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Tribal–Federal Collaboration in Resource Management



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ABSTRACT

*The increase in collaborative projects involving American Indian tribes and natural resource management agencies in the United States reflects two emergent trends: 1) the use of collaborative approaches between agencies and groups in managing natural resources; and 2) the concurrent increased recognition of American Indian rights, institutionalization of consultation processes, and a general movement of Indian self-determination. This article focuses on institutional mechanisms that bring together tribes and natural resource management agencies in collaborative processes to achieve mutually desired resource management objectives. Using qualitative analysis of data from ten collaborative projects across the United States, we identify attributes of collaborative arrangements emerging from tribal–federal collaboration: decision-making authority; transfer of funds from agency to the tribe(s); the level of mutual dependency; the sharing or transfer of various forms of knowledge, including scientific and cultural; and responsibility for conducting management field work. Examining the similarities and differences across the attributes, we characterize the projects into five types (co-management, contractual, cooperative, working relationship, and conservation easement), and find that considerable variation exists in the forms and functions of tribal–federal collaborative arrangements. We explore two types of collaborative arrangements in more depth to better understand what factors influence the integration of traditional ecological knowledge. Comparing gray wolf (*Canis lupus*) recovery in Idaho and forest restoration in northern California, we find that traditional ecological knowledge was a key factor in initiating both collaborative projects, but also that the application of traditional ecological knowledge on-the-ground differed.*

INTRODUCTION

Many factors have contributed to a proliferation of collaboration in natural resource management between American Indian tribes and federal agencies over the past decade. On federal and tribal lands, awareness of cultural values and traditional resource management practices is on the rise. This is supported by increased recognition of tribal treaty rights, adoption of tribal-federal consultation processes, and by the evolution of tribal self-determination. Moreover, resource management agencies are exploring new ways of doing business in the face of widespread institutional changes. At a time when budgets and staff are on the decline, public land managers are collaborating with partners and stakeholders to implement projects, deal with contentious management issues, and build ownership in the management of public resources (Kootz et al. 2004; Wondolleck and Yaffee 2000). This increased use of collaborative processes in federal resource management, combined with legislative and sociocultural developments pertaining to tribal sovereignty and culture, have contributed to an expansion of collaborative arrangements between tribes and natural resource management agencies, such as the Hopi Tribe and nearby U.S. National

Forests (Lesko and Thakali 2001), the Navajo hogan project (KenCairn 2002), and Yakama Nation huckleberry management on the Gifford Pinchot National Forest (Fisher 1997).

Contracts, memoranda of understanding, and partnership agreements define the collaborative processes and rules for many types of natural resource projects. Although mechanisms provide structure to collaboration, many aspects of stakeholder participation are not formally defined, including how mutual objectives are identified, how information is shared, how work is done on-the-ground, how financial and human resources are used, and how knowledge is respected, shared and transferred. Norms and culture shape the roles and responsibilities of participants in collaborative processes. Resource management agencies have rules and procedures and a culture of management; American Indians have distinct norms, beliefs, values and traditions related to the environment and resource management. Although there are many definitions and forms of traditional ecological knowledge, for many American Indian tribes, traditional ecological knowledge is the reflection of cultural norms and practices that influence how tribal members steward and coexist in natural environments. Traditional ecological knowledge is important in collaborative arrangements because it brings other forms of knowledge and practice to solve resource management problems, and creates opportunities for mutual learning and building respect for different ways of knowing. Given that these collaborative arrangements tend to explicitly define roles and responsibilities, this research asks the question to what extent do formal institutions, such as contracts and partnership agreements, limit or facilitate the integration of traditional ecological knowledge in collaborative resource management projects? And, does this vary depending on the type of institutional arrangement that governs the collaborative process?

This study examines arrangements for collaboration in natural resource management between tribes and resource management agencies to better understand variation in form and function. We begin with brief backgrounds on treaty rights and collaborative processes. Then, through qualitative analysis of data from semi-structured interviews with key informants for ten projects across the United States, we characterize attributes of collaborative arrangements to better understand their similarities and differences. From this we develop a typology of our sample of ten projects. Last, we explore two types of projects in more depth, with additional interviews and field observation, to better understand what factors influence the integration of traditional ecological knowledge in collaborative arrangements.

TRIBAL RIGHTS AND CONSULTATION PROCESSES

For much of the period since the United States government and tribal governments signed treaties as independent sovereign entities, concern for trust responsibilities and treaty rights has been eclipsed by the prevailing objectives to assimilate American Indians and terminate tribes. Since the 1960s, however, several pieces of legislation and executive directives have been enacted that were designed to protect the rights of tribes and create a legal framework for collaboration (e.g., President Clinton's 1996 Executive Order 13007, the National Indian Forest Resources Management Act of 1990 [Pub. Law 101-630 Title III, 104 Stat. 4532] and the Tribal Forest Lands Protection Act of 2005 [118 Stat. 868-871, 25 U.S.C. 3115-3115a]). Also, several decisions by the United States federal courts have reaffirmed the sovereignty of tribes and outlined their roles as co-managers of treaty protected resources, such as the 1966 Belloni Decision on tribal treaty fishing rights in the Columbia Basin (302 F. Supp. 899), the 1974 Boldt Decision on tribal fishing rights in Washington (384 F. Supp. 401), and the 1983 Voigt Decision pertaining to treaty rights of the Wisconsin Chippewa (700 F.2d 365). With these enactments, formal dialogue and engagement processes between American Indian tribes and the U.S. government have been mandated to protect tribal treaty rights, facilitate agency

protection of tribal interests, and promote agency consultation and coordination with tribes.

