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FISHERY CO-MANAGEMENT OPPORTUNITIES BETWEEN TRIBAL AND STATE AGENCIES: CONFLICT TO COLLABORATION

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FISHERY CO-MANAGEMENT OPPORTUNITIES BETWEEN TRIBAL AND STATE AGENCIES: CONFLICT TO COLLABORATION

By

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Preface

Goals and objectives

The research goals were to assess and describe characteristics of a multi-cultural fishery co-management arrangement of state and tribal organizations in Michigan in order to provide information and recommendations to enhance the institutional relationship. Information was collected through interview data and quantitative analysis of agency work plans of the Bay Mills Indian Community, Grand Traverse Band of Ottawa and Chippewa Indians, Little River Band of Ottawa Indians, Little Traverse Bay Bands of Odawa Indians, Sault Ste. Marie Tribe of Chippewa Indians and the State of Michigan.

Objectives Included:

1. Determine extent of agency understanding for each other's management priorities and knowledge systems used for guiding fishery management decisions and how they may influence views on the value of science in fishery management, and suggest strategies for navigating multi-cultural institution building (Chapter 2).
2. Present how different participant values and perspectives shape priorities of biological assessments and restoration activities, identify and assess common and exclusive priorities and develop recommendations for collaboration (Chapter 3).
3. Describes how agency participants value collaboration, what barriers exist for successful collaboration and how an ideal relationship could be formed and function (Chapter 4).

Format of dissertation chapters

Except for the introductory chapter (Chapter 1), all other chapters have been formatted for publication in pertinent scientific journals with review completed by the research committee. Chapter 2 will be submitted for publication in *Ecological Applications* with contributions of data collection and compilation by myself and analysis and manuscript development completed by myself and Dr. Nancy A. Auer. Chapter 3

will be submitted for publication in *Fisheries Magazine* with contributions of data collection and compilation by myself and analysis and manuscript development completed by myself and Dr. Nancy A. Auer. Chapter 4 will be submitted for publication in *Society & Natural Resources* with contributions of data collection and compilation by myself and analysis and manuscript development completed by myself and Dr. Nancy A. Auer.

Abstract

Over the past 40 years global recognition has occurred for indigenous groups to be represented and have input in how natural resources are managed. This has largely occurred because of how management decisions have consequences to indigenous groups that reach beyond natural resource issues but into cultural, spiritual, social and political elements including sovereignty, legitimacy, justice, equity and empowerment and the necessity of using indigenous paradigms to meet indigenous needs. In the United States numerous legal agreements have been reached that pair state and tribal agencies into co-management. This project concerns a recent co-management agreement between the State of Michigan and five Native American tribes where each has specific rights and responsibilities for fishery management. Using interview data collected from state and tribal participants and quantitative data from respective fishery work plans this Dissertation explores the co-management relationship, how well it is functioning, differences and similarities in participant values, worldviews, and perspectives, priorities for fishery biological assessment and restoration priorities and what the hopes for their co-management relationship. We found there was little understanding between state and tribal participants regarding how they understood each other's priorities for fishery management or the biological assessments and restoration activities they identified should occur. State and tribal participants viewed the fishery resource and the value of science in management differently through unique knowledge systems (western scientific and indigenous). These knowledge systems likely accounted for the difference found in how the agencies prioritized biological assessments and restoration activities. The state participants often described broad scale assessments and activities as a priority while

tribal participants often described those that occurred near tribal reservations, benefit native species, and promoted treaty protected harvest rights. Participants identified barriers towards successful co-management and they stemmed from legal negotiations and a history of conflict that had hindered personal and professional relationships amongst the agencies. However, even with these barriers participants recognized the value of collaborating for fishery management and proposed how they believed an ideal relationship would and could function. We suggest strategies that could assist the groups in realizing a successful co-management institution.

Chapter 1. Introduction and overview

This research project was initiated to provide information to the natural resource departments of the State of Michigan and five Tribal Nations that would assist the agencies in developing a more effective partnership (or institution) for collaboratively managing their commonly held fishery resource. This opportunity for collaborative management (co-management) was created when in 2007 the State of Michigan and the five Tribal Nations entered into a Consent Decree (File No. 2: 73 CV 26) which defined Inland fishing, hunting and gathering rights of the tribes. This decree (hereafter referred to as the '07 Decree) recognized tribal rights to manage their member's harvest of fish, wildlife and plants, conduct biological assessment activities and engage in fishery restoration projects. The three chapters will explore the potential for a successful collaboration, identify key culturally derived differences in knowledge systems and values, determine co-management needs of the agencies, find biological assessment and restoration priorities, and develop recommendations for refining the current institutional framework.

Chapter 1 focuses on the extent to which the agencies understand each other's management priorities, a collective identity has been formed, the knowledge systems used for guiding fishery management decisions and how science is valued in management. We end the chapter by suggesting strategies for navigating multi-cultural institution building. *Chapter 2* presents how the different values and perspectives held by state and tribal participants shape how they prioritize biological assessments and

restoration activities. We identify and assess the common and exclusive priorities and end the chapter by developing recommendations for mutually beneficial collaboration. *Chapter 3* describes how the agency participants view the benefit of collaborating with each other and what barriers are currently present to successful collaboration. The chapter finishes with how the ideal relationship amongst the six agencies would be formed and how it would function.

Indigenous people's participation in global environmental management

This research is complementary to the international call for indigenous groups to be involved in management of the natural resources. Although indigenous groups have consistently desired and attempted to be involved in natural resources decision making they often have been overlooked, even when the resulting decisions may affect them more than other segments of the population (Jentoft 2003). Many examples exist where indigenous management is not recognized. An example in the United States is found in Hartley and Reid (2006) where they identified 37 cooperative research and management cases from North America. Although they present an exhaustive list of government agencies, academia, natural resource funding agencies and commercial and recreational fishers no indigenous groups were included; even though 22% of the cases they used were located in the Pacific Northwest and Alaska where numerous examples exist of indigenous agencies participating in co-management and research (Dale 1989; Pinkerton 1992; Watson 2013).

Because indigenous cultures and the environment are inter-woven the impacts of decisions affect their cultural well-being and identity (Schmidt and Peterson 2009),

especially if over-harvest or degradation of the resource occurs. Many indigenous people view that a government from another culture, with different views, knowledge systems and perspectives, cannot adequately manage for their needs. Recently, calls have increased for the engagement of indigenous communities in decision making and has been identified as important for global stewardship of natural resources. At the United Nation's World Summit on Sustainable Development in 2002 the group stated, "We affirm the vital role of indigenous peoples in sustainable development." Jentoft (2003) noted how this was the first time the United Nations had used the words "indigenous peoples" in an "unqualified manner". Another important recognition was described in Agenda 21 from the World Commission on Environment and Development that declared, "Indigenous peoples…have a vital role in environmental management and development because of their knowledge and traditional practices."

Recognition of the importance of indigenous participation is based, in part, on the ideology that by including indigenous organizations in decision making they acquire access to the resource, management influence, and a role in integrating traditional knowledge, thereby sustaining their cultures (Doubleday 1989; Schmidt and Peterson 2009). Consequently, it appears that benefit is not only derived by the indigenous peoples but also on the management outcome affecting all user groups. The indigenous peoples bring unique insight and increase group heterogeneity creating more diverse solutions and in turn develop outcomes that are more novel and creative (Natcher et al. 2005). Additionally, a broader collection of worldviews, perceptions, attitudes and values are established (Berkes 2009).

Select legal cases that have built co-management institutions in the United States

The State of Michigan and five Tribal Nations are one of the newest co-management arrangements and can learn from past successes and difficulties. During the 20th century state and tribal agencies have developed a history of disagreement about the extent and breadth of tribal fishing rights (Dale 1989) and resolution was often initiated by the Courts. These agreements ultimately resulted from the insistence of tribal leadership to preserve fishing rights when negotiating Treaties with the Federal government during the 1800's (Cohen 1989; Mattes and Kmiecik 2006). Each agreement is unique and often mandates cooperation in management of a shared fishery with state managers. Also, each agreement has created institutional arrangements for the agencies to work collaboratively in management by forming technical committees and advisory boards. The following three cases exemplify the types of co-management arrangements formed.

The Boldt Decision

The most notable and controversial agreements were developed in the States of Washington and Oregon during the 1970's where the Tribes challenged state authority to enforce salmon fishing regulations on tribal members (Cohen 1989; Pinkerton 1992; Matylewich 2006). In 1974 the landmark case *US vs. Washington,* later titled the *"Boldt Decision"* guaranteed the plaintiff tribes the authority to manage their own fishery under certain conservation principles and gave legal authority for tribal participation in cooperative decision making. The Boldt Decision established a framework for the tribes and State of Washington to determine allocation of the shared fishery, collect and

cooperatively analyze data, and affirmed the ability of the tribes to protect fishery habitat (Pinkerton 1992).

Prior to the Boldt Decision, many of the individual tribes hired biological staff, habitat analysts, data analysts and policy specialists (Dale 1989). After the decision the tribes capacity was increased with the hiring of additional personnel, as well as, the formation of two umbrella organizations to represent member tribes; the Northwest Indian Fisheries Commission and the Columbia River Inter-Tribal Fish Commission. Both organizations were created to protect the Treaty-reserved rights of its member tribes and to realize their co-management roles. Commissions and Advisory Boards were formed between federal, state, and tribal agencies to facilitate co-management.

The Voight Decision

The Boldt Decision, credited as the first example of fisheries co-management in the United States (Pinkerton 2003), provided an impetus for Treaty-cases in the Great Lakes region that were beginning to progress through the courts. The first Treaty-case in the Great Lakes region was between the Lac Courte Oreilles Band of Lake Superior Chippewa Indians and the State of Wisconsin (USDOI 1993). Eventually five other Chippewa bands in the region joined suit and this was termed the *"Voight Decision"*. Similar to the Boldt Decision, there was a public perception that the tribes would deplete the fishery resource (Busiahn 1989) and that recreational (state) harvest would be severely diminished. What followed were the "walleye wars" as state representatives, tribal officials, and the public were often at odds with battles erupting in the courts, news media, and boat launches. After 6 trials, 3 appeals, and a petition for review to the US

Supreme Court, the Courts found that the reserved Treaty rights had not been extinguished and continued to guarantee the right of traditional hunting, fishing and gathering on Ceded-Lands (Busiahn 1989). The Voight Decision provided the tribes an active part in fishery management, where the state and the tribes would collaborate on setting management objectives for species and perform joint and independent biological assessments.

