Karuk Department of Natural Resources, 2015)]; the Federal Energy Regulatory Commission licenses the four hydroelectric dams that control the flow of the Klamath River; and the State and regional water boards establish and enforce water quality standards for rivers and other water bodies under the federal Clean Water Act. Under these jurisdictions, watershed management is broken down into silos, where different agencies manage different resources for different aims. Each agency manages the resources in its jurisdiction according to the priorities set by distinct mission statements.

While Karuk traditional management practices are intended to benefit whole ecosystems (Karuk DNR, 2015), these jurisdictional boundaries present a definite barrier to holistic management. Indeed, multiagency jurisdictional frameworks are frequently characterized by poor communication between agencies and a lack of authorization for holistic or collaborative resource management across agencies (Wolfley, 1998). Reed said the following when asked how well he believes Karuk issues and concerns about watershed management are being addressed by regulatory processes:

I'd say that no they haven't in a cultural sense, [though] I think in a modern science way, I think that yeah. ... The people that are working on those scientific issues I feel very comfortable with. I think we're hitting the mark. But ... on a stewardship level from the mouth to the headwaters, I'm not so sure. I'm not too sure if the landscape and the river will be able to support the process. And so I think that's why it's very important to come back and manage the landscape more properly. (Ron Reed, interview February 13, 2012, in Happy Camp, California)

Here, Reed notes that he thinks the Tribe is, broadly, doing a good job at engaging in regulatory processes through its use of and contribution to Western regulatory science. Even so, though, he notes that the central principle of the Tribe's stewardship perspective—holistic management—is still not being achieved. This highlights the tension between participation in existing regulatory frameworks on the one hand, and formal recognition of a Tribe's equal, sovereign right to manage culturally important natural resources on the other. In a sense, because the TMDL process is rooted in a fundamentally different worldview than the Karuk Tribe's,

this process can be made more, though not fully, inclusive of Karuk values and management perspectives.

Capacity

Another dimension of all of the above challenges—documentation, translation, legitimacy, and multiple jurisdictions—is the issue of capacity. As will be discussed in the next section, the Tribe devotes many resources to documenting, translating, and legitimizing knowledge. This is necessary in order to get tribal perspectives inserted into resource management processes, but it is important to note that in all of these endeavors, because they are essentially fitting their resource management perspective into a different cultural framework, the Tribe bears a disproportionate (as compared to other government entities) amount of the burden to document, translate, and establish legitimacy of their management perspective. And has been seen in the microcystin example, even with rigorous technical methods, the legitimacy of the Tribe's science is still sometimes questioned. The result is that the Tribe spends "way more time trying to make [Karuk] science bullet proof and to maintain some level of credibility amongst resource agencies than ... trying to communicate issues in our own way" (Leaf Hillman, interview February 17, 2012, in Happy Camp, California). This again highlights the point that ultimately the cause of environmental justice would best be served by the formal recognition of traditional knowledge and traditional management practices.

Additionally, with forced relocation, genocide, and high poverty rates, the capacity of the Tribe to serve in all of the roles (as documenter and translator, for example) required for participation in regulatory processes is reduced: "Now we don't have tribal members in the watershed the way we used to. [So] we need to use the communities that are in place to move management objectives in the same manner we would if we was just all tribal members" (Ron Reed, group interview 2/14/2012, in Orleans, California). Education of tribal youth, then, becomes a key way that Reed sees for the Tribe to build capacity to participate in management processes: "We need to send our kids away to do things when they come back. That's one of the things we're trying to do, education, K-12, to get our kids

empowered” (Ron Reed, group interview 2/14/2012, in Orleans, California). Youth education has been explored as a solution to building long-term tribal capacity for resource management in the literature (Pickering Sherman, Lanen, & Sherman, 2010).

CHAPTER V
OVERCOMING BARRIERS: A CASE STUDY OF KARUK PARTICIPATION IN A
WATER QUALITY REGULATORY PROCESS

Broad Overview of Karuk Participation in Regulatory Processes

Before providing a close examination of the ways that the Karuk DNR inserted Karuk knowledge and values into the TMDL process in particular, it will be helpful to review the Karuk DNR's general approach to engaging in regulatory processes. This broad overview will be done through a review of foundational institutional documents as well as some personal perspectives from Karuk DNR staff. The Tribe has rigorously engaged in documenting their traditional management perspective so it can be used in resource management processes. Most significantly, the Tribe has engaged in an ambitious process to create an Eco-Cultural Resources Management Plan (DRAFT ECRMP), the most recent draft of which was completed in 2010. The purpose of that document is to present an "integrated approach to adaptive problem solving, in the interest of managing the restoration of balanced ecological processes utilizing Traditional Ecological Knowledge supported by Western Science" (Karuk DNR, 2010). The Draft ECRMP does this by identifying cultural resources of concern, including fisheries, forestry, watershed restoration, and water quality, and for each resource, describing the resource's cultural significance to the Tribe, and cataloguing the traditional management of that resource, from the use of fire to manage upslope forests, to the timing of when to initiate and close seasonal harvests of eels or salmon (Karuk DNR, 2010). The purpose of the document, says Karuk DNR Natural Resources Policy Advocate Craig Tucker, is to easily insert the Tribe's perspective into regulatory processes:

We're trying to write it in this language that you can insert it into a NEPA process for timber sale or a NEPA process for dam removal. So that's the struggle that this Tribe is trying to do to document all that kind of stuff. ... I think we're getting better at it. (Craig Tucker, interview February 15, 2012, in Orleans, California)

This documentation of traditional knowledge marks a cultural shift where the Tribe has adapted in order to insert Karuk management perspectives into a contemporary management regime. As noted already, due to genocide and extreme human rights violations, Karuk cultural practices were publicly concealed; this practice of cultural invisibility was precisely the thing that allowed Karuk culture to survive. Documenting cultural knowledge for use in regulatory processes, then, requires a significant break from this practice of cultural invisibility. Hillman notes his own personal transformation in this regard, which he says took place as he engaged with the Federal Energy Regulatory Commission (FERC) relicensing process in his role as Director of the Karuk DNR:

I did decide that we had to change and now our survival was probably going to be dependent on our ability to tell our story, and our ability to articulate all the things that we had become adept at hiding. And I decided that ... was the truth, that times had changed, and it was time to adapt. ... And if I believed that, then I had to embrace it, and I had to be good at it. And so yeah, it was a major turning point in my life personally and career-wise. It affected everything. ... And you know, while I don't know that the new strategy has been successful for us, I am convinced still today that it is true, that the only way that we are going to survive is by adapting to that reality. By being unashamed about who we are and what we do, and articulating our issues. (Leaf Hillman, interview February 17, 2012, in Happy Camp, California)

This perspective resonates with the definition of traditional knowledge as a system of responsibilities noted in the previously quoted perspective of McGregor, where traditional knowledge is defined as the dynamic act of fulfilling moral responsibilities by engaging in a “process of participating (a verb) *fully* and *responsibly* in such relationships [between knowledge, people, and all Creation]” (McGregor, 2008, p. 145). Whyte’s (2013b) evaluation of McGregor’s definition is relevant here:

The ideas of “fully” and “responsibly” suggest what in the field of philosophy is often called moral character or just character. Character refers to the idea that acting responsibly (and hence ethically) is a matter of possessing embodied traits like courage or respect that enable one to know the right thing to do in particular situations and to act in ways that maintain relations of balance within one’s society. People who possess the character traits also possess the internal motivation to do what is right. (p. 4)

When the Karuk DNR department communicates Karuk management perspectives to regulatory managers in documents like the Draft ECRMP—or when, more broadly, it documents or translates Karuk knowledge in order to get Karuk values inserted into regulatory processes—it engages in an adaptive cultural practice that embodies courage, resilience, and responsibility.

At the same time, as noted previously, researchers have cautioned that translation of traditional knowledge into a technical narrative can further extend the colonial influence of Western scientific resource management into Native communities (Nadasdy, 1999). In order to reduce this impact, then, it is critical that partnerships between traditional knowledge holders and Western scientific experts are ultimately empowering of tribal cultural goals. One way to accomplish this might be to have tribal members who are equally fluent in traditional cultural management practices and Western scientific methods serve the roles of documenter and translator. But, as noted in the discussion of capacity in Chapter IV, the ability of the Tribe to serve both roles—as documenters and translators of Karuk knowledge and values—has been reduced due to genocide, forced relocation, and poverty.¹² Education of tribal youth was identified in an interview¹³ as a way that the Tribe might build capacity to participate in management processes. Youth education has been explored as a solution to building long-term tribal capacity for resource management in the literature (Pickering Sherman, Lanen, & Sherman,

¹² This is in reference to the following quote, cited earlier. In the quote, tribal member and cultural practitioner Ron Reed addresses the impacts of historical oppression on tribal capacity: “Now we don’t have tribal members in the watershed the way we used to. We need to use the communities that are in place to move management objectives in the same manner we would if we was just all tribal members” (Ron Reed, group interview 2/14/2012, in Orleans, California).

¹³ This is in reference to the quote cited earlier: “We need to send our kids away to do things when they come back. That’s one of the things we’re trying to do, education, K-12, to get our kids empowered. And until we do that, we rely on—it’s a community-based process, it’s always been, as far as we’re concerned. That’s how management in the basin will work” (Ron Reed, group interview 2/14/2012, in Orleans, California).