The executive and legislative developments demonstrate an evolution from discretionary considerations of tribal interests in federal projects to mandated government-to-government consultation and inclusion. Presently, federal land management agencies must consult with tribes where: tribal rights are reserved by treaty, spiritual and cultural values and practices exist, public lands are adjacent to tribal or trust lands, and tribal water rights may be affected (Mitchell 1997). These developments demonstrate that even with over a hundred-year history of treaty rights, collaboration between American Indians and the U.S. government in resource management is relatively new. Examination of collaborative approaches would be instructive to both agencies and tribes as this era of tribal rights and Indian self-determination continues to evolve.

CHARACTERISTICS OF COLLABORATIVE PROCESSES

Numerous factors affect collaboration between agencies and non-governmental entities. Barriers to collaboration include power differentials among stakeholders (Selin and Chavez 1995; Williams and Ellefson 1997), unclear or inflexible legal authorities and administrative policies; organizational cultures unaccustomed to collaborative processes (Cortner et al. 1996; Pinchot Institute 2001), agency fears of losing control (Schuett et al. 2001), and funding availability (Pinchot Institute 2001). Factors which promote collaboration include shared and open decision-making processes, goal-setting early on in the process, and continual information sharing (Gray 1985; Schuett et al. 2001; Williams and Ellefson 1997). In addition, stakeholders' willingness to share authority and benefits (Persoon et al. 2003), provide resources, acknowledge the legitimacy of other stakeholders, be flexible, and trust other stakeholders increases the likelihood of successful collaborative arrangements (Gray 1985; Schuett et al. 2001; Williams and Ellefson 1997). The emphasis on empowerment of local residents and communities by treating them as equal participants in resource management decision making has its roots in many developing countries where participatory development has been attempted and espoused for several decades (Borrini-Feyerabend et al. 2004; Ingles et al. 1999).

Agency directives for collaboration provide institutional backing and programmatic structure to collaborative processes (Gray 1985; Williams and Ellefson 1997), but procedural flexibility has been identified as being important as well (Pinchot Institute 2001; Selin and Chavez 1995; Williams and Ellefson 1997). Collaborative arrangements that identify a common goal (Michaels et al. 1999; Selin and Chavez 1995) and define stakeholders' roles and responsibilities contribute to successful collaboration. Institutionalizing the collaborative process through a variety of mechanisms, such as contracts, partnership agreements, and memoranda of understanding contribute to sustainable collaborations because they provide structure and validity (Wondolleck and Yaffee 2000). However, collaboration is also understood to be an evolving process involving social learning and flexibility (Armitage et al. 2007). Rigid institutional arrangements can become obstructive to the adaptive nature of collaboration, leading to calls for policy reform (Clark et al. 2008). How different institutional arrangements and mechanisms influence the social dynamics and structure of collaborative processes and thereby shape their form and function is not well understood. For instance, what dynamics does a contract create between partners in a collaborative project and how do they differ from the relationships formed through a partnership agreement?

Many definitions of collaborative resource management exist. Adapting Gray's (1985) definition of collaboration, we focused on collaborative arrangements that reflected the pooling of resources (e.g., money, labor, knowledge) to address needs that neither party could address adequately on their own. This definition distinguishes these projects from other forms of

collaboration that are designed to resolve conflict or build bridges among disparate stakeholders.

TRADITIONAL ECOLOGICAL KNOWLEDGE IN RESOURCE MANAGEMENT

Since the 1980s, natural resource managers around the world have looked to indigenous groups and their knowledge to manage processes and functions of complex ecosystems (Berkes et al. 1994, 2000). Although many definitions of traditional ecological knowledge exist, it is generally considered the "cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment" (Berkes et al. 2000:1252). Knowledge development is based on detailed observation of the natural environment, feedback learning, links between society and the environment, and resilience to changes within the environment (Berkes 1999; Berkes et al. 1998; Pierotti and Wildcat 2000).

Traditional ecological knowledge is often considered as being ethically-based, spiritual, intuitive and holistic. In contrast, western science tends to focus on understanding small parts of larger systems that separate humans from the natural environment (Berkes 1999; Berkes et al. 1994; Pierotti and Wildcat 2000). Western science combines a particular set of values with systems of knowing based on empirical observations, rationality, and logic as opposed to perceived truths or perceptions (Usher 2000). According to Kimmerer (2002), incorporating traditional ecological knowledge into natural resource management practices is one way to validate and include tribal abilities. Using the above definitions as a guide, we viewed traditional ecological knowledge as a process that incorporates tribal culture, values, practices and beliefs, as well as the relationships that exist between humans and the natural environment.