Following the Voight Decision the tribes developed their own natural resource departments and formed the Great Lakes Indian Fish and Wildlife Commission which represented eleven Tribal nations in the states of Minnesota, Wisconsin, and Michigan. The tribes hired biological staff because they recognized the courts used biological data for management solutions and for resolution of fishery issues (Mattes and Kmiecik 2006). The three states and 11 tribes began to coordinate biological assessments, analyze data, and discuss regulations. The significance Voight Decision reached beyond fisheries management but was recognized as having numerous other effects including improved government-to-government relationships. Nesper (2012) notes that after 25 years it, "has changed those [tribal] communities' practices and self-conceptions in some fundamental ways." He suggests these include improvements to tribal institutions through development of fish hatcheries, Natural Resource Departments, tribal courts, education programs and inter-governmental relations).

The Fox Decision

In the mid-1960 the State of Michigan began to limit entry into the Great Lakes commercial fishery in favor of expanded recreational opportunities. In response, a Bay Mills Indian Community member set commercial nets in Lake Superior to challenge the right of the state to enforce its law on a Treaty-protected tribal fishing activity. In 1979 the US District Court found that the tribes maintained a right to commercially fish as guaranteed in the 1836 Treaty of Washington. Two agreements were negotiated one in 1985 and 2000 among the federal government, State of Michigan, and the five Treaty Tribes; the agreement set allocations for harvest of fish and created a governance structure for the agencies to meet regularly (Ebener 2008). Inland fishing rights were not defined during these agreements but all parties recognized litigation would eventually occur to determine their existence and extent.

To facilitate co-management of the Great Lakes fishery, a Technical Fisheries Review Committee was formed with biologists from the Chippewa Ottawa Fishery Management Authority (a management body for the tribes), the Michigan Department of Natural Resources, and the United States Fish and Wildlife Service. In 2000 the group became the Technical Fishery Committee (TFC) to function as the "primary body for consultation and collaboration on biological issues." (Ebener 2008). Two species, whitefish and lake trout, became a central focus of the TFC and the management of these species demonstrates the complex nature of the governance arrangement. For Great Lakes whitefish management there are 35 Native American and First Nations governments, 8 states and the Province of Ontario involved in decision making.

Co-management Theory and State and Tribal Institutions

Successful co-management has been defined as a knowledge partnership that brings organizations together, establishes lasting networks, develops trust, and resolves conflict (Armitage et al. 2007; Berkes 2009). Over the past 40 years cooperation and partnerships between tribal and state governments have been developed largely in response to legal mandates and political and social crisis. Since early mandated agreements in the 1970's it has been recognized that co-management involving tribal entities is extremely difficult and problematic. Many reasons are responsible but the most notable is that tribal (indigenous) knowledge is based on a different worldview, or "cultural lenses", than their management counterparts (Notske 1995; Holm et al. 2003). Tribal worldviews incorporate values and beliefs that implicitly involve how they view the position and role of humans within the environment. State institutions make natural resource decisions based on scientific and increasingly social criteria (Patterson and Williams 1998; Lackey 2005), whereas tribal governments have historically been based on a cultural belief system (Kimmerer 2000; Mattes and Kmiecik 2006).

The basis of state fisheries management relies on ownership of the fisheries resource. This is known as the common property principle, where the fishery is owned by the entire populace and the state governments have the right and responsibility of being the Trustee (Nielsen 1999, Henquinet and Dobson 2006). Within this framework the states possess the difficult task of maintaining open access to the fishery while ensuring the protection, sustainability, and productivity of the resource. The tribal framework for management is largely based on stewardship with humans co-existing with the environment and where the fate of humans is inextricably linked to all other

creatures (Kimmerer 2000; Reo and Powys White 2012). Berkes (1993) described the indigenous framework (referred to as *traditional ecological knowledge* or *indigenous knowledge*) as, "…a cumulative body of knowledge, practice and belief, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment." It has been suggested that when state and tribal worldviews are both present in co-management that it can stimulate a management potential greater than if only one worldview was used (Berkes 2009; Wehi 2009).

Beyond the differing worldviews, many other impediments to cooperative partnerships exist. These difficulties include a long history of inequitable public policy, numerous issues other than biological being present during discussions, complexity within institutional arrangements, varying capacities and abilities of tribal management agencies, and struggles for legitimacy (Pinkerton 1992; Natcher 2005; Mattes and Kmiecik 2006; Hall and White 2008). Even though these partnerships have shown difficulties, successful and beneficial relationships between state and tribal agencies have been formed (Busiahn 1989). It has been proposed that coordinated management by state and tribal institutions can develop into mutually and collectively advantageous partnerships, where the resource is managed at a broader scale (Dale 1989).

Opportunities for cooperative fishery management in the '07 Consent Decree.

The most recent natural resources treaty settlement between federal, state and tribal agencies is focus of this study (the '07 Decree), where the geographic area affected was approximately 1/3 of the land and waters in Michigan. The '07 Decree was signed

by the Bay Mills Indian Community, Grand Traverse Band of Ottawa and Chippewa Indians, Little River Band of Ottawa Indians, Little Traverse Bay Bands of Odawa Indians, State of Michigan, Sault Tribe of Chippewa Indians and United States government. The litigation was initiated by the state when they filed a claim against the tribes asserting that the 1836 Treaty had expired and therefore the right to hunt, fish and gather within the tribes ceded lands. The state, tribes and US decided to attempt a negotiated settlement rather than have a court determine the extent of the right and the parties negotiated in good faith. After two years of difficult and intense discussions an agreement was reached that was deemed, "fair and equitable" (File No. 2: 73 CV 26).

The agreement recognized tribal rights to hunt, fish and gather with certain limitations. Similar to other treaty cases it recognized the tribes desire to conduct biological assessments and engage in restoration, reclamation and enhancement projects (RRE). In order to coordinate biological assessments the parties agreed to meet annually and review assessments scheduled for the upcoming year. The state could only object to a proposed assessment if a *legitimate State interest* was found and was based on a "material biological harm to a resource; a threat to public health or safety; material interference with ongoing research projects; or unreasonable redundancy of effort." This provision afforded the tribes the ability to conduct assessments and research to benefit the unique needs of each tribal agency. For RRE activities (i.e. habitat improvement, fish stocking, etc.) the tribes would request state approval. Approval could not be withheld unless a legitimate state interest was established, similar to the *legitimate State interest* criteria described above for biological assessments. These two provisions established the Tribes as co-managers of the resource as defined by Notske (1995) and Pinkerton (1989).

The agencies are in the beginning stages of determining how and to what extent cooperative management will occur. The parties have recognized that establishing this relationship will be difficult, primarily because the relationship needs to transition from one of adversaries to partners in management. Additionally, the worldviews and management perspectives of the agencies are quite different. Nonetheless, the parties are willing to attempt and develop a successful partnership. In 2008, the state and the tribes unanimously supported this research project which was designed to enhance coordination amongst the agencies and to determine management priorities of each agency and develop recommendations for establishing an institutional framework for collaboration.

Recently, there has been a focus on determining how to successfully develop new, collaborative relationships, where multiple agencies and stakeholders mutually participate in natural resource management. From this growing body of literature a theoretical framework, derived largely from organizational theory, has been developed to guide institution building between groups (Chompalov and Shrum 1999; Armitage et al. 2007). Gray (1985) outlines four primary steps for natural resource managers to use when building institutions such as that sought amongst the '07 Decree parties. The first step is to understand the environmental context out of which the relationship is formed. At least 7 antecedents have been identified that may singly or jointly form the basis for a context, including a collaboration formed out of crisis, one that is legally mandated, where a common vision has already been formed, or where a strong leader has been responsible. In the case of the '07 Decree at least two antecedents exist, "formed out of crisis" and "legally mandated." Following this step, the process proceeds through problem-setting, direction setting, and a structuring phase with tangible outcomes.

In addition to Gray's (1985) structured approach Berkes (2009) proposed that it is important to use a process called, "Learning by doing", especially with tribal organizations. This is where social learning takes center stage in building trust and bridging organizations. "Learning by doing" brings actors from the different organizations to share ideas and experiences. Further, an indigenous research paradigm exists and suggests that when western researchers (or managers) work with indigenous people they need to be respectful and understanding that their "expert" way of knowing is not universal but other realities and worldviews are equally valid (Wilson 2008; Hart 2010).

A great opportunity exists for state and tribal managers to collaborate on problem solving and decision making for the fishery resource in Michigan and throughout North America. Because the '07 Decree is at the beginning of implementation the parties are presented with an opportunity to develop a unique framework and use existing theory for successful institution building that ends with a thriving collaboration. While few examples exist where these relationships were not extremely difficult to develop we hope this work furthers the abilities of the agencies to build a strong collaborative relationship.

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Chapter 2[1]. Forging a collective identity for multi-cultural fishery management

INTRODUCTION

Far reaching change in fisheries management occurred in the United States during the 1970's when states and tribes were mandated by courts to collaboratively manage shared fisheries. The most notable and controversial agreements were developed in the States of Washington and Oregon where the tribes challenged the enforcement of state salmon fishing regulations upon tribal members (Cohen 1989, Matyelwich 2006). In 1974 the landmark case US vs. Washington, later titled the "Boldt Decision", guaranteed the plaintiff tribes the authority to manage their own fishery under certain conservation principles and the legal authority for tribal participation in cooperative decision making. The Boldt Decision established a framework for the State of Washington and tribes to determine allocation of the shared fishery, collect and cooperatively analyze data, and affirmed the ability of the tribes to protect habitat of fish. In the years following 1974 similar decisions established mandatory state and tribal coordination on fisheries management in the Pacific Northwest and Great Lakes region. The Boldt Decision, credited as the first example of fisheries co-management in the United States (Pinkerton 2003), provided an impetus for Treaty-cases in the Great Lakes region. Between the years 1979 to 1983 the Fox and Voight Decisions forged arrangements between the State of Wisconsin and six Chippewa bands (Busiahn 1989) and the State of Michigan and five Chippewa and Ottawa bands (Ebener et al. 2008), respectively. Both decisions grouped

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states and tribes into co-management institutions and technical fisheries committees were formed with biologists from all parties to function as the "primary body for consultation and collaboration on biological issues (Ebener et al. 2008)."

A recent natural resources Treaty agreement, and the focus of this paper, concerns the 2007 Consent Decree (hereafter referred to as the '07 Decree), which deals with the inland portion of the geographic area of the 1836 Treaty of Washington (D.C.) Ceded Territory which encompasses approximately 1/3 of the land and waters in what is now the State of Michigan (Figure 2.1). The '07 Decree was signed by five Native American tribes; the Bay Mills Indian Community (BMIC), Grand Traverse Band of Ottawa and Chippewa Indians (GTB), Little River Band of Ottawa Indians (LRBOI), Little Traverse Bay Bands of Odawa Indians (LTBB), State of Michigan (State), Sault Ste. Marie Tribe of Chippewa Indians (SSMT) and United States (US). The litigation was initiated when the state filed a claim against the tribes questioning whether the 1836 Treaty had expired and therefore the right to hunt, fish and gather within the ceded lands. The state, tribes and US negotiated a settlement in good faith rather than have a court determine the extent of the treaty right. After two years of difficult and intense discussions an agreement was reached that was deemed, "fair and equitable" (File No. 2: 73 CV 26).