2010). In the meantime, a key to building tribal capacity has been what Reed calls reliance on a “community-based process.”¹⁴ This process involves collaborating with a broader community of individuals and organizations that respect and understand the Tribe. Reed identifies that this may include non-Native local residents—“generations in this watershed that think like we do”—and also networking with academic institutions—which has been “the most valuable resource that we’ve created in this process since I’ve been working with [sociologist] Kari [Norgaard]. It’s enormous” (Ron Reed, interview 2/13/2012, in Happy Camp, California). Since collaborating with sociologist Kari Norgaard for a 2005 report to the Federal Energy Regulatory Commission (FERC), the Tribe has expanded its collaboration with academic institutions, initiating, for example, a research collaborative with the University of California, Berkeley. The role of both of these collaborative relationships—with local non-Native individuals and organizations,¹⁵ and with academic institutions—in supporting the Tribe’s efforts to insert a Karuk perspective into resource management processes is examined more closely in following section, which provides a specific analysis of the Tribe’s involvement in the TMDL process.

In addition to collaboration, the Karuk Tribe has also invested a good deal into the development of internal technical capacity. The Tribe maintains an active natural resources department that, founded in 1989 with a single employee to support fisheries management and restoration, has grown into a department that houses several programs and supports a staff of as much as 100 during peak season fire events (Karuk DNR, 2015). The mission statement of the Karuk DNR is to:

protect, enhance and restore the cultural/natural resources and ecological processes upon which Karuk people depend. Natural Resources staff ensure

¹⁴ See footnote 13.

¹⁵ The Karuk Tribe has collaborated with the nonprofits Klamath Riverkeeper and Mid Klamath Watershed Council, for example. Examples of collaboration include jointly-released press releases (see e.g. Chichizola, Spain, & Tucker, 2007 and Harling & Tripp, 2014).

that the integrity of natural ecosystem processes and traditional values are incorporated into resource management strategies. (Karuk DNR, n.d.)

The task of incorporating traditional values into management processes is central to the Karuk DNR's mission statement. The Karuk DNR's recently completed strategic plan elaborates on this mission statement:

A focus of the department is to integrate traditional management practices into the current management regime. ... These traditional management practices are coupled with Western scientific research, as well as data collection and analysis to provide the contemporary management scheme of DNR throughout Karuk ancestral homelands. (Karuk DNR, 2015)

These documents frame the purpose of the Karuk DNR as an institution that aims to get traditional management practices integrated into regulatory management processes through the use, in part, of the language and tools of Western science.

To accomplish this, the Tribe has invested in a robust technical science program. In all, the Tribe's full-time permanent staff includes fishery biologists and technicians, water quality specialists and technicians, fuels planning specialists, and watershed restoration specialists. The Tribe has produced numerous technical documents; following are some examples:

- Eco-Cultural Resources Management Plan (complete draft, 2010)
- Plan for Restoring Fire Adapted Landscapes (completed collaboratively under the Western Klamath Restoration Partnership; see Harling & Tripp, 2014)
- 10+ water quality reports (from 2000-present)
- 10+ technical memoranda summarizing findings from the Tribe's *Microcystis aeruginosa* monitoring efforts (from 2005-2010)
- Technical review and public comments on Regional, State, and Federal policy documents, including a 37-page public comment on the "Public Review Draft and Staff Report for the Klamath River Total Maximum Daily Loads (TMDLs)" and "Action Plan Addressing Temperature, Dissolved Oxygen, Nutrient, and Microcystin Impairments in California" (2009) and an alternative plan submitted in response to the Forest Service's Draft Environmental Impact Statement for the Westside Fire Recovery Project (2015)

Additionally, the Tribe recently completed a Natural Resources Strategic Plan for Organizational Development (Karuk DNR, 2015) that outlines a comprehensive plan for growth and prioritization of programs moving forward. The document identifies 14 programmatic areas: Air Quality, Cultural Resources, Environmental Education, Enforcement/Regulation, Fire and Fuels Reduction, Fisheries, Natural Resources Policy Advocacy and Environmental Justice, Restoration Forestry, Solid Waste, Soils/Minerals, Tribal Historic Preservation, and Watershed Restoration. According to the document, cultural resources are central to all of these program areas:

[C]ultural resources are synonymous with natural resources and, therefore, the management, protection, preservation, and promotion of continued access to cultural resources by Karuk Tribal members is a fundamental function of all programs of DNR. Thus, it is the responsibility of DNR staff members to incorporate this principle into their programs and daily operations. (Karuk DNR, 2015, p. 6)

The implication here is that the Tribe's technical capacity serves the purpose of getting traditional management goals and perspectives inserted into management processes. While Western science is heavily utilized, it is always framed by tribal values, which direct where and why data are collected, and how the data are used or interpreted.

Case Study: Karuk Participation in the Klamath River TMDL Process

The water quality arm of the Karuk DNR has been particularly involved in producing scientific reports for regulatory policy. In the case of the California State Total Maximum Daily Load (TMDL) process,¹⁶ the Tribe has been very involved in collecting and reporting monitoring data to incorporate into the process. Under the federal Clean Water Act (CWA), states play a role in managing water quality by setting limits (TMDLs) on the amount of pollution that a water body can receive without negatively impacting beneficial uses. This process, then, plays a significant role in the management of tribal trust resources. Perhaps most significantly, the TMDL process provides an opportunity for dam removal. Before the federal

¹⁶ See footnote 1.

government may license an activity that could impact a state's water quality, the state must issue a license with conditions (determined by TMDLs) ensuring water quality for that license. Under Section 401 of the Clean Water Act, 33 U.S. Code § 1341, Stringent water quality standards set for the bodies of water impacted by PacifiCorp dams could make relicensing too expensive for the company.¹⁷

The Karuk Tribe has been very involved, through its water quality monitoring programs, in collecting monitoring data and producing scientific reports that have played a role in the establishment of TMDL standards for temperature, dissolved oxygen, nutrients, and microcystin for the Klamath River. The Tribe's monitoring of *Microcystin aeruginosa* is a particularly powerful example of the Tribe's efficacy using technical tools to get their cultural values inserted into the TMDL process. The Tribe implemented monitoring programs for *Microcystin aeruginosa* when its EPA-funded baseline water quality-monitoring program uncovered potentially toxic levels of the blue-green algae in the Copco and Iron Gate Reservoirs. Previous to 2008, *Microcystin aeruginosa* had not been listed as a pollutant of concern for Klamath River water bodies. The Karuk Tribe's monitoring efforts around *Microcystin aeruginosa* have been persistent and involved: Since 2005, the Tribe has produced at least 11 reports and technical memos that added to the body of scientific and technical data shaping the TMDL process for the Klamath River.

Getting these documents recognized by the appropriate regulatory bodies was a struggle, due to regional hostility and resistance from the Siskiyou Health Board. One way the Tribe got recognition of their microcystin monitoring results was through a collaborative action campaign. For example, the Tribe put out a joint press release with local nonprofits Klamath Riverkeeper and the Pacific Coast Federation of Fishermen's Association (Chichizola, Spain, & Tucker, 2007). The

¹⁷ On April 6, 2016, the States of Oregon and California, PacifiCorp, the Yurok Tribe, the Karuk Tribe, and the U.S. Departments of the Interior and Commerce signed an agreement to remove four dams on the Klamath River by 2020, and on June 16, 2016, FERC approved a motion from PacifiCorp to suspend the relicensing proceedings for the Klamath Hydroelectric Project.

release announced that the groups “jointly petitioned the California State Water Board to hold PacifiCorp accountable for dangerously high toxic blue green algae in Klamath reservoirs.” Subsequently, in May 2007, the Klamath Riverkeeper filed a public nuisance case against PacifiCorp. In July 2007, the State Water Board recognized the issue by forming a Blue Green Algae Work Group to provide guidance to health officials on how to deal with toxic algae blooms (Tucker, 2007). And in 2008, even more tangible results were achieved when the EPA issued a determination to include microcystin as a toxin of concern for the segment of the Klamath River that includes the Copco and Iron Gate Reservoirs, citing the Karuk DNR technical reports as evidence for their determination (USEPA, 2008). Ultimately, the Tribe’s technical work was incorporated into regulatory processes through collaborative publicity and grassroots actions that brought attention to the issue first raised by the Tribe. This collaborative dynamic has been key to the Tribe inserting their perspective into a political and, at times, hostile regulatory environment. Erica Terence, the Project Manager for the Klamath Riverkeeper, describes the relationship broadly:

Riverkeeper in particular was formed by a number of people, including a few people at the Tribe who saw that there was a need for that heavy lifting outside of that tribal entity but in step with the Tribe’s goals. And that’s how Riverkeeper was formed, and we still view our role very much that way. (Erica Terence, group interview 2/14/2014, in Orleans, California)

Klamath Riverkeeper is particularly involved with getting people mobilized to attend meetings to provide public comment in the regulatory process around watershed management and with doing the “heavy lifting” of, for example, litigating to apply pressure to regulatory agencies to act on, in this case, the Tribe’s technical reports. In this way, collaboration with local non-tribal organizations is important in publicizing the Tribe’s efforts and countering local resistance or hostility.

Beyond these microcystin monitoring efforts, the Karuk Tribe has been more broadly involved in providing technical support and review throughout the TMDL process. The Karuk Tribe—along with other Lower Klamath Basin tribes—were very involved in collecting baseline data for the TMDL process. During the TMDL process, the Klamath Basin Tribal Water Quality Work Group represented the

combined efforts of Lower Klamath tribes to participate in the process. From the group's website:

The recognized legal standing of TMDL plans (Pronsolino et al. vs. Nastri et al.) makes them important tools for the Tribes to use to reverse the decline of Pacific salmon and other important Klamath River fish species upon which they rely for subsistence.