Application of traditional ecological knowledge in research and management of public resources raises several concerns. Once written, codified, or taken outside of its cultural context and put into another frame of reference, traditional ecological knowledge can assume different meanings (Cruikshank 1998; Kimmerer 2002). Moreover, integrating traditional ecological knowledge with western science imposes non-native ideals about knowledge and life experiences of native people and forces researchers to compartmentalize and distill indigenous beliefs, values, and experiences according to non-native criteria (Nadasdy 1999). Finally, understanding of traditional ecological knowledge varies within and between individual tribes. Among more heterogeneous tribal communities in particular, different claims to knowledge can create inequality and competition, and thus the application of traditional ecological knowledge in interactions with the natural environment can be challenging for some tribes (Cruikshank 1998).

We considered these concerns about traditional ecological knowledge research in our examination of the ways in which collaborative arrangements incorporated traditional ecological knowledge. Our objective was not to validate nor document traditional ecological knowledge. Instead, we focused our data gathering on the collaborative arrangements in order to better understand what dimensions and conditions within the arrangements were conducive, or not, to the integration of traditional ecological knowledge and why. Whether or not traditional ecological knowledge was characterized as integrated into the resource management project or not is based on interviewee perceptions of the role of traditional ecological knowledge in these collaborative arrangements.

METHODS

The research for this paper was conducted in two phases. In the first phase, we characterized a sample of collaborative projects involving American Indian tribes and public resource management agencies based on key attributes of collaboration. First we developed a descriptive database of over 60 tribal-

agency collaborative projects in the United States. From this database we selected a sample of ten projects based on criteria that allowed for variation among geographic location and the type of resources managed (Appendix).

For phase one, we conducted semi-structured phone interviews with between two and five key informants representing agencies and tribes for each of the ten projects. Project representatives were asked to provide information about their project, such as the history, membership, and the purpose of the project. Interviewees were asked about their perceptions of the collaborative process, such as the impetus that brought the partners together, the perceived benefits of collaborating, the specific problem or issue that the group addressed, the decision-making process, the degree of flexibility that the institutional arrangement afforded, and lessons learned, successes, and barriers. Descriptive information on the location, time frame, and financial support for the project was also gathered. These categories of interview topics served as the basis for coding the interview text (Robson 2003). The qualitative analysis of interview data was designed to reveal distinguishing attributes of tribal–federal collaborative arrangements. The identification of attributes was informed by the literature on collaboration but was primarily grounded in the descriptive information of the sample collaborative projects. Examination of the differences and similarities of these attributes across the ten projects led to a characterization of five types of collaborative arrangements.

In phase two of the research we examined how cultural values and traditional ecological knowledge were reflected in two of the five types of collaborative arrangements: co-management and contractual. These two types had interesting differences among key attributes, namely decision-making authority and implementation of the ground work, providing a rich foundation for a comparative inquiry in the second phase. Time and resources limited our expanded inquiry to two cases. Key informants were selected based on expertise and involvement in the collaborative arrangement and their ability to speak about the role of traditional ecological knowledge in the project. Informants included tribal and agency decision-makers, personnel involved in collaborative arrangements, tribal traditional ecological knowledge bearers (self-identified), and tribal members with strong connections to the resource being managed. Data in phase two were collected through semi-structured interviews with key informants, participant observation of tribal-agency interactions, field investigation of on-the-ground management activities, and documentation of written agreements and management policies. A total of 25 interviews were conducted as a part of phase two: 11 in the co-management Maidu case and 14 in the contractual Nez Perce case. Transcripts of interviews, 130 pages of field notes, and over a dozen textual documents, such as official agreements and reports, were coded and analyzed for key themes related to the role of traditional ecological knowledge in these two types of collaborative arrangements. Interview transcripts and notes were coded through a progression of increasingly abstract (Robson 2003) open coding, axial coding, and selective coding (Glaser and Strauss 1967). Open coding allowed us to sort and draw meaning from the interview text and included over 30 codes identifying aspects as diverse as agency support, project economic and cultural goals, respect, trust, priority species, cultural values, and management activity. Axial coding showed relationships within the data, such as contractual processes and inter-group communication. Selective codes, such as sources of power, organizational capacity of both tribal groups and agency management units, and application of traditional ecological knowledge in management projects, linked axial codes to core themes (Strauss 1987) in understanding the effects of collaborative arrangements on the ability to integrate traditional ecological knowledge in natural resource management.

TYPES OF PROJECTS AND THEIR ATTRIBUTES

The collaborative projects in our sample reflect the diversity of collaborative arrangements in the U.S. in

terms of geographic locations, resource being managed, management objectives, and entities involved (Appendix). Beyond these descriptive differences, the projects had substantive differences reflecting distinct structures and roles within the collaborative arrangements. A number of distinguishing attributes surfaced in our analysis of qualitative data for these collaborative projects. In particular, five attributes with key relevance to the forms and functions of tribal–federal collaborative arrangements emerged: decision-making authority; whether or not funds were transferred from the agency to the tribe(s); the expressed level of mutual dependency and mutual benefit of collaborating; the sharing or transfer of various forms of knowledge, including scientific and traditional ecological knowledge; and responsibility for implementing the on-the-ground resource management activity. We did not include attributes such as "type of resource being managed" or "number of tribes involved in the collaborative arrangement," although these characteristics also serve to distinguish projects. Within each of the five attributes, variation existed for level of achievement. For instance, funds may or may not have been transferred; the agency or the tribe may have had responsibility for the field work; there may have been a high or low sense of mutual dependence; decision-making authority was independently held, joint, or shared; and a process for transferring various forms of knowledge and information may have been well-established or informal.