The agreement recognized the tribes' right to hunt, fish and gather in the entire territory with certain limitations. Similar to other treaty cases (Cohen 1989) it recognized the tribes' right to conduct biological assessment activities (Section XXI. Assessment Activities) and engage in restoration, reclamation and enhancement projects (Section XXII. Restoration, Reclamation, and Enhancement Projects). In order to coordinate biological assessment activities (hereafter referred to as assessments) the parties agreed to

meet annually and review assessments scheduled for the upcoming year. It was agreed that the state could only object to a proposed assessment if a *legitimate state interest* was found based on a "material biological harm to a resource; a threat to public health or safety; material interference with ongoing research projects; or unreasonable redundancy of effort." This provision provided the tribes the ability to conduct assessments which benefit the unique needs of each tribal agency. For restoration, reclamation and enhancement projects (hereafter referred to as restoration) (i.e. fish stocking, rearing, habitat improvements, etc.) the tribes agreed to request state approval. Approval could not be withheld unless a legitimate state interest was established, similar to the criteria described above for assessments. These two provisions, as well as those involving harvest allocations, established the tribes as co-managers as defined by seven categories in Pinkerton (1989). The '07 Decree recognized each of the categories thereby providing the opportunity for extensive collaboration.

Over the past 25 years nationally and internationally, a growing body of literature has developed which recognizes potential and realized beneficial outcomes of indigenous and state co-management institutions for fisheries and wildlife (Pinkerton 1989; Skogen 2003; Kendrick and Manseau 2008; Berkes 2009). Some benefits are advantageous for both groups, while a portion may be mutually exclusive. For indigenous groups the right to manage and make management decisions often reaches beyond just natural resource issues but into the interconnected web of cultural, spiritual, social, and political elements (Nesper 2012). Specifically co-management and access rights have been suggested to support self-determination and sovereignty (Ohlson et al. 2008; Schmidt and Peterson 2009), enhance management capacity (Mattes and Kmiecik 2006),

increase legitimacy (Notske 1995; Berkes 2007), promote justice, equity and empowerment (Doubleday 1989, MacLeod 1989, Berkes 2009) and develop research that uses indigenous paradigms to meet indigenous needs (Wilson 2008, Hart 2010).

This research project was sparked by a discussion with leaders from the state and tribes who recognized an opportunity existed to work together and obtain outcomes that would protect the fishery resource within the treaty area to the benefit of all. Outcomes benefiting both groups include greater efficiency in protecting resources, new knowledge and innovations, and eventually addressing broad environmental and social issues (Dale 1989, Chompalov and Shrum 1999, Armitage *et al.* 2007, Berkes 2009, Brummel et al. 2012). For instance, for assessments and restoration activities there are perceived benefits for operational and socio-political dimensions. Operationally, a cooperative institutional system promotes less duplication of effort, greater efficiency through coordinated implementation, enhanced funding opportunities, an increased knowledge base, greater sophistication in collecting data and modeling because of more diverse criticism, and better decision making (Hartley and Reid 2006). Socio-political enhancements include improved multi-cultural relationships (Edwards et al. 2004, Brummel et al. 2012), creative multi-cultural group discussions (Skogen 2003), greater knowledge and understanding of socio-ecological systems to accommodate changing management issues (Tompkins and Adger 2004, Bodin et al. 2006), more research credibility (Notske 1995, Ohlson *et al.* 2008), and development of shared norms and values (Plummer and FitzGibbon 2007, Armitage et al. 2009). However, examples exist where indigenous and state co-management arrangements were untenable and did not succeed demonstrating inherent risks of failure (Jentoft 2007). The route to achieving

equitable and effective co-management systems is not a simple endeavor and especially difficult between state and indigenous systems (Busiahn 1989, Notske 1995).

At the most fundamental level state and indigenous groups do not have cohesive social systems because of different culturally derived schema and the inability to find common ground (Natcher 2005, Lerma 2012). Sewell (1992) describes how agency structure is an evolutionary product which includes historical and cultural precepts which may be one explanation for this lack of cohesion. Further, it has been argued that many contemporary institutional structures used in natural resources management lack cultural compatibility or appropriateness with indigenous value systems (Natcher et al. 2005). These will not be easy issues for the state and five tribes to overcome because their history is grounded in conflict and hegemonic control.

Difficulties based on cultural and socio-political differences have been discussed (Natcher et al. 2005, Reo and Powys Whyte 2012), specifically how indigenous and non-indigenous view the role of humans in the world and thus the legitimacy of each other's knowledge and authority (Notske 1995, Kimmerer 2000, Guilmet and Whited 2002). This has been referred to as cultural distance (Natcher et al. 2006) and is founded within the use of different knowledge systems; indigenous knowledge (IKS) and western knowledge (WKS). IKS features are shared by indigenous communities worldwide with a fundamental principle being the system is a way of life founded on forming a web of relationships with human and nonhuman parts of the environment (Wilson 2008, Reo and Powys Whyte 2012). This system is developed through a living, intergenerational (ancestral) knowledge between people in a common territory where there is intimate contact with nature and where all ideas are culturally based (Wilson 2008, Wehi 2009,

Mazzochi 2012) and form a sacred history where values are shaped, language developed, and customs followed (Holm et al. 2003, Lerma 2012). The IKS is non-linear where spiritual and physical realities are encouraged and considered valid. Because IKS is associated with plants, animals and important locations within a territory or homeland the collectivist knowledge system will be uniquely related to each community. WKS is characterized as empirical and positivist-reductionist where complex phenomenon and processes are knowable and reduced to simpler forms for understanding (Patterson and Williams 1998). It is linear through a hypothetico-deductive method (hypothesis tested and verified or falsified) where establishing a cause and effect is desirable. In WKS the observer is removed from the phenomenon being studied to produce an objective, "value free" output (Mazzochi 2012, Weiss et al. 2013).

Management systems based upon IKS and WKS are expectantly different. The basis of all state fisheries management in the US relies on ownership of the fishery resource. This is known as the common property principle, where the fishery is owned by the entire populace and the state governments have the responsibility of being the Trustee (Nielsen 1999, Henquinet and Dobson 2006). Within this framework states have the difficult task of maintaining open access to the fishery while ensuring the protection, sustainability, and productivity (biological and economic). The indigenous framework is largely based on stewardship and being a part of the natural world where humans have a relationship with creation, where they co-exist and interact in balance because they are inextricably linked to all other creatures (Kimmerer 2000, Salmon 2000). Mitchell (2013) described *Baamaadziwin*, an Anishinaabek (no. 1, Table 1.1) belief structure, which translated means, "living in a good and respectful way" where resource

management uses knowledge and faith based on oral tradition passed down through generations by teachers to students participating in the spirit realm, and where wisdom is found through interacting in wilderness. Ringney (1997) characterized differences by saying, "Indigenous peoples think and interpret the world and its realities in differing ways to non-indigenous peoples because of their experiences, histories, cultures, and values." This difference, or cultural distance, is acknowledged as being expansive but where it is important to elucidate alternative worldviews so fundamental commitments to how knowledge and the world are viewed can co-exist within a single management institution (Houde 2007).

Beyond the differing worldviews, many other impediments to cooperative partnerships exist including a long history of inequitable public policy and antagonism (MacLeod 1989, Jentoft et al. 2003,), numerous issues other than biological being present during discussions (Cohen 1989, Jentoft 2007), complexity within legal and institutional arrangements (Mattes and Kmiecik 2006, White et al. 2008), varying capacities and abilities of indigenous management agencies (Skogen 2003, Natcher et al. 2005), and struggles for legitimacy of knowledge and rights (Rettig et al. 1989, Notske 2005, Hall and White 2008). Therefore, to begin creating favorable conditions for the state and indigenous groups there is not simply a need to understand the cultural difference but rather to understand cultural attributes and relationships between group members. In the example of the State of Michigan and 1836 Tribes the cultural attributes and relationships between group members is further complicated because many of the tribes biological staff are not tribal members and may possess worldviews different than the other groups because of western training combined with indigenous indoctrination.

Understanding cultural attributes has been suggested as an effective first step in obtaining group cohesion (Ostrom 1990, Thomas 1994) for cross-cultural social learning. Social learning has been described as "learning that occurs when people engage one another, sharing diverse perspectives and experiences to develop a common framework of understanding and basis for joint action" (Schusler et al. 2003). This requires those involved to be open to accepting and respecting different realities (Hart 2010) and knowledge (Moller et al. 2009) which include religious beliefs, traditions, and customs which include potentially unfamiliar or contrasting epistemologies (Natcher 2005). Ultimately, this process involves the socializing of groups from different cultures where worldviews and knowledge are comprehendible (Berkes 2009), trust can be built (Chompalov and Shrum 1999), motivations and values understood (Mezirow 1994) and shared norms and respect developed.

The value of collaboration is when the parties successfully achieve mutual and exclusive goals. Clarifying goals and expectations is an important initial step in collaboration partially because it allows for partners to develop a common frame of reference (Willard and Norchi 1993). Therefore, understanding cultural attributes and values, unique to a geographic territory, and how these shape management perspectives should assist in establishing long-term partnerships and should be a key component of research aimed at promoting collaboration.

This research was designed to understand the relationship and cultural attributes of the state and tribes to further the desire of the '07 Decree signatories to improve the developing management partnership and hopefully illuminate the potential found within collaboration. The objectives for this study are to 1) understand the degree to which a

collective identity has been established, 2) determine how ’07 Decree parties understand each other’s management priorities, 3) describe the knowledge systems present, 4) describe how science is valued and 5) elucidate strategies for navigating multi-cultural institution building.

METHODS

A qualitative strategy was used to gather interview data from 26 participants during 2009 and 2010 for the purpose of understanding perspectives on fisheries management. We interviewed 12 tribal agency employees (three individuals from BMIC participated in an interview together); two Ogema’s (chairperson’s), two Natural Resource Directors, three biologists, two technicians, and two legal counselors. Four of the tribal staff participants were non-tribal members (TNE) including all of the biologists and one legal counselor. Although we have listed organization positions the tribal citizens often identified themselves by community roles rather than organizational titles and this will be described in detail later. The 14 state DNRE participants included the fisheries chief, four section coordinators, a research biology manager, three unit managers, and five biologists. The participant list was developed purposively with “key informant” (Weiss 1995), and chain referral (Brandenburg and Carroll 1995) methodologies in order to represent all institutional scales to assure broad representation of perspectives. Key informants were selected due to their position in influencing fisheries management policy and ’07 Decree implementation. For tribal agencies elders were valued as key knowledge holders and informants (Hart 2010). The key informants

referred participants (chain-referral) from multiple institutional scales and reduced the population of research participants.