Work Group members have provided comments on several Klamath Basin TMDLs to make sure that analysis was conducted using the currently recognized "best science." They also urged speedy implementation guided by existing, scientifically sound restoration plans where they are available. (Klamath Basin Tribal Water Quality Work Group, 2008)

As in the Karuk DNR mission statement, the sentiment here is, effectively, that tribes adopt technical and scientific tools so that they can enter into policy frameworks that impact the water resources—and especially salmon—that are central to the tribes' cultures. The tribes employed rigorous scientific methods:

Part of the Tribal Water Quality Work Group is we all adopted the same protocols, we had everything signed off on by the regional board and the EPA, we checked our stuff. ... And everybody got really anal about it. It's like if you're going to collect this data, you need to do it right. ... Before the tribes didn't really have high quality data, and it was totally questioned. (Susan Corum, interview 2/16/2012, in Somes Bar, California)

To counter the scrutiny directed at the tribes' participation in water quality management by some groups, the Work Group put a good deal of emphasis on ensuring rigorous monitoring methods. The Work Group also invested heavily in rigorous technical participation in the TMDL process because this was the best way to ensure a high quality product:

We helped back-up or provide a lot of the science for the TMDLs. The tribes were integral on that. I mean we were doing all sorts of [stuff the non-tribal agencies] ... didn't really have the capacity to do, or if they'd done it, it would have been a half-assed job because they didn't have the time, didn't have the resource to do it, and we had the people. ... We had the resources to help check to make sure things were going good, and sometimes they weren't, and sometimes the model runs needed to be tweaked, but I felt pretty good with the science. (Susan Corum, interview 2/16/2012, in Somes Bar, California)

Due to their direct connection to the resource and stake in the outcome of the TMDL process, the tribes were more invested in producing rigorous technical products that, in turn, would help stricter water quality standards be adopted. In addition to a

higher quality product, the tribes' involvement in the technical portion of the TMDLs had the additional benefit of allowing the tribes to develop "a really good rapport with the [Regional] Board's staff" and with the EPA staff involved; Corum elaborated, saying she developed a positive working relationship with the agency staff from the EPA (Susan Corum, interview 2/16/2012, in Somes Bar, California). In this sense, the technical staff of the water quality department served as an interface through which respect and cooperation was developed with non-tribal regulatory agencies.

Ultimately, the tribes' involvement in the technical portion of the TMDL process can be considered successful in that it helped produce a regulatory document that Karuk DNR staff felt reflected the Tribe's management perspective. The regulatory document produced in the Klamath River TMDL process is a document that 1) establishes acceptable load targets for identified toxins of concern—specifically temperature, dissolved oxygen, nutrients, and microcystin—for the Klamath River; 2) establishes an implementation and action plan; and 3) establishes a monitoring plan.¹⁸ The "technical portion" of this document is the portion that deals with this first item—establishment of acceptable load targets. This portion of the document contains the following components: pollutant source analysis (Chapter 4 of the final staff report; see North Coast Regional Water Quality Control Board, 2010b), and allocation and numeric targets (Chapter 5 of the final staff report; see NCRWQCB, 2010c). The monitoring data collected by the Klamath Basin Tribal Water Quality Work Group informed this portion of the TMDL document, and Karuk DNR staff and consultants were involved in reviewing "a long list of TMDL-related documents" produced by the Regional Board throughout the TMDL process (Karuk DNR, 2009, p. 2). During the final stages of Regional Board's adoption of the Klamath River TMDLs for temperature, dissolved oxygen, nutrients, and microcystin, the Karuk DNR submitted comments on the Regional Board's "Public Review Draft and Staff Report for the Klamath River Total maximum Daily Loads (TMDLs) and Action Plan Addressing Temperature, Dissolved Oxygen,

¹⁸ See footnote 1 for more details.

Nutrient, and Microcystin Impairments in California” (Karuk DNR, 2009). These comments generally supported the technical portion of the Klamath TMDL using, for example, the following language in the Introduction/Summary of the Karuk DNR’s extensive 37-page comment document:

Overall the technical analysis presented in the Klamath TMDL is scientifically rigorous and provides a solid foundation for remediation of the river’s pollution problems. We commend Regional Board Staff for their effort on the TMDL conceptual framework and technical analysis.

The technical portion of the Klamath TMDL is scientifically sound. The load reductions, water quality objectives, and water quality targets detailed are supported by good science, realistic, and must be met to bring back good water quality to the Klamath to protect beneficial uses.

(Karuk DNR, 2009, p. 2)

Terms like “scientifically rigorous,” “solid foundation,” “scientifically sound,” “good science,” and “realistic” all express general support and approval for the technical portion of the Klamath River TMDL. Susan Corum, the Karuk DNR Water Resource Coordinator during the TMDL process for the Klamath River, explains:

The Klamath TMDL was the best one ... the biggest one, kind of the culmination, and it was totally because of all that we had [done]. It was lovely. ... It did incorporate as much of that stuff as they could. (Susan Corum, interview 2/16/2012, in Somes Bar, California)

This comment shows a belief that the Tribe’s technical work in collecting monitoring data for and reviewing the content of the technical portion of the Klamath River TMDL “paid off” and was, generally, incorporated directly into the process.

While the adopted TMDL targets were viewed as a positive step toward “remediat[ing] the river’s pollution problems,” the TMDL process is still a long way from supporting holistic resource management, which is central to the Tribe’s management perspective and cultural survival. For example, fish—and specifically commercial salmon species—have been relatively easily protected through the TMDL process under the California State Code establishing beneficial uses (CCR §659-672). Salmon fit the TMDL water quality regulatory paradigm nicely: salmon runs are measureable, and because salmon are a commercial species, political will

exists to implement an action plan to meet a water quality objective around a temperature TMDL (temperature TMDLs impact fish). And while salmon are central to Karuk culture, a regulatory system with an outsized focus on salmon doesn't match the Tribe's goal of achieving a more holistic approach to water quality: a regulatory system that supports good water quality throughout the watershed, year-round. Where the Tribe's management perspective benefits the health of the entire watershed, a TMDL process based on protecting discrete beneficial uses makes comprehensive water quality management more difficult.

Perhaps the most significant accomplishment of the Tribe in the TMDL process, then, has been the Tribe's long-standing efforts to insert their cultural values directly into the TMDL process through beneficial use designations. Though traditional cultural uses are not recognized at the state-level, Regional Water Quality Control Boards have the opportunity to designate beneficial uses and establish water quality objectives in their regional basin plans (California Water Code §13050). The North Coast Regional Water Quality Control Board (which at the time was called the California Regional Water Quality Control Board North Coast Region) first adopted a basin plan that identified and designated beneficial uses in 1971 (California Regional Water Quality Control Board North Coast Region [CRWQCBNCR], 2003, p.1); at this time, the list of beneficial uses did not include tribal cultural uses explicitly, but deferred to the beneficial uses identified by the State of California (Cal/EPA, 2014). In a formal review process initiated in 2001 (CRWQCBNCR, 2003, p.1), the Regional Board reviewed the list of beneficial uses identified in the Regional Plan, and a 2003 resolution (Resolution No. R1 2003-0052) was proposed and adopted to revise the Basin Plan to include Native American Cultural (CUL) beneficial use as an existing use in the basin (CRWQCBNCR, 2003). The designation was proposed as a result of strong advocacy on the part of collaborative inter-tribal efforts in the basin, and the staff report for adoption of the resolution cited the fact that "the Karuk Tribe (located within the North Coast Region) has requested that we add this use" as a reason for staff proposing the resolution (CRWQCBNCR, 2003, p. 7). Subsequently in the 2007 Basin Plan review, a Subsistence Fishing (FISH) beneficial use was added by the Regional

Board (North Coast Regional Water Quality Control Board [NCRWQCB], 2007). The definitions of these two uses, as established in the Basin Plan, are:

CUL: Uses of water that support the cultural and/or traditional rights of indigenous people such as subsistence fishing and shellfish gathering, basket weaving and jewelry material collection, navigation to traditional ceremonial locations, and ceremonial uses.

FISH: Uses of water that support subsistence fishing. (NCRWQCB, 2007, p. 2-3.00)

Ultimately, CUL and FISH were listed as impaired beneficial uses in the final staff report for the Klamath River TMDL (NCRWQCB, 2010a); the impact of this accomplishment was more comprehensive clean water protection measures. To underscore this success, the State Board recently followed suit and adopted a resolution directing staff to “develop beneficial uses pertaining to tribal traditional and cultural, tribal subsistence fishing, and subsistence fishing,” to be modeled after the beneficial uses in the North Coast Regional Water Board’s basin plan (California Environmental Protection Agency State Water Resources Control Board [Cal/EPA SWRCB], 2016a, p. 3). The significance of the Regional Board’s adoption of CUL and FISH is described by Susan Corum, who says the addition of cultural uses gives the Tribe’s water quality staff regulatory backing to make the following kind of argument for more comprehensive water quality protections:

Look, every month of every year, the water needs to be good. Every month, every year. Every minute of every day, this place needs to be rock solid. Because what they’ll do is they’ll chart, if all they’re going off of is salmon ... life cycles, then normally the only times they’re worried about is June to August or September. So you can pollute the [river] the rest of the year and nobody cares. So this says to them, you have to protect it all year round. (Susan Corum, interview 2/16/2012, Somes Bar, California)

By getting the Tribe’s cultural uses “on paper” and recognized as beneficial uses, the Tribe’s effort made it possible to get a more holistic—or at least more comprehensive—management perspective inserted into the TMDL process.