After grouping the projects based on their similarities and differences across five key attributes of collaboration, the ten projects were sorted (Table 1) into five types of collaborative arrangements for which descriptive names were assigned, and which are described below: co-management (two projects), contractual (two projects), cooperative (three projects), working relationship (two projects), and conservation easement (one project). The type names do not necessarily reflect the on–paper mechanism that established the collaborative arrangement; for instance, the Maidu project was not formally called a co-management project by the agency, but instead was established through the Forest Service's stewardship contract pilot authority. However, it had attributes that distinguished it from more traditional contracts as used in the cases of the Confederated Tribes of the Grand Ronde and the Nez Perce Tribe. In addi-

TABLE 1: Characterization of tribal-federal collaborative arrangements.

	ATTRIBUTES OF COLLABORATION				
TYPES OF COLLABORATION	**Decisionmaking authority**	**Transfer of funds**	**Level of dependence on each other**	**Transfer of knowledge**	**Implementation of on-the-ground work**
Comanagement (2)[1]	Joint	Yes	High	High	Joint
Contractual (2)	Agency	Yes	Varied	High	Tribe
Cooperative (3)	Shared	Varied[2]	Varied	Varied	Varied
Working relationship (2)	Independent	No	High	Varied	Independent, but with coordination
Conservation easement (1)	Independent, within agreed limits	Yes	Moderate	Low	Independent, but with coordination

[1] Numbers in parentheses indicate the number of projects in the sample that fall under a particular type.

[2] "Varied" indicates there was variation among the projects pertaining to a particular attribute. For instance, for three cooperative projects one project had clear mechanisms for transferring information and knowledge among partners in the project, whereas the other two projects had less clear ways in which knowledge was communicated among parties.

tion, we recognize that the literature offers a variety of definitions to some of these types, in particular co-management. Our typology was developed to serve as a tool for understanding similarities and differences among projects, rather than to coin new terms or contribute to a broader definitional debate. The types of collaborative arrangements are described below.

CO-MANAGEMENT ARRANGEMENT

Co-management arrangements were collaborative efforts in which all stakeholders shared joint decision-making authority. Examples of co-management were the Maidu Stewardship Pilot Project and the Polar Bear Agreement. Authority was divided equally between the parties or resided more heavily with the tribal entity. Each entity retained veto power over proposed decisions. Considerable autonomy was granted for certain parties to conduct specific activities, but the parties jointly agreed on such a strategy. There was a consistent transfer of funds between the stakeholders and the level of dependence among the stakeholders was very high. In addition, there was a high level of information and knowledge transferred among the stakeholders and the work on-the-ground was implemented as a joint effort.

CONTRACTUAL ARRANGEMENT

Contractual arrangements were collaborations in which the federal resource management agency retained ultimate decision-making authority. Within our sample, the contractual arrangements were the Gray Wolf Recovery and Grand Ronde Forest Stewardship projects. Funding was transferred from the agency to the tribe throughout the course of the project, and tribes were responsible for the implementation of on-the-ground work. The level of perceived dependence among the stakeholders varied within the cases from low in the Grand Ronde arrangement to high in the Nez Perce case. Transfer of knowledge among the stakeholders was limited to information that both parties needed to fulfill their roles or responsibilities.

COOPERATIVE ARRANGEMENT

Three cooperative arrangements were in our sample: the Circle of Flight-Red Lake project, the Forest and Fish project, and the Grande Ronde Model Watershed project. These cooperative arrangements were characterized by a shared, although not equal, decision-making authority and the ability of individual stakeholders to make decisions pertaining specifically to them. This allowed decisions and actions to move forward with some, though not necessarily complete, support of the tribal entity. There was much variation in how funds were transferred. Certain collaborative projects provided funding directly to the tribe whereas others distributed money through cooperatives. These collaborative efforts included a shared, overarching objective, but also maintained a perception of individual benefit.

WORKING RELATIONSHIP

Within the two working relationship projects, decisions were made independently by the stakeholders. The projects included the Santa Clara Pueblo Elk Management and the Navajo Nation Hogan Project. There was no transfer of funds between agencies and tribes, and each entity financially supported its involvement in the collaborative project. However, the stakeholders within working relationships were highly dependent on each other and recognized the mutual benefits of collaborating. Since there was no binding agreement, stakeholders were involved because of the benefits they received from pooling their resources. There was a transfer of knowledge among stakeholders in the form of data and resources. On-the-ground work was implemented independently but with a high level of coordination among stakeholders.

CONSERVATION EASEMENT

For the one conservation easement project in our sample, Kodiak Island Conservation Easement, the project goals and objectives were established and agreed upon by the stakeholders. Parties retained independent decision-making authority within the

parameters of the easement. For certain issues, the parties behaved less independently and chose to communicate and coordinate actions; for instance, implementation of on-the-ground work was conducted with a certain level of coordination. Both parties maintained independent but coordinated responsibilities for on-the-ground activities and management on the land. There was an annual transfer of funds from the agency to the tribe. A process for sharing knowledge was not formally established. Through the development of the easement, the parties came to recognize the mutual benefit of collaborating.