Two research paradigms were present (western and indigenous) in the multicultural participant pool and we attempted to incorporate methods respectful of both and supported by the individual participant (Holm et al. 2003, Wilson 2008). An illustration of this approach was the manner used to select the place where interviews would be conducted. Each participant selected location, setting and time they preferred for a meeting. This gave participants a partnership in the research, a culturally appropriate and personally comfortable setting, where a knowledge relationship could be formed. Specifically for the indigenous participants the sharing of knowledge could be culturally positioned in the context of time, place and how they related to the ideas being shared (Wilson 2008). TME interviews were held in differing locales and times including around a fire at night after a smudge ceremony, a tribal community center over lunch, and at offices during work hours. DNRE interviews were held at offices and libraries during work hours.

Semi-structured interviews with open-ended questions were conducted and lasted between 35 to 90 minutes. A printed interview guide was used to ensure all research topics were discussed and each interview focused on comparable topics. Probes were used to elucidate more detail on particular topics and for clarification. While the interview guide provided consistency across interviews the participants were encouraged to share topics not covered in the guide and provide information from their associations with the topic covered.

All interviews were recorded, transcribed and imported into NVIVO© qualitative data analysis software. Data were analyzed inductively using grounded theory concepts (Charmaz 2001) with bottom-up coding to assemble theoretical constructs by identifying and grouping repeated themes (Creswell and Plano Clark 2007). Because this study was designed to understand the range of perspectives all relevant non-repeating information was also included and used during analysis. Data analysis was focused on finding thematic patterns between individuals and within and among groups to develop rich detail to compare and contrast how participants viewed; 1) their role in natural resource management, 2) how they were prepared for their employment, 3) how well they understood the other '07 Decree parties management priorities, and 4) how the role of science in management was viewed. To authenticate the concepts described in this research we continued communication with many of the participants and collaboratively analyzed and discussed the ideas in group settings and one-on-one.

The emergent themes from this study are often supported with quotations and excerpts from within the interviews, to present a commonly held view of multiple participants. The quotations describe themes and were intended to keep ideas grounded within their context (and relationship) with other ideas. We also provide quotations to present parts of stories and metaphors commonly used and critical within indigenous discourse (Wilson 2008). It is important to mention the intent of comparing the groups and codifying perspectives was not to focus on disagreement but rather illuminate these conceptions for greater understanding, to find common ground and develop understanding between groups more fully to produce information useful for institutions

and staff involved in co-management within the ’07 Decree territory and to possess larger relevance beyond this study.

RESULTS

Inter-Agency Understanding

Responses from DNRE and tribal participants suggested that, whether indigenous or not, ’07 Decree parties did not understand each other’s priorities for assessment activities and restoration except for the TNE who self-identified as understanding state priorities. DNREs often seemed apprehensive to identify understanding tribal priorities even though policy participants described at length what the priorities may be. A state leader remarked, “No, I wouldn’t be so arrogant to say I know them; I have worked with them for years…I have a pretty good idea of where their focus is and why”. (DNRE 1) They also recognized difficulties in understanding tribal priorities because a “tribal perspective” was not an amalgamation of five tribal views but each maintained autonomy and thus potentially different priorities. Interestingly, DNRE biologists believed they shared similar management perspectives with TNE employees because “biologists are biologists” with equivalent training and knowledge (No. 1, Appendix 2). However, DNRE biologists believed they did not understand tribal agency priorities because tribal leadership’s views may diverge from non-member tribal biologists (TNE); therefore DNREs perceived non-indigenous tribal scientific staff views may differ from those of the tribal agency they represented.

I am sure I know what the management biologists of a tribe would want but I am

not so sure what the overall tribal…the chair or committees…I bet I wouldn't have a clue and not sure if I would like it either but I think the managers and the people more at the ground level I probably share a lot with. (DNRE 11)

All TNE identified having an understanding of state priorities while TME often did not. When TME described an "understanding of state priorities" they spoke of how the state priorities were influenced by readily identifiable social and political pressures and not biological issues.

The limited understanding between participants was acquired through 1) political, 2) institutional, and 3) personal relationships. The first form developed from the political process of the '07 Decree negotiations and 2000 Great Lake Consent Decree meetings and second from the institutional process established in the '07 Decree for reviewing biological assessment activities of the state and tribal agencies. The political engagement was often expressed in negative and personal terms by TME because of how the negotiations were aimed at decreasing tribal rights, questioning legitimacy of their management responsibilities and self-determination, and an attempt to diminish culture.

In the negotiations it was breaking my heart to see the state people, who weren't even a state when this treaty was signed trying, striving to lessen our treaty rights and it was their duty, and I understood that, and didn't take it personally from people who were there, because that is what they were there for, but it didn't change things. It was hard for me to sit there in those meetings and have

to listen to all of the things that were said to try to take away our right and most were social issues that drove it and that was the hard part to take. (TME 3)

The third form mentioned far less frequently was developing personal relationships. This was described as being ideal because "long-term friendships" would be important to developing a mutual understanding. Many DNRE participants had not been involved in '07 Decree negotiations because only a small team of high ranking staff had participated and many participants believed very few opportunities had been developed to interact with tribal staff leading to why they did not understand tribal priorities. They recognized they had little understanding of '07 Decree negotiations or why and how terms were agreed upon.

Knowledge and experiences leading to understanding

Each participant was asked to describe their background and experiences preparing them for their employment to understand how they 1) contextualized their knowledge and experiences and 2) included cultural attributes. The DNRE and TNE participants shared a core belief that formal education and scientific training had prepared them and largely spoke of individualistic preparation. The TME primarily used cultural constructs and spoke in collectivist terms, often referring to their role and experiences within their community and natural environment.

Department of Natural Resources Employee (DNRE)

DNRE participants identified three major categories having prepared them for

their positions; 1) western education, 2) diverse work experience, and 3) working throughout their organization. Participants described important individual experiences, as in their educational pursuit, and some collective experiences, as in working throughout their organization. They used an organizational frame rather than community based and enumerated the work groups they had participated in and were associated with.

Western education was identified by 80% of DNREs as how they gained knowledge and they expressed how it was an expectation for their position. "And I of coarse have degrees in Natural Resources Management; a Master's in Fisheries and a Bachelor's in Chemistry." (DNRE) Work experiences, specifically working for multiple agencies at many organizational levels, was important because of the breadth of knowledge it provided. Therefore, individual knowledge was gathered from multi-institutional experiences and provided a broader perspective and understanding towards fisheries and organizational management. Additionally, half of the participants responded that it was "good to work throughout the state organization" because it provided a learning experience where they comprehensively understood how the state organizational system functioned, changes were implemented, and plans developed from the entry level employee to supervisors. Some DNRE supervisors expressed the importance of mentoring and passing on of knowledge systemically within the organization. They described working with very good people during their professional formative years and how this had been influential in developing an understanding of fisheries management. A state leader described how mentoring had been important; "They were great mentors and teaching me about the breadth of fisheries management activities and responsibilities." (DNRE 3) Mentoring younger employees within the

agency was considered an important and rewarding role of their position. The DNRE participants described few experiences outside of professional.

Tribal Member Employees (TME)

The TME described how indigenous knowledge and values prepared them for their position and a responsibility to their community. Knowledge was acquired throughout their lifetime by forming learning relationships; interconnections through living in the tribal community and ancestral homelands, and understanding their collective, sacred history. Participants described how knowledge had been gained through elders, ceremonies, stories, songs, and by observation with the senses. Concepts and ideas were allocentric and reinforced how relational learning was done collectively and culturally and often described using metaphysical terms (physical and spiritual attributes with anthropomorphisms). Some described an intuitive knowledge ("blood memory") where they had always known certain principles.

Because of the inherent responsibility of their positions preparation was much different than the DNRE and TNE; they needed to be prepared to uphold treaty rights passed down from their Ancestors, sustain and protect their culture, and be a protector of the environment. The TME shared metaphysical examples of how "doors were opened for them" to be in their positions and therefore identified no separation from work and life responsibilities. Two interconnected concepts emerged that demonstrated collectivist, place-based and ceremonial supported knowledge systems; "In my blood" and "Out in the woods". "In my blood" described growing up Indian and centered on protecting and furthering the life-work of relations and elders who fought for protecting

treaty rights, culture and the natural world (Nos. 2 and 3, Appendix 2).

> *I could go back to 1836 Treaty of Washington because I have a Grandfather which would be several great grandfathers back that was actually a signatory on that document, so that is where it goes back to me as far as my blood and who I am. (TME 3)*

> *I almost had article 13 memorized [an important and controversial section in the 1836 Treaty of Washington] verbatim since I was a kid that we reserved the rights to hunt and fish with all the usual privileges of occupancy in the lands ceded and that was good enough for me. (TME 6)*

TME described the blood connection with Ancestor's who had been at treaty signings, elder's and through use of ceremonial implements such as the pipe (No. 2, Table 2.1).

"Out in the Woods" focused on learning experientially and through existing as part of the environment, how *these* woods and *these* lakes were a place where knowledge had always been acquired. There was a strong sense of place towards ancestral homelands and community where certain places and non-human and human "people" were remembered through story (No. 4, Appendix 2).

> *We've always been known in our family as hunters and fishers, we are well known in our area for that so, a lot of that has come natural to me because I have spent so much time out in the woods and on lakes. (TME 1)*

Work and leadership experiences were important especially for those in policy positions because they had learned from others in the community and had represented their issues. Western education was ambivalently described with many not acknowledging it. A small number spoke of thinking in western ways but noted how they should continuously interface with their environment and live near the woods and waters.

Tribal Non-Member Employee (TNE)

The TNE used the DNRE participants (western) criterion of educational and work experience legitimacy while recognizing the cultural, spiritual and collective attributes of TME. They rarely elaborated on their western education but mentioned it as a requisite. By contrast to DNREs the TNEs all characterized experiences in tribal treaty rights issues as defining criteria for preparation, whether it was involvement in the negotiations of the 2000 Great Lakes Decree, '07 Decree, or promoting self-determination. TNE understood their duties and expectations would not be strictly scientific in nature but also aligned with "seven-generation" philosophies and indigenous worldviews, as well as, possessing knowledge of the tribal communities and governments (Nos. 5 and 6, Appendix 2). Interestingly, TNEs expressed certain worldviews, norms, values and communication styles learned from the tribal communities while also using scientific terminology. The TNE used similar expressions as the TME when describing the tribes cultural and collective identities, including words such as "Ancestors", "struggles", "community", "rights" and "seven-generations".

So in one form or another I have been working for this tribe my whole professional career in implementing the rights reserved by this community's ancestors. (TNE 1)

Importance of biological assessments

Respondents from all agencies agreed that biological assessments were important because scientific information is 1) applied to management actions and 2) provide for social benefit and cultural need (Table 2.2). They identified that scientific data could aid in decision making, ensure sustainability of ecosystems and the fishery, and prevent overexploitation. A benefit expressed by tribal participants was that it empowered them as decision makers and co-managers because they could collect and interpret their own data and include tribal perspectives to shared fishery issues. The DNRE participants recognized the value of financially evaluating their stocking and restoration projects through cost/benefit analysis. Participants from both the state and tribes described how assessment led to having more predictive power to identify emerging risks to the fishery, develop safety mechanisms and guide in harvest allocations and regulations. They believed ecosystems within the treaty area would come under numerous threats impacting the ability of their respective citizenry to use or interact appropriately within the natural environment. Many suggested that baseline data would continue to become more valuable.