This success with getting CUL and FISH recognized as beneficial uses is in large part due to the Tribe’s work documenting cultural practices and identifying culturally significant resources; their work collaborating with academic partners to quantify how water quality impacts these cultural practices; and the support

received from a small grant that was a part of the Cal/EPA pilot projects and small grants program to kick start implementation of the statewide Environmental Justice Action Plan (Cal/EPA, 2006). The staff report that established the CUL and FISH beneficial uses cited evidence from Ron Reed, who provided oral testimony of Karuk cultural practices, and additional evidence from tribal staff members and researchers who have worked closely with the basin tribes (NCRWQCB, 2010a, pp. 2-86 to 2-90). Reed describes the process of getting his cultural perspective incorporated in the process:

So then, with my TEK—before it was just the salmon, before it was a few things like the willow root, things like that, but then with the oral history—my mother, before she passed away, told me ... about when she made medicine up there, and when she was a baby, the way she connected the circle of the ceremony is when she drank the water that came from the Klamath River. So when we said that, it put the water quality issue very high in this process. (Ron Reed interview, 2/13/2012, Happy Camp, California)

This traditional knowledge was developed into a calendar that showed tribal spiritual, cultural, and subsistence use of water throughout the year (NCRWQCB, 2010a, pp. 2-89 to 2-90).

The staff report also cited research developed collaboratively with Norgaard (NCRWQCBa, 2010a, pp. 2-85 to 2-87). This research quantified the physical health, mental health, and cultural impacts of the Tribe’s “denied access to traditional foods” as a direct result of resource degradation, including impacted water quality (Norgaard, 2005). This research was originally developed as a report that was submitted to the Federal Energy Regulatory Commission (FERC). The intent was to represent the impacts of the dams on Karuk members in a technical report that was then used to get the Karuk cultural perspective into the Environmental Impact Statement (EIS) required by the FERC relicensing process.¹⁹ Ultimately, the FERC EIS did not fully incorporate the report’s findings, but concluded “that the best

¹⁹ Through the FERC relicensing process, non-federal hydropower projects—such as PacifiCorp’s Klamath Hydroelectric Project—are federally licensed. PacifiCorp’s license includes four hydroelectric dams on the main stretch of the Klamath River: Iron Gate, Copco 1, Copco 2, and J.C. Boyle, which all expired in 2006, and must be relicensed by FERC.

alternative for the Klamath Hydroelectric Project would be to issue a new license consistent with the environmental measures specified in the Staff Alternative” (Federal Energy Regulatory Commission, 2007, p. xxxviii). Despite this outcome, this effort to quantify the Tribe’s loss became a useful tool that garnered national media attention²⁰ and has subsequently been used and cited often by the Tribe throughout their involvement with other water resource management regulatory processes in the basin, as it was in the Klamath River TMDL staff report. Karuk DNR staff Craig Tucker commented on this document: “It’s been entered into the public record in virtually every river-related issue since then, both as a piece of science, but also a media hook” (Craig Tucker, interview 2/15/2012, in Orleans, California). Reed also notes that, after this report was published, he felt empowered to get his tribal perspective inserted into public processes: “So now instead of me being unquantifiable, just the Indian walking around telling stories, now all of a sudden I’m connected to these scientific processes. It empowered me to a level of what I’m doing now” (Ron Reed, interview 2/13/2012, in Happy Camp, California). Once the importance of salmon was translated into academic terms, the Tribe’s perspective became more easily communicated to non-tribal resource users, non-tribal resource managers, and the broader public, all of which facilitated Karuk participation in public processes around dam removal and water resource management in the basin. The report made it possible, for example, for the Tribe to articulate the cultural importance of good water quality in quantified, scientific language that could be included in the TMDL process, and the final TMDL staff report cited many of the report’s key findings and excerpted its executive summary (NCRWQCB, 2010a, pp. 2-87).

²⁰ See article “Tribe Fights Dams to Get Diet Back” published in the Washington Post on January 29, 2005 (Harden, 2005).

Case Study: Remaining Barriers to Karuk Participation in the
Klamath River TMDL Process

The TMDL process is an example of how the Karuk Tribe has successfully been able to insert their management perspective into a regulatory process that directly impacts the Tribe. Indeed, the technical portion of the TMDL was determined by Karuk staff to adequately address the Klamath River's pollution problems and, in turn, the negative impacts that pollution has on the health of the Tribe and its members. But where the theoretical framework for protection of water quality objectives was determined as solid by the Tribe, much more scrutiny was given to the implementation of the action plan to meet these objectives (Karuk DNR, 2009).

The primary concern expressed in the Karuk DNR comments on the Klamath River TMDL implementation plan was timely implementation. Specifically, the comments expressed concern for the lack of explicit measures to prevent "unwarranted delay on the part of con-compliers" (Karuk DNR, 2009, p. 13). The comments cite a "lack of action under the [previous adoption] of Shasta and Scott TMDLs" as an example of agency inaction to enforce water quality standards in agricultural areas (Karuk DNR, 2009, p. 14). This concern about lack of enforcement was also raised in interviews when, for example, Susan Corum recalls reporting a water quality violation:

The land owner's very hostile, but ... if I'm submitting saying that there is a polluter, and he's polluting—there's cows defecating in the river, right there. ... It's such an easy one to see and fix. He has a fence right there. He'd just have to keep it up. ... I submitted an official thing [two times] and they're like oh, we'll forward that onto the pollution department, who are actually supposed to crack down on people. And what's happened? You drove by. The cows are still standing there. (Susan Corum, interview 2/16/2012, in Somes Bar, California)

This was echoed in another interview where the lack of enforcement was described as due to a "jurisdictional nightmare, when people, when there's a cash cow ready to happen, they're ready to jump at it. Where there's a problem, they're all passing the buck" (Ron Reed, group interview 2/14/2012, in Orleans, California). Lack of enforcement, as it's described in these interview excerpts, is ascribed to an agency

tendency to give the “squeakiest wheel” the most attention and to avoid enforcement when it requires confronting a hostile offender. Additionally, poor enforcement is ascribed to a lack of interagency accountability when it comes to enforcement. Specifically, the concern is that the various agencies that comprise the “jurisdictional nightmare” ultimately serve to benefit the commercial interests of polluters, and not to take remediating action when pollution becomes a problem that negatively impacts other groups. These concerns both get at the same underlying frustration: that agencies, ultimately, respond to the concerns of non-tribal interests when it comes to taking tangible action.

Additionally, the Karuk comments on the TMDL process express underlying concern about the role of the regulatory process itself in delaying tangible action. Indeed, the process took nearly a decade from the time that the Regional Board first began its public process to establish the Klamath River TMDLs to the final adoption of those TMDLs by the EPA, and this, the Karuk comments note, came even after many of the drivers of Klamath River water problems had already been identified:

Many of the drivers of water problems (e.g. Shasta and Scott River flow depletion, the Klamath Hydroelectric Project, and Upper Klamath Basin agricultural pollution) were identified decades ago, yet positive action has been slow in coming. We strongly encourage the Regional Water Board to fast-track implementation, to the maximum extent possible, of these key problems. (Karuk DNR, 2009, p. 13)

The Karuk comments also identify jurisdictional coordination as another roadblock to fast action:

We question, however, the necessity for the MAA [Management Agency Agreement between the Regional Board, U.S. Bureau of Reclamation, and the U.S. Fish and Wildlife Service to implement the Lost River TMDL] to include an action item to ‘Complete a water quality study to characterize the seasonal and annual nutrient and organic matter loading through the KIP and refuges’ ([citation from quote] p. 6-21).

The technical analyses conducted in the development of the Lost River TMDL have already provided this. If not, then what was the purpose of the Lost River TMDL?

The only thing accomplished by conducting yet another study would be a delay in water quality restoration. What is needed, in fact, are detailed work plans for the types of project that would be most effective in cleaning up

water quality pollution in the Lost River basin, the prioritization of projects, and implementation of the highest priority projects.
(Karuk DNR, 2009, p. 13)

Taken together, the concerns expressed in interviews and the Karuk TMDL comments underscore overall frustration with what is perceived as the role of regulating agencies in delaying actual actions to reduce harm, whether through lack of enforcement, or through the cumbersome regulatory process itself.

CHAPTER VI

TOWARD A MORE PARTICIPATORY REGULATORY PROCESS

In many ways, the above description of the Karuk Tribe's participation in the TMDL process shows how the Tribe acts to insert itself as a meaningful participant in regulatory processes through the vehicle of regulatory science. The extent to which the Karuk Tribe has successfully inserted their management perspective into the TMDL regulatory process may be viewed as an example "democratizing" the regulatory science process to make it more participatory. Scholars have shown that social movements and social actors can transform regulatory systems to be more democratic and participatory (Liévanos, London, & Sze, 2011), and following is analysis of the extent to which the Karuk Tribe's efforts have transformed the TMDL regulatory process.

First, the Tribe inserted tribal values directly into a process where previously they were not included. This happened most clearly in the Tribe's success in getting Tribal cultural and subsistence values recognized as beneficial uses. Prior to this, the technical work of the TMDL process was organized around setting standards and water quality objectives to protect non-Karuk beneficial use values. What might appear to be a purely technical—and thus objective—process (setting TMDL standards, in this case) of course rests on fundamental assumptions about the value of water that are initially defined by bureaucrats. That is, beneficial uses reflect the values of the groups that originally defined them. Because tribes were not involved when the State Water Control Board originally identified and defined beneficial uses, their values were not represented. The Karuk DNR's efforts to get CUL and FISH recognized as beneficial uses was critical to inserting a tribal perspective into the TMDL regulatory process.