Table 1 presents the information on project characteristics in a condensed form, using short phrases or single words as descriptors to portray variation across project types. For example, in the case of the contractual type, the attribute of responsibility for "implementation of on-the-ground work" has the descriptor "Tribe," indicating that for both projects in this type the work was conducted by the tribes. Typologies rarely maintain consistent matches for all attributes across all cases. This was the situation for the three projects that fell under the cooperative type project. The attribute "implementation of on-the-ground work" has the descriptor "Varied" in the corresponding cell. This indicates that there was no consistent tendency in this type of project for work in the field to be done by the tribe, the agency, or some coordinated effort.

The typology was developed to serve as a tool for understanding similarities and differences among projects. Our intent was not to argue for one type over another, and the table does not reflect a hierarchical nesting of types. The typology and descriptions do not characterize the universe of collaborative projects. Rather, the typology demonstrates that within a sample of collaborative projects involving agencies and tribes, considerable diversity exists in form and function. Although we recognize the dynamic nature of collaborative arrangements, the types reflect the status of projects at the time of the fieldwork, as a longitudinal study was beyond the scope of this project.

Increased awareness of and appreciation for differences among collaborative arrangements involving tribes may assist project stakeholders in developing institutional mechanisms for collaborative projects that best address particular resource management issues and stakeholder needs. Evidence from these projects suggests that different arrangements serve different purposes for tribes. For instance, the transfer of funds from the agency to the tribe, as part of a mechanism, did not ensure a strong sense of mutual benefit of collaboration and mutual dependency, as in the case of one of the contractual projects, the Grande Ronde Stewardship project. Other factors, such as both entities contributing physical resources and personnel to the collaborative effort to achieve a shared objective, as in the case of both working relationship projects, seemed more important to building a sense of mutual dependence. Although the literature on collaboration often presents co-managemen projects as an ideal type for which projects should strive to become—returning territories to American Indians notwithstanding—other types of arrangements, such as contracts, may have certain legal provisions that tribes may find desirable in some circumstances.

COMPARISON OF TWO COLLABORATIVE PROJECTS AND THE ROLE OF TRADITIONAL ECOLOGICAL KNOWLEDGE

We now turn to examination of two cases and the role of traditional ecological knowledge for two types of collaborative arrangements indentified in phase one: a contractual arrangement and a co-management arrangement. The Nez Perce case represents a contractual arrangement in which the tribe collaborated with the U.S. Fish and Wildlife Service and the State of Idaho on wolf recovery efforts. The Maidu case in northern California is what we call a co-management arrangement involving collaboration in forest restoration between the Maidu community and the U.S. Forest Service Plumas and Lassen National Forests. For both the Nez Perce and the Maidu, cultural values played an important role in the development of the collaborative projects although the explicit

use of traditional ecological knowledge played out differently in the two cases.

For the Maidu, the collaborative project was an opportunity to demonstrate to the Forest Service their knowledge and traditional management practices, despite the absence of tribally owned lands, while contributing to the revitalization of Maidu culture. Maidu community members developed the Maidu Cultural and Development Group (MCDG), a non-profit organization that strives to restore Maidu culture, strengthen the Maidu community, provide community members with opportunities to celebrate their culture, and rebuild the relationship between the Maidu community and the natural environment.

The stewardship contract between MCDG and the Forest Service was designed to restore a forest landscape using Maidu traditional ecological knowledge. However, it was also about restoring and validating Maidu culture to both members and non-members of the Maidu. Although traditional ecological knowledge has different meanings to different members of the Maidu community, interviewees explained that some components of traditional ecological knowledge are recognized by all Maidu. Natural resources such as beargrass, willow, trees and animals are referred to as non-human Maidu by members of the Maidu community. Traditional ecological knowledge reflects an interactive relationship between all Maidu, both human and non-human. This relationship exists on a number of forms: as a kinship relationship with the land and the resources, as a subsistence relationship, and as a physical presence of humans on the landscape, whereby the landscape responds to human activity and presence. According to Maidu interviewees, the health of the land directly relates to the management of those lands by the Maidu people.

The recovery of wolf populations in central Idaho is culturally important to the Nez Perce Tribe. Interviewees describe complex relationships between tribal members and wolves, in which the wolf serves as a brother, guide, and teacher to the tribe. Some interviewees described a parallel between survival of wolves in the face of civilization and the survival of the Nez Perce Tribe through the development of the western United States.

Like the Maidu, the Nez Perce Tribe wanted to demonstrate their abilities as resource managers. However, rather than explicitly integrating traditional knowledge and culture into the recovery effort, the Nez Perce used management techniques consistent with western science to rebuild the cultural and spiritual component of tribal culture that was jeopardized when wolves were eliminated from the landscape. The cultural values associated with wolves were a fundamental factor for the tribe's involvement in a highly controversial recovery effort. The emphasis on western scientific management techniques can be seen in the Memorandum of Agreement between the State of Idaho and the Nez Perce Tribe, which states that "biology should drive wolf population and management" (State of Idaho 2005). Interviewees indicated that the decision to use western science was made because the tribe believed a western-scientific approach would give an important level of transparency to the project by providing other agencies, such as the U.S. Fish and Wildlife Service (USFWS) and the State of Idaho, as well as their biologists, a way to relate to the tribal program. One interviewee indicated that designing a program that agencies could relate to would help give validity to the tribal program.