Social-cultural benefits were unanimously viewed as an outcome of assessments in part because it could provide harvest opportunities (Table 2.2). DNREs described how they have an engaged public who request information about the status of the resource.

Therefore they described how assessments provided information to communicate with and inform their public who had a need, want, and right to know. The TME and TNE believed conducting assessments could bridge distance between state and tribal communities by fostering good public relations through tribal presence on area waters where dialogue and interaction could occur. TME and TNE viewed conducting assessments as enhancing their scientific credibility and credentials.

Sustainability was a term used ubiquitously by all participants to describe how assessment data could provide information towards long-term management of "healthy" ecosystems, fisheries, and social and cultural practices. However sustainability was often described with different associations by DNRE and tribal participants (Table 2.2) because of divergent views on how ecological and social/cultural processes should be viewed and managed. Tribal participants described sustainability as balance (as in a circular construct) which transcended biological and ecological functions and included all socio-ecological facets while DNRE references were often biological or as a commodity output for the public. Tribal participants always spoke of sustainability of the ecological system connected to the health of their cultural system which included treaty rights, subsistence opportunities, and plant and animal rights. DNRE participants focused on environmental sustainability and "doing what was best for the resource" with a major focus on providing a product to fishers. They also recognized, to a lesser extent, the importance of non-consumptive practices that provided intangible benefits, such as protection of rare fish with "existence value" or preserving rare aquatic habitats.

Role of Scientific Information

Department of Natural Resources (DNRE)

For DNREs scientific information was authoritative in decision making and a driver of management: "Our decision making and our management is science based. That is in our mission statement so that is the basis; everything we do should be biologically based" (DNRE 10). Scientific information would therefore be used in meeting what DNRE identified as the states management responsibility of; 1) scientifically managing in the best way possible for all the state natural resources and 2) produce a fishery product of fishing opportunity. This responsibility was referenced through their Mission statement, "The Michigan Department of Natural Resources is committed to the conservation, protection, management, use and enjoyment of the state's natural and cultural resources for current and future generations." (MDNR 2013) This task was described as difficult and daunting because of the massive fishery resource but imperative because it was mandated under the Public Trust Doctrine. Within this management perspective was the concept of sustainability which centered on continuance of ecosystem function, provided services (harvest, recreation), and fiscal responsibilities (No. 7 and 8, Appendix 2)

DNREs recognized assessments were important to provide fishing opportunities to anglers because they purchased fishing licenses and bore much financial burden for the state's fishery assessment costs. A commitment to anglers was described by a state biologist as, "Our job is to provide a fishery for people who are paying our wages, that's a simple a statement that carries a lot of baggage. I'm being paid by fishing licenses and for that reason I have to concentrate my time on providing a product that they're happy with". (DNRE 13) However, they recognized their ultimate obligation was to act in the

best interest of the natural resources. Therefore, the state viewed science as the driver of management making biological assessments essential for producing data needed to sustainably manage aquatic resources while producing a product.

Tribal Member Employees (TME)

The terms "natural resources" and "management" (used frequently by the interviewer and DNRE) were often viewed by TME as western terminologies not necessarily appropriate within an indigenous knowledge paradigm. One tribal leader requested the question be rephrased into an indigenous context, "I have a hard time saying natural resources because that is a very western notion. It is abstract but [rather] living the way we are supposed to live with the things the creator put here for us so can you rephrase the question again?" (TME 6) The TME expressed how scientific information (including assessments) was important but should be and is combined with native sensibilities. Some described how native peoples have practiced an *indigenous* science which uses a broader context than western society's. "Cultural practices are aligned with our observations and when you look at science it is the study of natural phenomena and native peoples were studying natural phenomena forever." (TME 6) Many TME explained how indigenous knowledge is not "unscientific" but rather aligned with scientific exploration through observation of natural phenomena. This was an analogous concept to what had prepared them for their employment which included life-long learning experiences through observation and an intimate relationship with the Circle of Life (No. 3, Table 2.1). TMEs explained how when biological assessments and indigenous observations were combined they provided a fuller knowledge of the Circle of

Life and an appropriate understanding of balance because "biological assessments help quantify [indigenous] experiences" while indigenous knowledge provides rich observational and experiential information (No. 9, Appendix 2). The "Circle of Life" was a frequent theme for many TME where DNREs exclusively used resource. Some TME used both terms but often described the "resource" through a circle conceptualization. Therefore, the importance of biological assessments was integrated into how it related to sustainability of the Circle of Life.

> *When you talk about the Circle of Life, to me the Circle of Life from what I have learned, it ties into the Medicine Wheel, with the four directions, the four colors, all of the medicines that are connected with it. Well the circle of life is really part of that medicine wheel…there is no end to that circle so as Anishinaabe people we tend to look at the world around us as a circle because everything is connected to each other and so when you think about that if you take out a piece of that circle you are in effect trying to break that Circle of Life and we know as Anishinaabe, how everything is so connected to everything else, you know if you are having a healthy environment, you strive hard not to break up that circle because it is so important to balance, and you know people talk about balance and you get balance in your life. In the old days we understood that balance and worked hard daily to be part of the balance, and that is why the natural resources around us were in good shape because we were in-tune with that balance. (TME 3)*

The term management was described as a dominant society term while many tribal participants used the term balance within the Circle of Life concept. Although TNE often used the words resource and management like TME they also used balance, whereas DNREs did not. For TMEs assessments were important for understanding the resource and promoting balance when used with other means of acquiring knowledge. An important outcome of biological assessments to TNEs was that it allowed for understanding appropriate harvest levels. A non-member tribal biologist described this outcome saying, "One of the main goals is the sustainability of harvest for seven generations and is a main purpose for having a Natural Resources Department…to assess species that are harvested." (TNE 3) They also described the benefit of conducting their own assessments through the responsibility of caring for the native species that may not hold as much prominence to the state: "In our language we talk about other birds, animals, plants and trees as peoples also of their own nations and that we live with these nations, the tree nations, the fish nations, the animal nations, and I think that we have to represent their interest, because they don't have voices within the apparatus of the state government necessarily." (TME 6)

Social-Cultural Benefits

All DNREs viewed assessments as providing major social benefit which was expressed through "reasonable expectations" for fishing that continued into the future. Particularly, providing diverse fishing opportunities was beneficial because of varied angler interests combined with an understanding of what different fisheries river/lake

systems could provide. They described how management objectives may differ between systems and included many beneficial outcomes to anglers; such as trophy-sized fish and a wide variety of species. A state biologist characterized the management objective as, "We were told in one state wide training, the job of fisheries very simplified is to make more fishing, more available, to more people." (DNRE 13)

All tribal participants identified a benefit of assessment information as providing tribal members a sustainable fishery. Harvest was not described as a managed product or an economic benefit but as a treaty right and cultural necessity. A tribal member biologist described the benefit as, "Having tribal member harvest opportunities so we can get back to cultural roots…surveys are of the utmost importance because that is how we set regulations and know we have a sustainable resource for seven generations." (TME 4) Sustainability of the fishery, "Augment[ed] their beings of being Indian people". (TME 3) Therefore, the benefit of harvest was interconnected with how it augmented cultural, spiritual and community connections to the natural world.

DISCUSSION

Envisioning a Collective Identity

Collective identity is needed in multi-cultural collaboration so culturally originated knowledge gaps are diminished and understanding developed. This study shows a cultural distance impedes development of a collective identity among tribal and state agencies. There was poor understanding of each other's management priorities or beliefs on how the natural environment should be viewed and treated. One possible explanation is cross-cultural learning opportunities had not occurred. Many DNRE

biologists had not worked with TMEs before and were the only participants who expressed tribal priorities may be contrary to their own. Also, the learning that had occurred through '07 Decree negotiation was through crisis and legal mandates. Although, one benefit may have been realization by DNREs that cultural practices were still very active within tribal communities. A state leader remarked, "It was eye opening to learn that tribes are doing this because of cultural reasons." (DNRE 3) A third reason may be absence of linkages at different institutional levels because information exchange was often mediated by non-indigenous staff and interaction between DNRE biologists and TMEs was nearly absent thereby limiting exchange of culturally held values. A TME leader remarked how for biological issues they would leave discussions to the biologists. This could weaken vertical linkages and potentially create "messes" (Clark 1993) because biological issues are multifaceted and dynamic problems rooted in social systems. Biologists are not equipped or suited to address multi-cultural "messes" alone because of the socio-political nature (Patterson and Williams 1998). Also, authors have suggested native people need to speak for native issues where science, management, and indigenous knowledge can be translated and communicated directly into decision making (Brosius 2006, Berkes 2009). In the example of the '07 Decree parties there is not often a mediator because TNEs are not positioned to share indigenous knowledge.

Identifying a learning community could provide great value where multi-scale linkages are established and cycles of learning and adaptation occur. Linkages could be created by the '07 Decree parties to promote understanding of scientific, cultural, societal, political and management views within the context of each other's knowledge systems (Berkes 2009). This would require institutional strategies that promote

individual and organizational learning as described in adaptive co-management literature. Clark (2003) suggested identifying "social groupings of individuals within which learning occurs, and the institutional forms that stabilize and transmit the resulting lessons.'' Social groupings have included 'learning communities' (Kilpatrick et al. 2003) and 'communities of practice' (Wenger 1998) and describe a learning process where a group of people (community) share a common interest (domain area) and pursue knowledge through partnerships. These groupings form a framework where community-based resource management systems are fit to a specific place, situation, and scale. If forums for learning are not created the '07 Decree parties risk isolation, rigid management positions, and inconsiderate, self-interest (Ostrom et al. 1999, McClanahan and Castilla 2007).

Knowledge systems

As an initial methodological step for collaboration both Ostrom (1990) and Thomas (1994) suggested identifying cultural attributes of group members. While their suggestion seems especially relevant to this study the cultural differences present a problem for collaboration when we consider fisheries (and wildlife) science. Fisheries and wildlife institutions have been considered by some as dismissive of alternative knowledge systems and intent on maintaining superiority of scientific, centralized knowledge (Notske 1995, Jentoft 2007). Fortunately, calls for acceptance and use of multiple approaches have occurred within western and indigenous research communities (Patterson and Williams 1998, Wilson 2008).