Research on "boundary work" (Gieryn, 1983) or "boundary organizations" (Guston, 2001) shows how legitimacy and authority of expert Western scientific knowledge is maintained by drawing borders between the scientific and the political. When regulatory processes—like the TMDL process—invite tribal participation in technical aspects of a process after management goals and priorities are set, then those processes are not really inviting meaningful participation. Rather,

they are asking participants to adopt cultural values (of natural resources as commodities), and marginalizing tribal participants whose cultural values don't fit this frame. This underlines the importance of incorporating participation at all stages of the process if regulatory processes are to allow for "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of all environmental laws, regulations, and policies" (Senate Bill 115, 1999). Indeed, the Tribe's work on getting CUL and FISH beneficial uses recognized demonstrates the importance of directly involving tribes at the outset in regulatory processes, in the formulation of the management goals and priorities (i.e. identifying and defining beneficial uses, in this case) that define what is included in technical assessments. Involvement of tribes in the initial formulation of management frameworks, goals, and priorities is perhaps one of the best ways to make environmental regulatory processes that truly serve the cause of environmental justice. By getting CUL and FISH recognized as beneficial uses, the Karuk Tribe was able to gain, to an extent, recognition for their traditional cultural values.

Second, the Tribe's work inserting Karuk values into technical processes improved overall scientific inquiry and contributed to the production of good science. The Tribe's contributions to the technical portion of the TMDL are a good example of this. As mentioned above, interviewed tribal staff described the Tribe's—and, more broadly, the Klamath Basin Tribal Water Quality Work Group's—dedication to rigorous technical methods. Part of this dedication was to counter increased scrutiny, but an additional reason was given by the Tribe's water quality coordinator: In a nutshell, the tribes are more invested in the outcome of the monitoring. Tribal staff perceived that if non-tribal agency staff did the monitoring, they would do a less thorough job "because they didn't have the time, didn't have the resources" (Susan Corum, interview 2/16/2012, in Somes Bar, California). Tribal staff, on the other hand, are doing research with an outcome that directly impacts their community, and so have a stake in the monitoring products that's motivated by survival and even moral obligation. Ultimately, tribal staff felt

confident that the technical portion of the TMDL was “solid” (Karuk DNR, 2009, p. 2), and attributed this in part to the tribes’ efforts.²¹

Microcystin monitoring provides a similar example. Prior to the Karuk Tribe water quality staff’s work, non-tribal agency staff—including the Regional and State Water Boards—had not identified microcystin as a toxin of concern. Limited non-tribal agency staff resources probably impacted this finding as well—though regional hostility and non-tribal staff’s more abstract relationship to the resource are possible additional reasons why microcystin was previously overlooked by Water Board staff. Non-tribal and tribal DNR staff alike live and work along the Klamath River and are embedded in the Karuk cultural perspective of resource management.²² Karuk DNR staff are also trained technicians in Western scientific practices and protocols, giving them a unique role as both “local/traditional knowledge experts” and “technical experts.” Where, as Corburn (2005) puts it, distanced regulatory experts can “miss information that can improve scientific outcomes and the fairness of decision making when they fail to account for what populations living with a hazard already know” (p. 24), Karuk DNR staff are in a unique position to negotiate both types of knowledge, producing a better technical product (as in the TMDL technical report) that includes more of the relevant information (e.g. microcystin toxicity) for people directly impacted by water quality of the Klamath River. Indeed, many scholars have argued that traditional knowledge, in particular, is critical to addressing modern environmental problems (LaDuke, 1994; Olsson, Folke, & Berkes 2004), or so-called “wicked” environmental problems characterized by uncertainty, competing values, and high stakes (Funtowicz & Ravetz, 1991).

²¹ “The Klamath TMDL was the best one, the biggest one, kind of the culmination, and it was totally because of all that we had [done]. It was lovely. It did incorporate as much of that stuff as they could” (Susan Corum, interview 2/16/2012, in Somes Bar, California).

²² Protecting cultural beliefs and traditional values is at the heart of the Karuk DNR mission, for example, and in the DNR Strategic Plan, all staff are charged with ensuring that protection of cultural resources is the motivation behind all “programs and daily operations” (Karuk DNR, n.d.; Karuk DNR, 2015, p. 6).

Non-tribal and tribal Karuk DNR staff members serve in a unique role as translators and negotiators of cultural and technical knowledge. Other individuals were also described—including academic collaborators²³ and nonprofit community members²⁴— as serving in this “translator” role. Having individuals who are “fluent” in both cultural and technical knowledge is key to ensuring that the Tribe can participate meaningfully in regulatory processes; it’s also key to ensuring that this process is empowering and not, as Nadasdy (1999) warns, a process that further extends “the social and conceptual networks of scientific resource management” into Native communities (p. 12). To support meaningful participation that is empowering and avoids the pitfalls of appropriation, then, it would be helpful for environmental justice policies and action items to help tribes build internal capacity for developing more of these “translator participants” among tribal members.

Third, the Tribe’s active role in the technical TMDL process has potentially helped increase respect, trust, and cooperation between tribal and non-tribal agency resource managers. Susan Corum describes the development of “a really good rapport with the [Regional] Board’s staff” and with EPA staff (Susan Corum, interview 2/16/2012, in Somes Bar, California). This good rapport developed because tribal staff were working very closely with Regional Board and EPA staff during the development of the technical portion of the TMDL. The coordination among Regional Board staff and the Klamath Basin Tribal Water Quality Work Group allowed the Tribe’s staff to engage regularly with outside agency staff, which is important to “creating new channels for communication and fostering long-term relationships” that lead to more cooperative management environments (Ebbin, 2012, p. 181). In particular, given the historical context of the Lower Klamath Basin,

²³ “And so once Kari [Norgaard] was able to come in and unravel the cultural mystery of Western science is when I started getting traction in the natural resource management world” (Ron Reed interview, 2/13/2012, Happy Camp, California).

²⁴ “It’s very important when folks from the NGOs in the Klamath River come back and back the tribal perspective that I’m presenting, and make technical sense out of the cultural information that I’m transmitting means a lot, and allows these people to open” (Ron Reed, group interview 2/14/2014, in Orleans, California).

increased interpersonal trust is potentially very important for building cooperation (and enabling participation) in regulatory processes. Dolan & Middleton's (2015) conclusions from the study "Improving Tribal Collaboration in California's Integrated Regional Water Management Program" are very relevant here:

Across California, some regions have historically adversarial relationships between Tribes and local stakeholders, making IRWM [Integrated Regional Water Management Program] collaboration difficult. These adversarial relationships could have long roots in historically discriminatory policies promulgated by local jurisdictions including cities, counties, service districts, etc. They may also result from more recent conflicts over land use, economic development, and planning. (Dolan & Middleton, 2015, p. 403)

They go on:

Due to [this] history of Native American genocide and survival in California, tribes and local agency representatives often lack trust in one another. However, building trust and mutual respect are crucial for collaborative management. When thoughtfully and effectively implemented, California's IRWM process can provide a venue for collaboration and trust building through increased engagement and project implementation. (Dolan & Middleton, 2015, p. 407)

These findings are from a study of California's collaborative watershed co-management organizations, but I'd suggest they're directly applicable to enabling meaningful participation in regulatory processes as well, as trust will enable participation.

In another study, Ebbin (2012) points to the importance of "regularly and frequently scheduled meeting" as "forums where cooperation can emerge" because it increases the direct face-to-face contact that is necessary to building interpersonal relationships and trust (p. 172). More opportunities for this kind of regular meeting could enhance meaningful participation. And since transaction costs for these sorts of regular meetings can be high, this could be one area where environmental justice policies and action items could focus in order to build capacity and opportunities for these kinds of meetings.

Fourth, the Tribe's participation in regulatory processes and dedication to documenting and translating knowledge using technical methods—and also in the dedication to particularly rigorous methods in order to underscore the legitimacy of

the Tribe's knowledge—is an activity that Corburn might identify as “co-production of knowledge” (2005). Corburn argues that “scientific knowledge is always ‘co-produced’—science and politics are interdependent, each drawing from the other in a dynamic iterative process” (Corburn, 2005, p. 4). This idea of co-produced knowledge applies to all types of knowledge production in that all knowledge is produced from particular socio-cultural contexts. In this light, the adaptations that the Karuk DNR made—to document and translate, in particular—may be seen as “co-production” as tribal knowledge and politics interplay in a “dynamic iterative process.” If co-production always happens, then inequality occurs when one knowledge system must be more adaptive than another. In the case described in this paper, for example, the Tribe bears a disproportionate burden—to document, translate, and legitimate knowledge, and navigate multiple jurisdictions, too. The result is that the Tribe spends “way more time trying to make [Karuk] science bullet proof and to maintain some level of credibility amongst resource agencies than ... trying to communicate issues in our own way” (Leaf Hillman, interview February 17, 2012, in Happy Camp, California).

This reinforces the point that participation alone is not sufficient in addressing environmental justice issues. In the study of Cal/EPA's environmental justice pilot projects and grants, London et al. (2008) review the importance of “recognition” in “framing and implementing state policy” and note that:

[When] agencies' models of public participation do not fully recognize the legitimacy and value of the cultures of the “publics” they hope to engage, participation often results in further alienation, marginalization, and antagonism of these environmental justice populations. In this way, we concur with Schlossberg that “recognition” of diverse cultural identities is a precondition for entry into the distributional system and ought to be considered a third definition of justice in environmental justice.²⁵ (p. 258)

In order to truly serve the cause of environmental justice, measures must be taken to create policies that “recognize the [inherent] legitimacy and value” of tribal knowledge, so that regulatory processes can be less uneven in the demands placed upon participants.

²⁵ Schlossberg, 2004, as cited by London, Sze, & Liévanos, 2008.