Along with these differing predispositions for incorporating traditional knowledge and cultural values into these two cases of collaborative projects, we identified three other factors that played a role in the integration of traditional ecological knowledge in these collaborative arrangements: (1) agency mandates and commitment to collaboration with tribes; (2) retention of decision-making authority; and (3) perspectives on traditional ecological knowledge within tribes.

MANDATES FOR COLLABORATION

Legal and administrative mandates for collaboration, in the case of Nez Perce project, and programmatic priority and agency leadership, in the case of the Maidu project, contributed to the development of the collaborative agreements, and therefore the inclusion of cultural values into these projects. The Nez Perce Tribe viewed their involvement in Idaho's wolf recovery effort as one founded in their treaty right to harvest wolves, which was reserved when their treaty was signed with the federal government in 1855. Although treaty rights were the legal basis for the collaborative arrangement with the U.S. Fish and Wildlife Service, the agency began working with the tribe because of the tribe's willingness to take responsibility for wolf recovery in the face of political and legal controversy. Treaty rights, combined with requirements for government-to-government consultation and other authorities, were important catalysts for the collaborative arrangement between the Nez Perce and the U.S. Fish and Wildlife Service.

Federal acts and administrative mandates requiring government-to-government consultation were not applicable in the collaborative project between the Maidu Cultural and Development Group and the Forest Service because the Maidu are not federally recognized as a tribe. Even without federal recognition, the Maidu, through the operation of the Maidu Cultural and Development Group, were able to engage the federal government, represented by the U.S. Forest Service, in several ways and at different levels of organizational hierarchy. Their forest restoration project had national visibility and notoriety as one of a select group of pilot stewardship projects. In addition, theirs was the only pilot project involving a tribal entity, adding to its visibility and stature. The Maidu project was awarded from the national level of the Forest Service, and relied on continued support at the national and regional levels of the Forest Service when local support waned. The Forest Service's flexible interpretation of the stewardship contracting authority for the project provided the Maidu Cultural and Development Group with the opportunity to implement Maidu traditional ecological knowledge and traditional management practices. The Forest Service explicitly stated that integrating Maidu traditional ecological knowledge into the management activities was important to the project and that traditional ecological knowledge implementation was to be done by Maidu, not Forest Service employees attempting to interpret what traditional ecological knowledge practices the Maidu wanted done on the land.

In these ways, legal and administrative factors opened doors for both the Nez Perce and the Maidu projects to integrate cultural values and traditional knowledge into the projects. They provided opportunities for integrating traditional ecological knowledge and cultural values in the case of the Maidu project. In the case of the Nez Perce, tribal members chose to use western science and viewed the collaborative arrangement as a way to restore cultural values associated with wolves that disappeared when the wolf was eradicated from the landscape. Traditional knowledge and cultural values became a catalyst for wolf recovery without integrating traditional knowledge into the science of wolf recovery itself.

DECISION-MAKING AUTHORITY

One purpose of the Maidu's stewardship contract was to "use a traditional Native American approach to vegetation management" while demonstrating Maidu traditional ecological knowledge and land stewardship on lands that contain significant cultural resources (USDA Forest Service 2004). By framing the collaborative mechanism in this manner, the Maidu maintained the decision-making authority over what management practices would be implemented in the forest restoration project. Interviewees described how a largely hands-off approach by Forest Service staff provided the Maidu with the ability to use traditional ecological knowledge as defined and implemented by them, not the agency.

In the case of the Nez Perce and U.S. Fish and Wildlife Service collaborative arrangement, the Fish and Wildlife Service retained authority over the de-listing

and recovery efforts of wolves (USFWS 2005), with the tribe serving as contractors to implement aspects of recovery effort. Interviewees suggested that wolf recovery was about reintroducing and protecting a key component to tribal culture and demonstrating the tribe's ability to recover a species. In the Nez Perce case, the role of traditional ecological knowledge was less related to on-the-ground management activities and instead was a motivating factor for the tribe's involvement in wolf recovery. It was more important to the Nez Perce to protect and restore traditional ecological knowledge around wolves than to demonstrate it. Thus, the Nez Perce Tribe relied on methods consistent with western science to facilitate recovery and provide a high level of transparency to the reintroduction process all for the sake of reintroducing a species that has strong cultural values.

DIFFERING PERSPECTIVES ON TRADITIONAL ECOLOGICAL KNOWLEDGE

How members within a tribe reconcile different perspectives about what comprises traditional ecological knowledge, particularly in making decisions about resource management practices, was important in the Maidu project. Interviewees described a range of perspectives about traditional ecological knowledge among the Maidu that reflected a diversity of personal relationships with the land. Interviewees came from a variety of backgrounds ranging from logging and forestry to cultural heritage and revitalization. As such, some members considered traditional ecological knowledge to be about restoring forest health; others felt it was about enhancing relationships between the human and non-human Maidu. Different perceptions about what Maidu traditional ecological knowledge is and how it should be used in the Maidu forest restoration project created some tensions within the tribe and affected the implementation of some aspects of the project.