Participants in this study described the use of distinct knowledge systems; the state predominantly a western knowledge system (WKS) conception (academic pedigree, professional experience) while TME an indigenous knowledge system (IKS) conception (a web of human-nature relationships)(Wilson 2008, Holm et al. 2003). To demonstrate the WKS and IKS cultural difference we take the methods participants used to "introduce" themselves during our interviews and apply it to how someone using WKS or IKS (DNRE and TME for this example) may introduce themselves at a professional meeting with peers. For DNRE they may introduce themselves by pronouncing their name, followed by a linear and rational description of *individual* qualifications, current institutional affiliation, educational degrees, titles held, and finish with a description of current undertakings (boards, working groups, etc.). Personal anecdotes may often be omitted although it could be well received by the audience. For TME they may introduce themselves through a *collectivist* and *relational* manner in Anishinaabemowin (language of the Anishinaabe) by stating their name, tribal and Clan affiliation, and where they are from. In addition they may identify a teacher important to their cultural development and ask their Ancestor's to provide wisdom and guidance; their personal life indistinguishable from professional. We believe this example characterizes how participants understood and responded to our question; true to their cultural schema. We were presented with two different conceptions of knowledge; WKS embodied as a reducible, system of knowledge gathered through academia and professional experiences and IKS embodied as a way of life through a web of metaphysical and social relationships with the natural world.

We observed an ontological division by DNRE and TME for how their "professional" knowledge of the phenomenon was acquired. The DNRE gained

knowledge about the environment through western education and work experiences while TME through community experiences and relationships with the natural world. These two relationships with the phenomenon are founded on ontological and epistemological (ways of learning) commitments. When using epistemological commitments described by Patterson and Williams (1998) the DNRE responses are consistent with their definition of *dualism* while the TME responses are consistent with *fusions of horizon*. The DNREs used *dualism*, a human constructed process where western knowledge held a primary role, as well as learning from other professionals, mentors, and scientific information. In this *dualism* commitment the human and natural world are distinct domains. The TME could be characterized through *fusions of horizons*, a close relationship with the phenomenon co-producing knowledge as indicated by the "In my blood" and "Out in the Woods" characterizations from this studies participants. The TME attached sentient qualities to the phenomenon and spoke about spiritual insights, stories, and rituals; these qualities of their worldview is a dominant aspect of many indigenous people (Cajete and Pueblo 2010, Hart 2010)

Another difference was how DNREs purchased, and then "owned" their knowledge through an academic degree and were paid for work experience while TME were born into a community of learning and learned intuitively and experientially. This exemplifies the difference between individual and collectivist learning and how legitimacy is defined accordingly through these two cultural domains. Individual legitimacy resides upon ownership of human constructs (degrees and professional experiences) whereas indigenous collective legitimacy is positioned upon the emic of

unwritten, culturally based knowledge from local customs experienced within the natural world.

Role of science

The role of science and interpretations of its legitimacy often act as barriers in cross-cultural co-management arrangements because it's exclusive use may be distrusted by indigenous people (Skogen 2003) when applied within their communities (Weiss et al. 2013). We generally observed this although the TME recognized value of scientific information to decision making when indigenous values were applied because it contextualized the knowledge being produced. For western trained people science is often perceived as a universally accepted, objective, singular approach to understanding a phenomenon where the philosophical commitments are often taken for granted (Patterson and Williams 1998). Indigenous people don't suggest objectivity but encourage bringing a value-laden cultural lens to scientific issues (Watson 2013, Weiss et al. 2013). The DNRE participants largely viewed science as an authoritative and objective source for management decisions while recognizing economic and social values.

Weiss et al. (2013) gives an example where scientific legitimacy and data were distrusted by indigenous managers based upon several criteria; 1) the temporal scale of collection, 2) rigidness of quantitative worldview, and 3) competing paradigms (suggesting WKS held values too). They viewed a WKS description of the local phenomenon as relatively recent (decades) while they (through IKS) had been producing knowledge for thousands of years from that locale. They also described the scope of WKS as narrow (reductionist) and quantitative opposed to the holistic IKS approach

where different values and ethics were applied. Finally, they believed the WKS paradigm focused on biodiversity conservation without valuing the human: nature relationship of traditional hunting. The perspectives of these indigenous managers were often described by the TME who explained IKS had developed multi-generationally, was connected to a specific, intimately known locale and accumulated through their Ancestors' experiences from a common place and biota. This intimacy with people, place, history and language is a common theme within indigenous communities to the extent of considering animals and plants as kin (Holm et al. 2003).

The Circle of Life concept described by TME participants demonstrates difficulties posed for IKS and WKS commensurability because the circle's interconnectedness potentially contrasts with the linear, reducible system. Indigenous researcher Wilson (2008) describes how the web of life indicates interconnectedness where parts "blend into the next", where a change in one affects other parts, and components are viewed as relationships (between human and non-human). In many indigenous cultures reductionism and systematic generalization of a highly complex and intricate system is viewed as inappropriate (Berkes et al. 2007); whereas in western science the addition of information collected or viewed outside of scientific methodologies may jeopardize the rigorous and standardized procedures of the method by adding uncertainty and value-laden information. Wilson (2008) demonstrates the difficulty between the Circle of Life and scientific descriptions by presenting how IKS is collected through a web of connections having been passed through oral traditions while scientific written descriptions can remove ideas from the relationships under which they were created.

Responsibility and sustainability

An overarching and commonly held goal of federal, state and tribal agencies for fisheries management is to sustain the socio-ecological function of aquatic resources (Lackey 2005). This goal is founded on responsibilities to manage for sustainability and human benefit. In this study participants described a shared responsibility and the need to manage because it is part of both their cultures; the state through legal mandates and the public trust doctrine while the tribes through sacred and customary responsibilities protected through treaty rights. The state responsibility produced a need to understand the resource quantitatively and develop predictive capabilities so the fishery could be protected and provide recreational and economic commodities. The tribes needed to understand experientially and scientifically to ensure the strengthening of the connecting threads of the fishery, community, culture and treaty rights. The common responsibility (sustaining the fishery) may help '07 Decree parties recognize the benefit of collaboration along with how differing worldviews and management products demonstrate how neither state nor tribal agency can exclusively manage for the needs of the other. For example, due to the size of many tribal agencies they would be unequipped to manage a large sport fishery while the state is unequipped for sustenance of the tribal community, their way of life or protection of treaty rights. A uniform fear was recognized that uncertain yet impending human-induced pressures would threaten sustainability of the fishery. Participants from both groups expressed tenets of the "precautionary principle" (to protect people and the environment from risk in face of uncertainty) (Lackey 2005) and explained how their agency had much at stake and must protect future conditions of the

resource for human use and ecological function. This point of convergence may provide for values of sustainability to be shared where respective worldviews and epistemologies harmonize (Argawal 1995).

Recognizing responsibilities to "communities" of people sharing a common resource may provide insight for the '07 Decree parties to determine areas of common benefit and to collaborate on assessments and restoration; the challenge will be determining how to create linkages between parties to meet the obligation. For illustration, a mutually beneficial endeavor would be to combine tribal and state resources to understand and protect a fishery which provides sustainable harvest; irrespective of sport or subsistence use. The state benefits by protecting an economic and recreational commodity (MDNR 2013) while the tribes benefit by achieving subsistence harvest and protecting a way of life. Through this example both groups derive substantial outcomes; their constituents enjoy the experience of fishing a healthy, multiple-purpose fishery while the agencies benefit from their "communities" being engaged with the fishery.

However, responsibilities present obstacles through a conflict between science and treaty rights. Science is often used as a dominant frame to limit the exercise of subsistence harvest as exemplified in the Great Lakes region where states scientifically framed how tribal subsistence harvest of walleye would collapse the fishery and should cease (Busiahn 1989). The tribes viewed this as an unrealistic outcome and assault on their right to harvest. Moller et al. (2009) provides an example where indigenous people in New Zealand mistrusted researchers entering their community because of "fear that prohibition or quota would be imposed through political pressure from external groups."

In our study participants from one of the tribes described how the right to harvest should not be limited by requirements to study the fishery before there are indications, scientifically or otherwise, that limitations were needed. These examples show disagreement in scientific application when used through a valueless authoritative frame yet where hidden values exist. In the case of walleye harvest although the state's concern may have been legitimate it was founded on how tribal harvest would impact the "value" to state recreational fisherman and did not necessarily consider the same for treaty harvest. When the responsibility of science is portrayed as "value free" yet constructed upon human benefit the cultural context of science (or responsibility to other values) needs to be addressed.

In this study all TME spoke of protecting treaty rights and harvest opportunities and across the United States tribes consider the responsibility of protecting Treaty rights essential to the survival of their people and cultures (Cohen 1989, Nesper 2012). Nesper (2012) explained how treaty rights transformed how landscapes are managed within the Great Lakes region and how tribal members view treaty rights as recognizing and protecting distinctiveness of a people who live differently than other cultures because of a collective "set of practices" adhered to in close proximity to traditional homelands. Holm et al. (2003) describes the Peoplehood Matrix with four interlocking core elements common and critical to all indigenous groups that have undergone colonialism. These four elements are: sacred history, territory and water, ceremonial cycle, and specific language, where each element is connected to the other. He cautions about reduction to any of the elements, "Even well thought out, perfectly rational changes can cause serious injury to peoples, especially if one or more of the four factors of peoplehood is attacked,

modified by outside forces, or destroyed completely". This suggests that treaty rights protect what it is to be indigenous and this must be shared with state partners who may not understand its importance:

> *...sometimes it just doesn't make sense the amount of work that we went through for the Decree, for what the tribe appears to be getting out of it. (DNRE 3)*

Responsibilities are also defined by the language used to describe aquatic ecosystems. Similar to other indigenous communities the TME often anthropomorphized the responsibility using deep rooted connections of human values into nature. Whereas scientific discourse is often emotionless the TME used language embedded with deep emotional attachment, and related to the fishery using terms such as "fish people", "fish nations", and "clan animals" (No. 10, Appendix 2). These terms indicate a "relational ontology" similar to what Watson (2013) found that "nonhumans are kin to humans" and when using exclusive scientific discourse the human-nature relationship, which the indigenous worldview is dependent, becomes neutralized. Within indigenous groups there is a sense of commitment to non-human societies where relationships exist with fish, wildlife, plants and the earth. This commitment includes principles of "reciprocity of life and accountability to one another" (Hart 2010) and ties into how a healthy environment is inextricably linked to human-environment relations. Berkes et al. (2007) describes how indigenous people view environmental harm or disease as pathologies and "Unlike western science, traditional knowing seems to consider respect and healthy

human-environment relations to be at the root of the observed impacts of pollution, hydroelectric development, and climate change." This requires the belief that humans have ethical responsibilities to non-human parts of the environment, and as humans receive benefit they must share reciprocally. Some TME recounted the horrors their people experienced during early colonialism when the environment was damaged and how this fueled their "sacred responsibility" to defend non-human societies. This contrasts with the objective, passive and outside observer role of western science where environmental degradation may be rooted in human activities but doesn't necessitate a view that it was a breach of respect to the resource because it lacks spiritual characteristics and is a basic measurement of damage.