Fifth, throughout the Tribe’s participation in the TMDL process, Karuk DNR staff members brought up overall concerns about a lack of action by regulatory agencies, despite successful inclusion of Karuk management perspectives in the technical portion of the TMDL. The concerns expressed here took two forms—concern over a perceived lack of enforcement of regulatory standards,²⁶ and concern about the role of a cumbersome technical process in delaying action.²⁷ While the Tribe has been able to meaningfully participate in the TMDL regulatory process, these concerns about lack of enforcement and inaction leads to the point that meaningful participation alone is not sufficient in addressing environmental justice issues.

This first concern—about an apparent lack of enforcement of the regulatory standards that the Tribe participated in establishing—is reinforced in environmental justice literature that shows, for example, that enforcement of the Clean Water Act at the regional level is lower in counties with higher levels of poverty (Konisky, 2009). The second, broader concern that the regulatory process itself has caused delays in action is echoed by critiques that the risk assessment frame in general is not oriented toward efficiently moving toward actions to identify and reduce harm (O’Brien, 2000b).

With respect to enforcement, the State Water Board has identified “[e]stablishing a monitoring system to assess disparate impacts of enforcement decisions in EJ Communities” as a key strategy for addressing environmental injustice, and in the Lower Klamath Basin, where hostile land owners make

²⁶ As in this interview comment, about submitting a formal violation request on agricultural pollution: “I submitted an official thing [two times] and they’re like oh, we’ll forward that onto the pollution department, who are actually supposed to crack down on people. And what’s happened? You drove by. The cows are still standing there” (Susan Corum, interview 2/16/2012, in Somes Bar, California).

²⁷ As in these comments: “The only thing accomplished by conducting yet another study would be a delay in water quality restoration. What is needed, in fact, are detailed work plans for the types of project that would be most effective in cleaning up water quality pollution” (Karuk DNR, 2009, p. 13).

enforcement challenging, this strategy will be critical (Cal/EPA SWRCB, 2016b). In terms of broad scale regulatory inaction, the environmental justice movement has pushed for “precautionary measures to combat...cumulative impacts”²⁸ (Liévanos, London, & Sze, 2011, p. 209). While development of precautionary approaches is one of four central objectives in the statewide Cal/EPA Environmental Justice Action Plan (Cal/EPA, 2004), precautionary approaches receive no attention as a goal or strategy used by the State Water Board to address environmental justice (Cal/EPA SWRCB, 2016b).

Perhaps most importantly, however, these two concerns—about an apparent lack of enforcement of the regulatory standards that the Tribe participated in establishing, and the concern that the regulatory process itself has caused delays in action—highlight a broader, overarching tension that is seen throughout this paper. Specifically, the concerns highlight the tension between the Tribe’s successful participation in existing regulatory frameworks and the ongoing need for outright recognition of the Tribe’s resource management sovereignty (a tension identified near the end of Chapter I). On the one hand, the Tribe has been able to actively participate in the TMDL regulatory process to the extent that they’ve shaped it to allow for cultural values to be directly inserted into the TMDL process through CUL and FISH as beneficial uses. Ultimately, however, the concerns cited above suggest that the TMDL process still falls short of meeting the Tribe’s goals for watershed management. So while participation in the TMDL process has been a successful strategy on the part of the Tribe to help reshape a regulatory process to be more inclusive of tribal values and management goals, it is not an end in itself. Indeed, true environmental justice would best be served through formal recognition of the Tribe’s sovereign right to manage culturally important natural resources.

²⁸ Brulle & Pellow, 2006, and Corburn, 2005, as cited by Liévanos, London, & Sze, 2011.

CHAPTER VII

CONCLUSION

Given the historical context of genocide and discriminatory resource management practices in California in general and the Lower Klamath Basin in particular, Karuk participation in natural resource management is identified as a key component of environmental justice. Meaningful participation was defined as the ability to not only get “voices heard” in regulatory resource management processes, but to actually get knowledge and values inserted directly into regulatory processes. This paper presented analysis, then, on the extent to which Karuk knowledge and values are inserted into regulatory processes, and the Tribe’s involvement throughout the TMDL process serves as a case study analysis. Contextual grounding on the distinction between traditional knowledge and Western science was given; barriers to inserting Karuk knowledge into regulatory processes were identified; and critical analysis of the extent to which these barriers have—and have not—been overcome was discussed. The Tribe also transformed the TMDL regulatory process by inserting tribal cultural values into the process; improving scientific inquiry; and by developing key “translator participants” fluent in both cultural and technical expertise, facilitating cross-cultural exchange between agencies and building collaboration and trust. And to the extent that the Tribe’s participation was “uneven,” the above analysis showed the ongoing importance of inserting precautionary approaches into regulatory frameworks, and explicitly recognizing the inherent legitimacy and value of tribal knowledge in these frameworks.

A study that builds on this one—by 1) incorporating additional analysis of non-tribal agency staff (from the Regional and State Boards, for example) perspectives in these processes, and 2) evaluating participation in ongoing monitoring and implementation of the Klamath River TMDL action plan—would provide a more complete analysis that could lead to specific policy recommendations. Analysis of non-tribal agency interactions, for example, would provide more insight into how non-tribal agency staff experience barriers to

creating regulatory processes that allow for meaningful participation, how meaningful participation co-produces knowledge and perhaps impacts non-tribal agency actors' perception of what constitutes "legitimate" knowledge, and how more participatory processes can be created moving forward and perhaps, more broadly, how natural resource management sovereignty might be achieved. Generally, this type of comparative analysis—of Karuk participation from the perspective of both Karuk and non-Native Water Board actors—could provide important insight toward developing specific recommendations for policies and programs that could be developed under the Cal/EPA environmental justice program to make participation in State and Regional Board regulatory processes, for example, more participatory. Meanwhile, analysis of ongoing monitoring and implementation is important because this phase of the TMDL process is ongoing and, therefore, analysis of these ongoing processes could lead to concrete recommendations that are directly relevant to the TMDL process moving forward.

REFERENCES CITED

- Agrawal, A. (1995). Dismantling the divide between indigenous and scientific knowledge. *Development and change*, 26(3), 413-439.
- Agrawal, A. (2002). Indigenous knowledge and the politics of classification. *International Social Science Journal*, 54(173), 287-297.
- Agarwal, B. (1992). The gender and environment debate: lessons from India. *Feminist Studies*. 18(1), 119-158.
- Anderson, K. (2005). *Tending the wild: Native American knowledge and the management of California's natural resources*. Berkeley, CA: University of California Press.
- Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of planners*, 35(4), 216-224.
- Bacher, D. (2007, July 6). EPA Issues Toxic Algae Warning for Warren Buffett's Klamath River Reservoirs. *San Francisco Bay Area Independent Media Center*. Retrieved from <https://www.indybay.org/newsitems/2007/07/06/18433635.php>.
- Bäckstrand, K. (2003). Civic Science for Sustainability: Reframing the Role of Experts, Policy-Makers and Citizens in Environmental Governance. *Global Environmental Politics*, 3(4), 24-41.
- Bäckstrand, K. (2004). Scientisation vs. civic expertise in environmental governance: Eco-feminist, eco-modern and post-modern responses. *Environmental Politics*, 13(4), 695-714.
- Bell, M. (1991). *Karuk: The Upriver People*. Happy Camp, CA: Naturegraph Publishers.
- Berkes, F. (1999). *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Philadelphia, PA: Taylor & Francis.
- Berkes, F., & Folke, C. (1998). Linking social and ecological systems for resilience and sustainability. In Berkes, F., Folke, Carl, & Colding, Johan. (Eds), *Linking social and ecological systems: management practices and social mechanisms for building resilience* (pp. 1-25). Cambridge, U.K. ; New York, NY, USA: Cambridge University Press.

- Bielawski, E. (2003). *Rogue diamonds : The rush for northern riches on Dene land*. Vancouver; New York: Douglas & McIntyre.
- Brown, P. (2007). *Toxic Exposures: Contested Illnesses and the Environmental Health Movement*. New York: Columbia University Press.
- Brulle, R. J., & Pellow, D. N. (2006). Environmental justice: human health and environmental inequalities. *Annual Review of Public Health*, 27, 103-124.
- California Code of Regulations (CCR) §659-672. (Current as of April 2016). Retrieved from http://www.waterboards.ca.gov/laws_regulations/docs/wrregs.pdf.
- California Environmental Protection Agency (Cal/EPA). (2004). *Environmental Justice Action Plan*. Retrieved from http://www.sehn.org/pdf/cal_epa.pdf.
- California Environmental Protection Agency (Cal/EPA). (2006). *Environmental Justice Small Grant Recipients Grant Summary*. Retrieved from <http://www.calepa.ca.gov/EnvJustice/funding/smallgrants/2006/GrantSummary.pdf>.
- California Environmental Protection Agency State Water Resources Control Board (Cal/EPA SWRCB). (2014). *Beneficial Use Definitions*. Retrieved from http://www.waterboards.ca.gov/about_us/performance_report_1314/plan_assess/docs/bu_definitions_012114.pdf.
- California Environmental Protection Agency State Water Resources Control Board (Cal/EPA SWRCB). (2016a). *Draft Resolution No. 2016-, Directing Staff to Develop Beneficial Uses Pertaining to Tribal Traditional and Cultural, Tribal Subsistence Fishing, and Subsistence Fishing*. Retrieved from http://www.waterboards.ca.gov/board_info/agendas/2016/feb/021616_7_with_draft_resolution.pdf.
- California Environmental Protection Agency State Water Resources Control Board (Cal/EPA SWRCB). (2016b). Retrieved from http://www.waterboards.ca.gov/water_issues/programs/outreach/education/justice.shtml.