The Nez Perce tribal members share a single story of creation, and the personal relationship between tribal members and wolves, which serves as the basis for traditional ecological knowledge, is extremely private. Interviewees with the Nez Perce project explained that the emphasis on western science and biology in the recovery program was a conscious decision and did not minimize the role of traditional ecological knowledge in their culture; rather, tribal members believe that each member has a personal, individual responsibility to learn, share, and practice traditional ecological knowledge.

DISCUSSION AND CONCLUSION

Collaboration is a process, characterized by degrees of social learning and evolving relationships. This study represents a snapshot in time of dynamic forces at play in a selection of collaborative arrangements. Our objective in characterizing the types of arrangements was not to propose rigid categories. Instead, the characterization of attributes across a diversity of projects, helped us better understand how different institutional mechanisms, be they contracts, partnership agreements, or other types, influenced the function of the collaborative process. Institutional mechanisms connect parties in a collaborative process and the natural resources of interest through a series of formal and informal rules and procedures with varying degrees of flexibility. Better understanding of different types of institutional mechanisms is important for the development and improvement of these and similar types of mechanisms.

The identification of key attributes of tribal–federal collaborative arrangements and the characterization of project types revealed several differences among the collaborative arrangements. The two co-management projects had a level of joint decision-making absent in the other types and had a high autonomous decision-making authority on the part of the tribes. The agency and tribal entities shared project implementation and transferred knowledge back and forth more than in the other project types. Traditional ecological knowledge was recognized and incorporated into the institutional arrangements of the co-management projects but was not an explicit

part of the institutional mechanisms in the other types of projects. The tribes had the authority to implement their knowledge into on-the-ground management activities. In contrast, for the two contractual projects, the ultimate decision-making authority resided with the federal resource management agency. The tribes were paid by the agency to conduct on-the-ground work and mainly resorted to western practices and science in the implementation of that work. Cultural values were recognized, but were not integrated into the contractual arrangement. Decision-making authority in the working relationship projects was independent, and each entity retained full decision-making authority for key aspects of the collaboration. There was no transfer of funds within the working relationship projects. However, similar to the co-management type of projects, there was a strong recognition that each entity was dependent on the other to achieve the objectives of the project.

The tribes involved in the two cases we examined in more depth have witnessed a number of changes that directly impacted their relationship with the environment. They have been directly affected by the evolving definition of tribal rights and traditions on the part of the U.S. government. Among other things, the Maidu lost their ancestral lands and the Nez Perce Tribe lost the wolf from the landscape. In response to these changes, the tribes have adapted to survive in today's society. Because the Nez Perce Tribe has an established sense of self and cultural identity, their focus in the wolf recovery project was to demonstrate to non-tribal entities their skills and abilities in natural resource management while recovering a culturally important species. Although the contractual mechanism did not formally integrate traditional ecological knowledge into the project, the cultural values and knowledge related to wolves remain an integral part of the tribe. In contrast, the integration of traditional ecological knowledge in the Maidu collaborative arrangement was explicit, and was viewed as an opportunity for the Maidu Cultural and Development Group to demonstrate their abilities as natural resource managers while building cultural identity and pride within the Maidu community. This research has an indirect contribution of demonstrating that it is possible to enhance understanding about the integration of TEK in collaborative arrangements without having to delve into details about traditional ecological knowledge or cross into culturally sensitive values and knowledge.

Collaborative projects between American Indian tribes and federal and state natural resource management agencies have the potential to achieve ecological, social, and cultural objectives through natural resource management. The design and structure of an institutional arrangement for collaboration may affect the extent to which cultural values and knowledge are integrated into projects. Even where agencies are the owners of the land being considered for a collaborative management project, as seen in the Maidu, the mechanism that defines the collaboration can stipulate the extent to which the participating tribes have the authority and ability to implement traditional ecological knowledge into various aspects of the project. Tribes have different objectives for engaging in collaborative arrangements and therefore the level at which tribes choose to integrate traditional ecological knowledge varies.

In situations where integrating traditional knowledge and cultural values is important to tribes and their agency partners, new ways of thinking about collaborative projects may be necessary. This is particularly important in the case of projects with contractual mechanisms in which funds are transferred from an agency to a tribe to fulfill a contractual stipulation. Building autonomy into the collaborative mechanism, to allow tribes to determine and implement management practices associated with a project, would contribute to meeting cultural objectives of resource management on public lands. Opportunities may exist in contractual arrangements for tribes to integrate traditional ecological knowledge in the management of public natural resources. However, unless tribes are granted greater decision-making authority under contractual arrangements, they may be reluctant to incorporate traditional knowledge. Tribes must play active roles in developing the structure of

the collaborative mechanism, defining project goals, developing collaborative processes, and outlining roles and responsibilities. With shared ownership in the collaborative process, the actual mechanism used, whether it is a contract or partnership agreement, may become less relevant to the successful achievement of cultural objectives of resource management projects. Traditional ecological knowledge does not lend itself to line items in contracts or agreements. It is neither feasible nor prudent for agencies to attempt to understand traditional ecological knowledge and then develop contractual or agreement stipulations that reflect traditional ecological knowledge. Instead, institutional mechanisms for collaboration between tribes and agencies may need to better reflect the inherent adaptive nature of collaboration and allow for greater tribal autonomous decision making in order to effectively meet cultural, social, and ecological objectives of collaborative projects.