This is not to say that societal values were not recognized by DNREs who described how value must be considered in future management and was part of their Strategic Plan (MDNR 2013). Discussion of societal values assigned to the aquatic ecosystem will be an important point of dialogue and willingness was shown by some DNREs to understand and adapt to tribal values as suggested by a state leader.

> *"If you understand the cultural difference, background and heritage then it might give people more empathy or at least more understanding as to why they may be doing the things their doing and that gives us the ability to adjust…to meet both science and the social needs." (DNRE 2)*

Throughout this discussion two responsibilities have been described through WKS and IKS and little communication regarding compatibility of these values have

occurred between ’07 Decree parties. If only a WKS is used it will continue to impede understanding of common ground on fishery management issues because values, ethical responsibilities, and reciprocity will not be explicated and may continue to unsymmetrically legitimize knowledge giving power to those using scientific frames. The strong feelings about respective management responsibilities and rights and the colonial histories make navigating cross-cultural management difficult as the state has long been the primary management authority. Some tribal leaders spoke at length of the massive difference between knowledge systems and languages and described in detail the distance in understanding that will need to be bridged (No. 11, Appendix 2).

CONCLUSSION

Navigating the waters of difference

It is not necessary to live by the tenets of another world view, but it is essential to acknowledge the value of that other world view and to accept and respect the goals, values, and orientations that are held because of it. . . Respecting people means respecting their world views (Hawley et al. 2004: 44).

At the root of successful multi-cultural partnerships is respect. Respect for the people involved and their worldviews and values. Throughout this paper we described two groups sharing a common resource yet perceiving it in different ways, living with distinct cultural histories, carrying unique inherent responsibilities, and using knowledge systems and worldviews that are contradictory by nature. Despite this, optimism exists for a collective identity that fosters ecosystem sustainability, quality fishing opportunities, sustenance and survival of a culture, and reconciliation of a turbulent

colonial history. Many authors have struggled with how to realize this goal without comprising the integrity and identity of each knowledge system and culture. Recently calls for keeping knowledge systems autonomous have surfaced in co-management literature; recommending recognition of differences and commonalities rather than integrating them and risking diminishment of the alternative knowledge form (Cundill et al. 2005), but instead keeping usefulness, legitimacy, (Weiss et al. 2013) and value (Bohensky and Maru 2011) of both. This platform lends to the belief that truth can come in different forms (Natcher et al. 2005) and consensus does not need to be the end product of success. This in turn may lead to different epistemologies and ontologies becoming comprehensible (Ostrom 1990).

We would suggest learning from a multi-cultural relationship already present but overlooked within state and tribal governance structures; the case study between three overlapping groups – state employees, tribal member employees, and the non-member tribal employees. In Figure 2.2 the TNE appear to bridge two worlds as the primary conduit of information exchange within the state and tribal institution connecting both knowledge systems. They possess the same scientific training and vernacular as DNRE while possessing a collective identity with TME through sharing scientific and IKS discourse, collectivist perspectives, and the use of cultural vernaculars. However, in this example the DNRE and TME possess a cultural distance because cultural attributes have not been shared, possibly because the TNE works within two worlds but doesn't bridge this distance except on scientific issues. Although this "bridging" assumption has its merit, Weiss et al. (2013) found how positions spanning both systems may complicate a

collective identity and place TNE in a difficult position of navigating two cultures and professional responsibilities and in a "constant envisioning of self-identification".

The important lesson from the TNE and pertinent to collective identity is how it demonstrates individuals can adapt and expand worldviews and behaviors acquired from another culture. As Watson (2013) suggests, "these ways of knowing do not need to be indigenous alone". The TNE maintained the WKS positivist approach, upheld their scientific roles within the tribes, but also incorporated IKS concepts by viewing their professional responsibilities to the tribe as more than biological, "I wasn't completely blind thinking that I was coming into a job where I would just be a biologist." (TNE) All TNE spoke of stepping into the "unknown" when beginning work for the tribes; which is the approach many researchers have suggested for building multi-cultural relationships, where dialogue exists at unknown places of discovery and views can expand (Castillo 2009, Mazzochi 2008). The TNE was able to step outside of their worldview and reinvent it with another culture.

The conditions forming the TNE/TME collective identity followed recommended practices from adaptive co-management and indigenous research which include: 1) biologist presence within a community as normative, 2) participating in the culture, and 3) accessing multiple-levels within community. This case reveals how TNE/TME used a path of mutual discovery through a learning-by-doing approach or when viewed within an IKS perspective a "learning by watching and doing" (Wilson 2008) and produced a network of knowledge relationships. It appears a primary condition was that TNE presence in the tribal community was normative; as a tribal employee they interacted frequently within the community. The TNE used many methods to understand tribal

member needs; survey data and shared experiences through personal relationships, group gatherings, and even ceremonies. This use of both quantitative and experiential learning brought together linear and holistic thinking; the survey data provided a quantitative interpretation while the community relationship a rich and deeper understanding.

This concept of normative presence may be of foremost importance especially since the idea that simply "working together" (a key component to building trust), has largely been untested for cross-cultural relationships. Jentoft et al. (2003) suggests that working in the field together or interacting in board meetings does not always indicate cross-cultural learning. For instance, Kruse et al. (1998) studied how relationships were formed in a co-management institution in Alaska and northern Canada and found the key was biologists spending time "in" the indigenous communities rather than meeting in co-management boards. Watson (2013) provided a case where indigenous and federal biologists collaborated on a project involving geese and spent time in the field collecting data together, yet when the study concluded, the western enlighten-based knowledge (that of federal biologists) was presented and the IKS was absent. Although not a conclusion of the study it would appear a collective identity had not been established through data collection actions or through institutional processes. This adds a perspective to Jentoft et al. (2003) that practical field activities are a means to develop a "common frame of reference and personal trust" but not necessarily to diminish "knowledge gaps of cultural origin". Wilson (2008) calls for researchers to build a "relational accountability" within indigenous communities; to ethically interact to gain "closeness", participate in day to day activities, and in turn use the perspective of one participating in the culture being studied, as is the case of the TNE. "A key to being included is not just the work you have

done but how you have connected with others in the community" (Wilson 2008). Normative presence may be important with indigenous people because of the oral traditions of knowledge transmission (Agrawal 1995) which relies upon understanding the relationships which formed the concepts and ideas and where knowledge is not fragmented (Holm et al. 2003). Very different is the quick and efficient transmission of western knowledge presented with linear and concise concepts. Thus allowing for sufficient time for indigenous participants to explain context behind the knowledge will be needed (Tafoya 1995).

We also observed the TNE had access to multiple community levels and not just the political system. Many TNE participated in harvest activities with tribal members and some engaged in ceremonies (Holtgren 2013). This provided them access to community knowledge holders and experts. Jasanoff (2004) expressed knowledge should be co-produced through practice where people share their ways of knowing and relationship to nature and society because it determines how people live in the world together. Watson (2013) suggested how an institutional structure present in Alaska could be considered where indigenous knowledge-holders are employed in federal offices with the government regulatory scientists who are interdisciplinary and cross-culturally trained. The TNE and tribal community practiced and implemented co-production of knowledge in the forms of integrated resource plans where both WKS and IKS were shared, incorporated and ultimately implemented to guide how both the non-tribal and tribal people "lived together in the same world". The outcome of the TNE interacting in the tribal community was formation of a collective identity with mutual respect, trust and expanded knowledge base. This is the possibility for the relationship presented in Figure

2.2, for the three groups to merge into less defined spheres where a collective identity expands without losing the diversity of ideas and autonomy.

Key methodological practices can encourage a collective identity where dominant and alternative worldviews are legitimated through understanding the respective needs, responsibilities, and cultural attributes. In the case of the '07 Decree parties, the recognition that the institutional relationship is young and it may take many years to form a collective identity will be important (Berkes 2009). Additionally, there should be recognition that responsibilities are culturally derived and often produce different, yet valid conceptions of natural resource management (such as sustainability).

Numerous strategies have been proposed for navigating within multi-cultural collaborations and are present in the TNE/TME case study. The '07 Decree parties have the opportunity to break longstanding and rigid structures of communication and learning to co-build their own institution; unique to their location, cultures, and time thereby creating venues that both groups respect. This would require meeting at tribal community areas (often the area where the management activity is being applied) and "focuses on participatory techniques developed in community settings rather than imposed upon communities by research or government institutions (Mercer 2010)" where both IKS and WKS is shared, experts from both knowledge systems are present and the knowledge is applied to management. This may mean expanding colonial methods and creating new ones with equal power sharing (Kendrick and Manseau 2008) that respect long-established indigenous governance systems. This could include meeting in untraditional (or traditional depending on perspective) places such as teaching lodges, community centers, and at ceremony and using modes of communication appropriate to

the setting. Structuring learning opportunities in community settings could provide state and tribal participant's means to work through multiple levels of tribal communities. Increasing the capacity of key knowledge holders for cross-cultural exchanges (Brosius 2006) is important and these are often elders for indigenous communities who are deeply respected and valued for their knowledge and ethics.

There are demonstrated tools for co-producing knowledge where key participants interact in diverse settings with varying methodologies to develop a new type of institution and epistemological paradigms. Maffie (2009) has proposed the use of "polycentric global epistemologies" (PGE) which acknowledges many ways for humans to interact and understand nature and reality. He suggests successful examples exist where PGE has protected natural resources while maintained autonomy of cultural knowledge systems. Weiss et al. (2013) identify "platforms" supporting cultural capacity building that include constructing knowledge "networks" (Berkes 2009), the use of boundary organizations (White et al. 2008), knowledge protocols (Crawford 2009), cultural planning frameworks (Hill et al. 2006) and cultural capacity building (Stephenson and Moller 2009).

What we have suggested may put more burden, or navigation of the unknown, on state participants because it would require change from their normative structures of knowledge exchange to understand a different one and step into a world where their knowledge is not self-evident or authoritative. However, treading into unknown situations has been the reality of indigenous people since relationships with the western world were formed. Even present day, indigenous and state institutions center interactions within the western world; in conference rooms far from indigenous

communities and territories, with customs and modes of communication different, where indigenous knowledge and values are not understood or self-evident (Green 2009). However, indigenous people and their knowledge have survived through these circumstances and Holm et al. (2003) suggests they have syncretically changed as "Native American peoples have taken foreign ideas, institutions, and material goods, filtered them through the matrix of peoplehood, and given them meaning within their own cultures and societies" while maintaining their identity. The success of a collective identity being formed for the '07 Decree parties may partially depend on this phenomena; the state participant's abilities to syncretically change and expand their vantage point. Crawford (2009) suggests that "western science has a long history of cultural adaptation …and remains open for negotiation"; this may be an opportunity for that occurrence. The TME and TNE relationship suggests the potential to recognize commonality, value differences and work outside worldviews. Ultimately, success may depend upon the ability of the '07 Decree parties to desire knowledge exchange with each other, find value in doing so (Natcher et al. 2005), step into unknown and uncomfortable situations and possess willingness and commitment to let others experience their culture.