- California Regional Water Quality Control Board North Coast Region
(CRWQCBNCR). (2003). *Staff Report for the Basin Plan Amendment to Revise the Beneficial Uses Chapter of the Water Quality Control Plan for the North Coast Region*. Exhibit B of Resolution No. R1 2003-0052. Retrieved from http://www.waterboards.ca.gov/board_info/agendas/2004/june/0617-08att1.pdf.
- Chichizola, R., Spain, G., & Tucker, C. (2007). *Groups Want PacifiCorp Held Accountable for Toxic Discharges*. [Press release]. Released by Klamath Riverkeeper, Pacific Coast Federation of Fishermen's Associations, and Karuk Tribe of California. Retrieved from http://www.karuk.us/images/docs/_press/2007/07-02-20%20WDR%20petition.pdf.
- Clayton, D., & Rios, T. (2006, September 14). Dam removal surfaces in blue-green algae issue. *Siskiyou Daily News*, as reprinted by *Klamath Bucket Brigade*. Retrieved from http://klamathbucketbrigade.org/SiskiyouDaily_Damremovalsurfacesinblue-greenalgaeissue091706.html.
- Colorado, P. (1988). *Bridging native and western science*. *Convergence*, 21(2), 49.
- Corburn, J. (2005). *Street science: Community knowledge and environmental health justice*. Cambridge, MA: MIT Press.
- Dolan, D., & Middleton, B. (2015). Improving tribal collaboration in California's Integrated Regional Water Management program. *Natural Resources Journal*, 55(2), 361.
- Doremus, H. D., & Tarlock, A. D. (2008). *Water war in the Klamath basin: Macho law, combat biology, and dirty politics*. Washington DC: Island Press.
- Ebbin, S. (2012). Fish and chips: Cross-cutting issues and actors in a co-managed fishery regime in the Pacific Northwest. *Policy Sciences*, 45(2), 169-191.
- Ellis, S. (2005). Meaningful Consideration? A Review of Traditional Knowledge in Environmental Decision Making. *Arctic*, 58(1), 66-77.
- Executive Order No. 12898, 3 C.F.R. 11 (1994).

- Federal Energy Regulatory Commission. (2007). Final Environmental Impact Statement for Relicensing of the Klamath Hydroelectric Project No. 2082-027: Executive Summary. Retrieved from <https://www.ferc.gov/industries/hydropower/enviro/eis/2007/11-16-07.asp>.
- Funtowicz, S. O., & Ravetz, J. R. (1991). A new scientific methodology for global environmental issues. *Ecological economics: The science and management of sustainability*, 10, 137.
- Gieryn, T. (1983). Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists. *American Sociological Review*, 48(6), 781-795.
- Guston, D. (2001). Boundary Organizations in Environmental Policy and Science: An Introduction. *Science, Technology, & Human Values*, 26(4), 399-408.
- Haraway, D. (1988). Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist studies*, 14(3), 575-599.
- Harden, B. (2005, January 30). Tribe Fights Dams to Get Diet Back. *Washington Post*. Retrieved from <http://www.washingtonpost.com/wp-dyn/articles/A47525-2005Jan29.html>.
- Harling, W. & Tripp, B. (2014). *Western Klamath Restoration Partnership: A plan for restoring fire adapted landscapes*. Report submitted to the Klamath National Forest by co-authors from the Mid Klamath Watershed Council and the Karuk Tribe. Retrieved from <http://karuk.us/images/docs/dnr/2014%20Western%20Klamath%20Restoration%20Partnership%20Restoration%20Plan%20DRAFT%20FINA%20%20%20.pdf>.
- Hay, I. (2005). *Qualitative Research Methods in Human Geography* (2nd ed.). South Melbourne, Vic.; New York: Oxford University Press.
- Heizer, R. F. (1993). *The Destruction of California Indians*. Bison Books. Retrieved from http://pages.ucsd.edu/~rfrank/class_web/ES-10/ETHN110articles/California/Heizer_PS.pdf.

- Hewes, G. W. (1973). Indian fisheries productivity in pre-contact times in the Pacific salmon area. *Northwest Anthropological Research Notes*, 7(2), 133-155.
- Hoffman, R. (2016, July 6). Timber Wars: California's forests have been decimated, and this is their final insult. www.Fusion.net. Retrieved from <http://fusion.net/story/304478/clearcutting-californias-dead-tree-forests/>.
- Hoopes, C. L. (1975). *Domesticate or Exterminate: California Indian Treaties Unratified and Made Secret in 1852*. Redwood Coast Publications
- Hormel, L. M., & Norgaard, K. M. (2009). Bring the Salmon Home! Karuk challenges to capitalist incorporation. *Critical Sociology*, 35(3), 343-366
- Huntington, H. P. (2000). Using traditional ecological knowledge in science: methods and applications. *Ecological applications*, 10(5), 1270-1274.
- Johnston-Dodds, K., & Burton, J. L. (2002). *Early California Laws and Policies Related to California Indians*. California State Library, California Research Bureau. Retrieved from <https://www.library.ca.gov/crb/02/14/02-014.pdf>.
- Karuk Tribe Department of Natural Resources (Karuk DNR). (n.d.). *Mission Statement*. Retrieved from <http://www.karuk.us/index.php/departments/natural-resources/dnr>.
- Karuk Tribe Department of Natural Resources (Karuk DNR). (2009). *Comments on Public Review Draft and Staff Report for the Klamath River Total Maximum Daily Loads (TMDLs) and Action Plan Addressing Temperature, Dissolved Oxygen, Nutrient, and Microcystin Impairments in California*. Retrieved from http://www.klamathwaterquality.com/documents/2009/karuk_klam_tmdl_2009_august.pdf.
- Karuk Tribe Department of Natural Resources (Karuk DNR). (2010). *Draft Eco-Cultural Resources Management Plan*. Retrieved from http://www.karuk.us/images/docs/dnr/ECRMP_6-15-10_doc.pdf.
- Karuk Tribe Department of Natural Resources (Karuk DNR). (2015). *Karuk Department of Natural Resources Strategic Plan for Organizational Development*. Retrieved from http://www.karuk.us/images/docs/dnr/Karuk%20DNR_Strategic%20Plan_FINAL_12172015.pdf.

- Kimmerer, R. W. (2002). Weaving traditional ecological knowledge into biological education: a call to action. *BioScience*, 52(5), 432-438.
- Kimmerer, R. W., & Lake, F. K. (2001). The role of indigenous burning in land management. *Journal of Forestry*, 99(11), 36-41.
- Klamath River Basin Fisheries Task Force. (2005). *Final Minutes, Klamath River Basin Fisheries Task Force and the Klamath Fisheries Management Council joint meeting October 19-20, 2005*. Retrieved from <https://www.fws.gov/yreka/TF-Min/10-19-05.pdf>.
- Konisky, D. (2009). Inequities in enforcement? Environmental justice and government performance. *Journal of Policy Analysis and Management*, 28(1), 102-121.
- Kruse, S. A., & Scholz, A. J. (2006). Preliminary economic assessment of dam removal: The Klamath River. *Ecotrust, Portland, Oregon*. Retrieved from http://archive.ecotrust.org/workingpapers/WPS2_Klamath_Dam_Assess.pdf.
- LaDuke, W. (1994). Traditional Ecological Knowledge and Environmental Futures. *Colorado Journal of International Environmental Law and Policy*, 5(1), 127-148.
- Lake, F. K. (2007). *Traditional ecological knowledge to develop and maintain fire regimes in northwestern California, Klamath-Siskiyou bioregion: management and restoration of culturally significant habitats* (Doctoral dissertation).
- Lake, F. K., Tripp, W., & Reed, R. (2010). The Karuk Tribe, planetary stewardship, and world renewal on the middle Klamath River, California. *Ecological Society of America Bulletin*, 91, 147-149.
- Leach, M., & Fairhead, J. (2002). Manners of contestation: "citizen science" and "indigenous knowledge" in West Africa and the Caribbean. *International Social Science Journal*, 54(173), 299-312.
- Leonetti, C. (2010). Indigenous stewardship methods and NRCS conservation practices. *United States Department of Agriculture Natural Resources Conservation Service, Anchorage, Alaska, USA*. Retrieved from <https://www.fws.gov/nativeamerican/traditional-knowledge.html>.

- Lidskog, R. (2008). Scientised citizens and democratised science. Re-assessing the expert-lay divide. *Journal of risk research*, 11(1-2), 69-86.
- Liévanos, R., J. London, and Julie Sze. (2011). Uneven transformations and environmental justice: Regulatory science, street science, and pesticide regulation in California. In G. Ottinger & B. Cohen (Eds.), *Technoscience and Environmental Justice: Expert Cultures in a Grassroots Movement* (pp. 201-228). Cambridge, MA: MIT Press.
- London, J. K., Sze, J., & Liévanos, R. S. (2008). Problems, promise, progress, and perils: Critical reflections on environmental justice policy implementation in California. *UCLA Journal of Environmental Law & Policy*, 26(2), 255.
- McGregor, D. (2008). Linking traditional ecological knowledge and Western science: aboriginal perspectives from the 2000 State of the Lakes Ecosystem Conference. *The Canadian Journal of Native Studies*, 28(1), 139-158. Retrieved from https://www.nwclimatescience.org/sites/default/files/2013bootcamp/readings/McGregor_2008.pdf.
- McEvoy, A. F. (1986). *The fisherman's problem: ecology and law in the California fisheries, 1850-1980*. Cambridge University Press
- Merriam, S. (2014). *Qualitative Research: A Guide to Design and Implementation* (3rd ed.). Hoboken: Wiley.
- Nadasdy, P. (1999). The politics of TEK: Power and the "integration" of knowledge. *Arctic Anthropology*, 36(1/2), 1-18.
- National Research Council Staff. (1982). *Risk Assessment in the Federal Government: Managing the Process*. Washington, DC, USA: National Academies Press.
- Norgaard, K. M. (2005). The Effects of Altered Diet on the Health of the Karuk People. Report submitted to the Federal Energy Regulatory Commission Docket# P-2082 on behalf of the Karuk Tribe of California. *Report prepared for the Karuk Tribe Department of Natural Resources, Happy Camp, CA*.