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APPENDIX: DESCRIPTION OF TEN COLLABORATIVE PROJECTS

Maidu Stewardship Pilot Project

The Maidu Stewardship Pilot Project was a collaborative effort between the Maidu Cultural and Development Group and the U.S. Forest Service's Plumas and Lassen National Forests. Known as the Maidu Stewardship Project, the project began in 1998 as one of the Forest Service's original 22 pilot stewardship projects. The project objective was to restore 2100 acres (1500 acres within the Plumas National Forest and 600 acres within the Lassen National Forest) of federal lands using Maidu traditional ecological knowledge and management practices. The Maidu Stewardship Project was developed to demonstrate Maidu traditional ecological knowledge of land stewardship on lands that contain significant cultural resources. Stewardship activities were designed to improve forest, meadow, and riparian health by incorporating indigenous knowledge into progressive forestry (USDA Forest Service 2004).

Gray Wolf Recovery

The Nez Perce Tribe, U.S. Fish and Wildlife Service, the U.S. Department of Agriculture's Department of Wildlife Services, and the State of Idaho were working to reintroduce gray wolves (*Canis lupus*) onto federal lands within Idaho. The relationship between the Nez Perce Tribe and gray wolves runs deep, going beyond respect for wolves as a species, predator, and independent being to include a life and history that parallels the Nez Perce Tribe. The Nez Perce Tribe has been an active participant, along with the U.S. Fish and Wildlife Service, in reintroducing wolves into central Idaho since 1997. Under the Nez Perce Tribe's agreement with the U.S. Fish and Wildlife Service, the Nez Perce Tribe was responsible for the on-the-ground management of wolf populations, but the Fish and Wildlife Service retained the overall authority for the wolf recovery effort. Through the Nez Perce Tribe's agreement with the State of Idaho, the management of wolf populations was divided between the tribe and the State.

Polar Bear Agreement

This collaborative arrangement was between the U.S. Fish and Wildlife Service, the Alaska Nanuuq Commission, the Russian Federation Ministry of Natural Resources, and the Association of Marine Mammal Hunters of Chukotka. The collaborative arrangement coordinated the management of the circumpolar Arctic polar bear populations and ensured that needs of Alaskan and Russian natives were met. Since the field work portion of our study, this arrangement became a ratified treaty between the U.S. and Russia, fulfilling the spirit and enhancing the intent of the related 1973 Multilateral Agreement on the Conservation of Polar Bears.

Grand Ronde Forest Stewardship

The Confederated Tribes of the Grand Ronde and the U.S. Forest Service worked together to manage 6,600 acres of the Siuslaw National Forest. This included surveying for threatened and endangered species, as well as inventorying the forest stands for timber and downed woody debris. Activities were conducted under a participatory agreement that was signed in 1999 and extended in 2003 between the tribe and the Forest Service.

Circle of Flight – Red Lake

Since 1991, the Bureau of Indian Affairs Circle of Flight Program and the Red Lake band of Chippewa have restored waterfowl habitat in western Minnesota. These areas included over 1500 acres of wetlands and wild rice restoration and 1600 acres of grasslands. Restoration activities were made possible through the Circle of Flight funds that were given to the tribe.

Forest and Fish

The Forest and Fish project was a cooperative effort between various state and federal agencies, tribes, forest land owners, and other interests. Started in 1987, this collaboration worked to manage non-federal forestlands in Washington State for timber, while protecting fish, wildlife, water quality, and other areas of concern. Management decisions from this collaborative effort were the result of scientific study and a collective decision-making process.

Grande Ronde Model Watershed

The Grand Ronde Model Watershed included the Umatilla and Nez Perce Tribes, state and federal agencies, county governments, and private landowners. Affecting 5,265 square miles in the Grande Ronde and Imnaha sub-basins of eastern Oregon, this collaboration distributed funds for habitat restoration and restored degraded areas within the watersheds.

Santa Clara Pueblo Elk Management (Jemez Mountain)

The Santa Clara Pueblo, Los Alamos National Lab, and the New Mexico Department of Game and Fish have collectively monitored the Jemez Mountain elk herds in New Mexico. This included monitoring animals across multiple land ownerships, establishing an elk management program within the Pueblo, and sharing information and data about the herd among the stakeholders.

Navajo Nation Hogan Project (Indigenous Community Enterprise)

Since 1999 this collaboration used small diameter wood from U.S. Forest Service thinning activities to create housing on the Navajo Indian Reservation. Wood processed by a Navajo mill (Indigenous Communities Enterprises) in Arizona was used to create affordable and culturally based houses (hogans) for Navajo members.

Kodiak Island Conservation Easement

Since 2002, a conservation easement on Kodiak Island, Alaska, has allowed a native organization, Koniag, Inc., to receive a financial return from specific lands and allowed the U.S. Fish and Wildlife Service to manage the 57,500 acres for biological diversity. The U.S. Fish and Wildlife Service gained a known level of development in the area whereas the native organization benefited from annual payment and continued public access of lands.

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