- Norgaard, K. M. (2014). Karuk Traditional Ecological Knowledge and the Need for Knowledge Sovereignty: Social, Cultural, and Economic Impacts of Denied Access to Traditional Management. *Report prepared for the Karuk Tribe Department of Natural Resources, Happy Camp, CA.*
- North Coast Regional Water Quality Control Board (NCRWQCB). (2007). *Water Quality Control Plan for the North Coast Region.* Retrieved from http://www.waterboards.ca.gov/water_issues/programs/tmdl/records/region_1/2007/ref2463.pdf.
- North Coast Regional Water Quality Control Board (NCRWQCB). (2010a). *Final Staff Report for the Klamath River Total Maximum Daily Loads (TMDLs) Addressing Temperature, Dissolved Oxygen, Nutrient, and Microcystin Impairments in California, the Proposed Site Specific Dissolved Oxygen Objectives for the Klamath River in California, and the Klamath River and Lost River Implementation Plans: Chapter 2, Problem Statement.* Retrieved from http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/klamath_river/100927/staff_report/03_Ch2_ProblemStatement.pdf.
- North Coast Regional Water Quality Control Board (NCRWQCB). (2010b). *Final Staff Report for the Klamath River Total Maximum Daily Loads (TMDLs) Addressing Temperature, Dissolved Oxygen, Nutrient, and Microcystin Impairments in California, the Proposed Site Specific Dissolved Oxygen Objectives for the Klamath River in California, and the Klamath River and Lost River Implementation Plans: Chapter 4, Pollutant Source Analysis.* Retrieved from http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/klamath_river/.

- North Coast Regional Water Quality Control Board (NCRWQCB). (2010c). *Final Staff Report for the Klamath River Total Maximum Daily Loads (TMDLs) Addressing Temperature, Dissolved Oxygen, Nutrient, and Microcystin Impairments in California, the Proposed Site Specific Dissolved Oxygen Objectives for the Klamath River in California, and the Klamath River and Lost River Implementation Plans: Chapter 5, Allocations and Numeric Targets*. Retrieved from http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/klamath_river/100927/staff_report/06_Ch5_Allocations_Targets.pdf.
- North Coast Regional Water Quality Control Board (NCRWQCB). (2012). *Klamath River TMDL (project web page)*. Retrieved from http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/klamath_river/.
- Norton, J. (1979). *When our worlds cried: Genocide in northwestern California*. San Francisco: Indian Historian Press.
- O'Brien, M. (2000a). *Making better environmental decisions: an alternative to risk assessment*. Cambridge, MA.: MIT Press.
- O'Brien, M. (2000b). When harm is not necessary: risk assessment as diversion. In Hofrichter, R. (Ed.), *Reclaiming the environmental debate: The politics of health in a toxic culture* (pp. 113-134). Cambridge, MA.: MIT Press.
- Olsson, P., Folke, C., & Berkes, F. (2004). Adaptive Comanagement for Building Resilience in Social–Ecological Systems. *Environmental Management*, 34(1), 75-90.
- Pickering Sherman, K., Lanen, J., & Sherman, R. (2010). Practical Environmentalism on the Pine Ridge Reservation: Confronting Structural Constraints to Indigenous Stewardship. *Human Ecology*, 38(4), 507-520.
- Pierotti, R., & Wildcat, D. R. (1997). Native Tradition, Evolution, and Creation. *Winds of Change*, 12(2), 70-73.
- Pierotti, R., & Wildcat, D. R. (2000). Traditional ecological knowledge: the third alternative (commentary). *Ecological applications*, 10(5), 1333-1340.

- Quinn, S. (2007). Karuk Tribe of California, Aboriginal Territory, Acreage Assessment. Compiled by Scott Quinn. *Internal Document of Karuk Tribe, Happy Camp, CA.*
- Raffles, H. (2002). Intimate knowledge. *International Social Science Journal*, 54(173), 325-335.
- Reed, R., & Norgaard, K. (2010). Salmon feeds our people: challenging dams on the Klamath River. In K. W. Painemilla, A. Rylands, A. Woofter, & C. Hughes (Eds.), *Indigenous Peoples and Conservation: From Rights to Resource Management* (pp. 7-16). Arlington, VA: Conservation International. Retrieved from http://www.conservation.org/publications/Documents/CI_ITPP_Indigenous_Peoples_and_Conservation_Rights_Resource_Management.pdf.
- Reiners, W. A., & Lockwood, J. A. (2010). *Philosophical foundations for the practices of ecology*. Cambridge, UK: Cambridge University Press.
- Reo, N. J., & Whyte, K. P. (2012). Hunting and morality as elements of traditional ecological knowledge. *Human ecology*, 40(1), 15-27.
- Resolution No. R1 2003-0052 (2003). *Adopting an Amendment to the Water Quality Control Plan for the North Coast Region Chapter 2, Beneficial Uses*. California Regional Water Quality Control Board North Coast Region. Retrieved from http://www.waterboards.ca.gov/board_info/agendas/2004/june/0617-08att1.pdf.
- Ristroph, E. B. (2012). Integrating community knowledge into environmental and natural resource decision-making: Notes from Alaska and around the world. *Washington & Lee Journal of Energy, Climate and Environment*, 3(1), 81-131.
- Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, 4(2), 155-169.
- Schlosberg, D. (2004). Reconceiving environmental justice: global movements and political theories. *Environmental politics*, 13(3), 517-540.
- Senate Bill 115. (Statutes of 1999). Chapter 690. Authored by Senator Hilda Solis. Enacted. Retrieved from http://www.leginfo.ca.gov/pub/99-00/bill/sen/sb_0101-0150/sb_115_bill_19991010_chaptered.html.

- Small, S. A. (1995). Action-oriented research: Models and methods. *Journal of Marriage and the Family*, 57(4), 941-955.
- Tremblay, M. (1957). The Key Informant Technique: A Nonethnographic Application. *American Anthropologist*, 59(4), 688-701.
- Tucker, C. (2005). *Klamath Reservoirs Plagued by Toxic Algae*. [Press release]. In Jacob, K., & Corum, S., 2006, *Technical Memorandum: Summary of 2005 Toxic Microcystis aeruginosa Trends in Copco and Iron Gate Reservoirs on the Klamath River, CA* (p. 24). Prepared for the Karuk Tribe Department of Natural Resources. Retrieved from <http://www.karuk.us/images/docs/wqdocuments/Karuk%20Tribes%20Toxic%20Cyano%20In%20Copco-Irongate%202005%20Final%20Report.pdf>.
- Tucker, C. (2007, July 2). *Toxic Algae Returns to PacifiCorp's Klamath Reservoirs in Time for Summer Holidays*. [Press release]. Released by Karuk Tribe of California. Retrieved from <http://www.karuk.us/images/docs/press/2007/07-07-01%20toxic%20reservoirs.pdf>.
- United States Environmental Protection Agency (US/EPA). (2008). *Staff Report: Reconsideration of California's 2006 Section 303(d) List Omission of Microcystin Toxin Listings for three Klamath River Segments and Determination to Add Microcystin Toxins Listing for Klamath River Hydrologic Unit (HU), Middle HA Hydrologic Area (HA), Oregon to Iron Gate*. Retrieved from <https://www3.epa.gov/region9/water/tmdl/303d-pdf/Klamath-SWRCB303d-final.pdf>.
- United States Environmental Protection Agency (US/EPA). (2010). *Approval Letter for Water Quality Control Plan for the North Coast Region (Basin Plan) containing Total Maximum Daily Loads (TMDLs) for temperature, dissolved oxygen (DO), nutrients, and microcystin impairments in the Klamath River in California*. Retrieved from <https://www3.epa.gov/region9/water/watershed/pdf/klamath-approval-letter-final.pdf>.

- Usher, P. (2000). Traditional Ecological Knowledge in Environmental Assessment and Management. *Arctic*, 53(2), 183-193.
- Whyte, K. P. (2013a). Justice forward: Tribes, climate adaptation and responsibility. *Climatic Change*, 120(3), 517-530. Retrieved from https://www.nwclimatescience.org/sites/default/files/2013bootcamp/readings/Whyte_2013b.pdf.
- Whyte, K. P. (2013b). On the role of traditional ecological knowledge as a collaborative concept: a philosophical study. *Ecological processes*, 2(1), 1-12.
- Wolfley, J. (1998). Ecological risk assessment and management: Their failure to value indigenous traditional ecological knowledge and protect tribal homelands. *American Indian culture and research journal*, 22(2), 151-169.
- Woodard, S. (March 2005). Blending science and tradition in the arctic. *Indian Country Today*. Retrieved from <http://indiancountrytodaymedianetwork.com/2005/03/30/blending-science-and-tradition-arctic-94650>.
- Yin, R. (2014). *Case study research: Design and methods* (Fifth ed.). Los Angeles: SAGE.
- York, R. (2009). The Science of Nature and the Nature of Science. In K. Gould & T. Lewis (Eds.), *Twenty Lessons in Environmental Sociology* (pp. 85-94). New York, New York: Oxford University Press.