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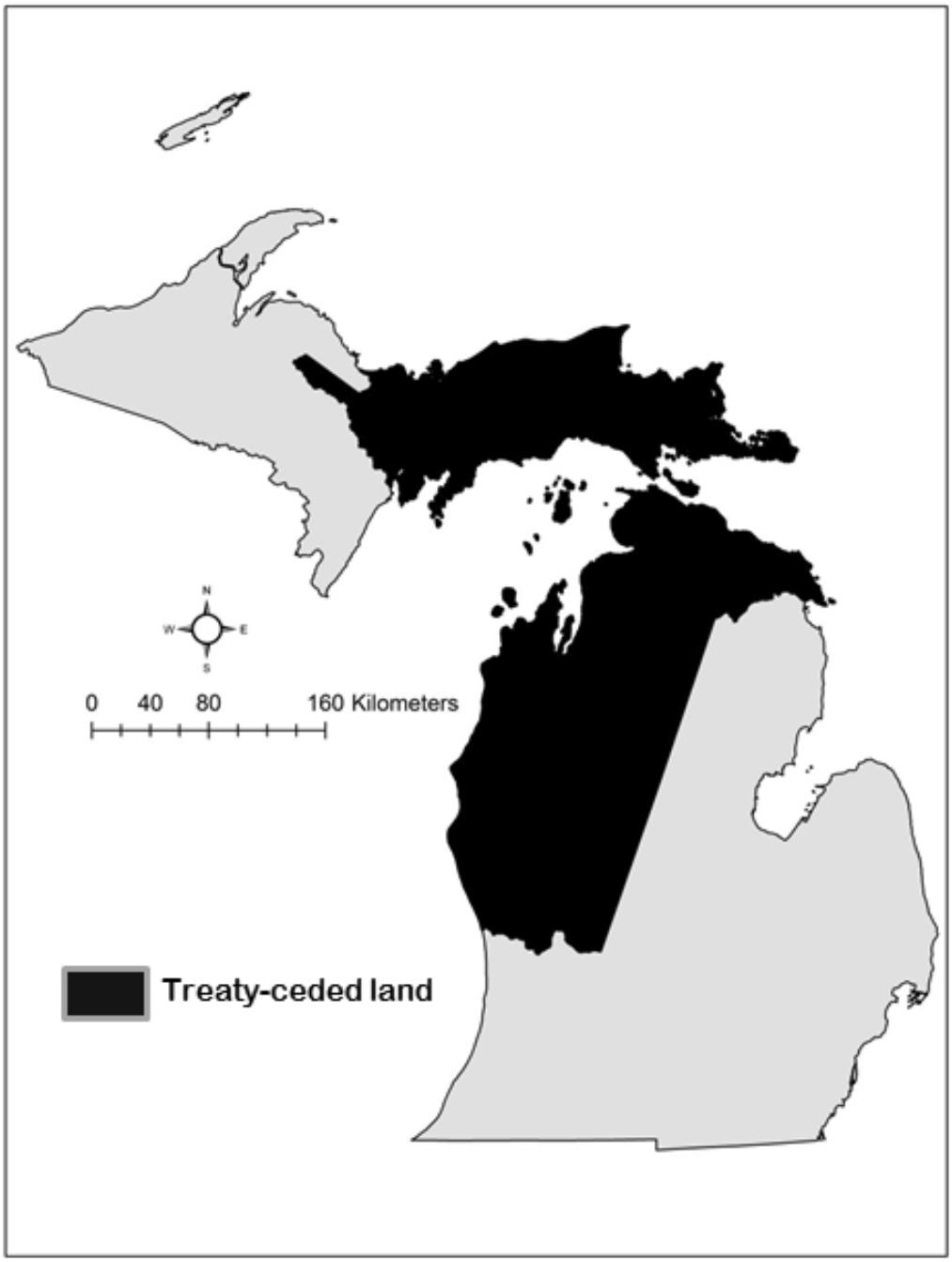

Figure 2.1. Inland land of the 1836 Treaty of Washington ceded territory (excluding Great Lakes boundary).

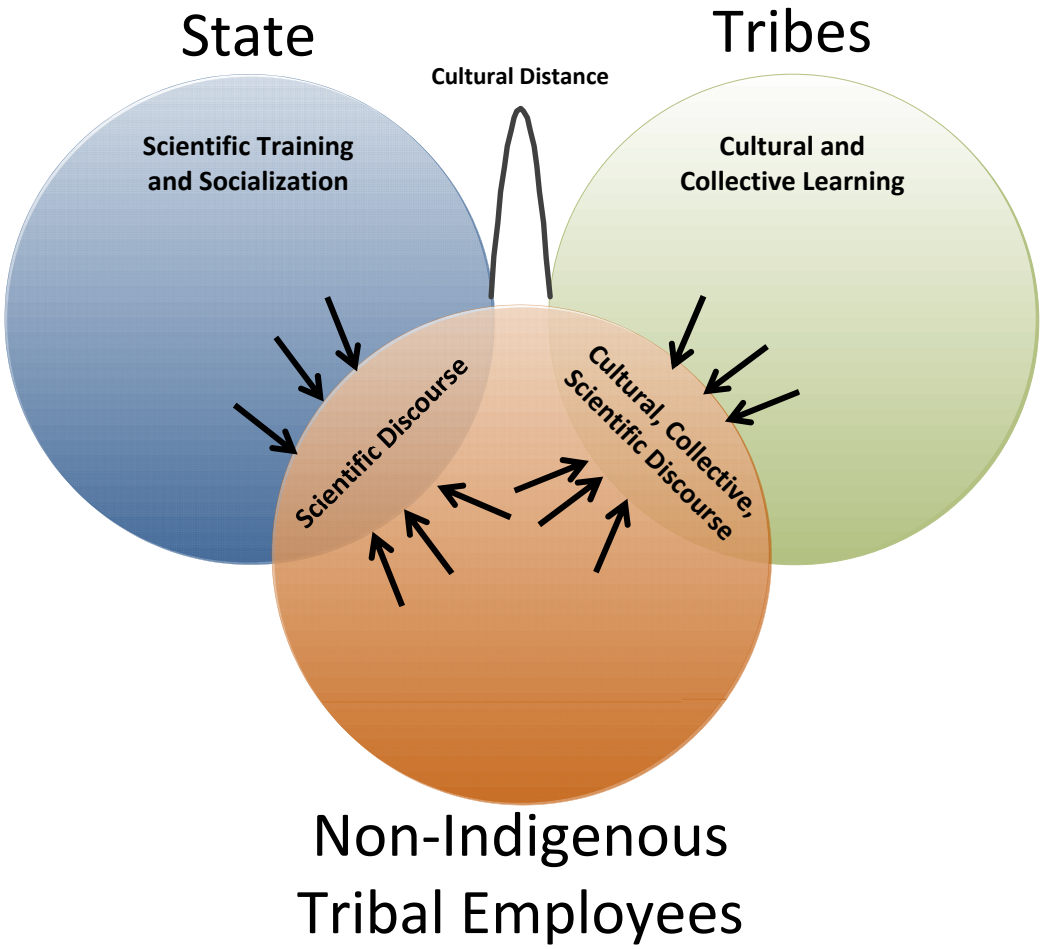

Figure 2.2. Representation of the multi-cultural relationship of state employees and indigenous and non-indigenous tribal employees. Collective identity illustrated by areas of overlapping cicles. A cultural distance exists between state employees and indigenous tribal employees.

Table 2.1. Terms and concepts used by indigenous participants during interviews. Descriptions are based upon explanations provided during interviews, follow-up conversations and were reviewed by J. Mitchell (LRBOI).

No.	Anishinaabek saying	Explanation
1	Anishinaabek	Term used by many Chippewa, Odawa and Ottawa people in North American whose language is Anishinaabemowin with meanings of "People of this place" and "good people" that are living on a path provided to them by the Creator.
2	Pipe	The Pipe is a Tribal Lifeway's instrument used by Anishinaabek Spiritual Practitioners, (and other Indigenous Peoples living in North American) to confer communion between the Spiritual/Physical nature of their symbiotic connection to their natural occurring environment. The Pipe is respectfully offered at the beginning of a new venture, as it represents the Axis between Heaven and Earth, the balance between male and female and is revered as the means in which to provide prayers of thanks or requests for healing and guidance directly to Gžhémnidoó, the Creator of everything that was, is and will be.
3	Circle of Life	The circle symbol is a shared concept throughout indigenous communities. It embodies interconnectedness within the environment, living and non-living, where elements are interrelated, connected, and inseparable; a change in one element affects the others. The importance of the circle is found within the web of relationships composing the circle.
4	Medicine Wheel	The Medicine Wheel symbol is a teaching tool used by the Anishinaabek and other Indigenous peoples living within North America and specifically articulates the circle and its interconnectedness with the earth as both a living and spiritual entity. The Medicine Wheel is divided into four segments comprised of four unique colors, each representing its own specific quadrant within the wheel, reflecting numerous physical and spiritual representations separate yet inherent of the others (the four directions; ages of man; seasons, etc.)

Table 2.2. Summary of major associations regarding the importance of biological assessments held commonly and exclusively between state and tribal participants.

Importance of Biological Assessments	Major Associations *Common*	State Association	Tribal Association
Scientific Information Is Applied to Management Actions	Decision making Scientific information is critical and brings strength to decision making. Makes evaluation of management actions possible by having baseline data (restoration actives).	Assessment data is primary driver of management. Decision making and management is science based. Implement cost savings based on evaluation (i.e. Hatchery stocking), answer management questions on a regional scale.	Scientific information should be combined with "Native Sensibilities" (ex. intuition, observations, stories, attachment) to provide knowledge and understanding of balance. Empowers tribal agencies to sit at decision making table for comanagement and policy. Provides for a "tribal version" or interpretation of data.
	Ensure sustainability Functional and healthy ecosystems which provide harvest. Understand and manage human impacts. Broad understanding of resource allows for predictive power for making sustainable management decisions in face of uncertainty	Sustainability as a Public Trust Responsibility - long-term protection of ecosystem function, health and its services through broad understanding. First priority is sustainability of environment while providing a product for fishing public. Sustain or increase utilization.	Responsibility for Seven generations - provides for sustainable healthy ecosystems, native species communities, subsistence harvest, and thriving culture. Sustainability premised on not breaking up Circle of Life (connectedness) and promoting balance (Reciprocity and pathologies). Protects treaty rights.
	Financial evaluation of projects	Fiscal responsibility to anglers, improve and increase use for dollars spent. Determine how money is most wisely spent on restoration activities.	N/A
	Prevent Overexploitation Develop scientifically derived safeguards and quotas, understand pressures and impacts.	N/A	Reciprocity
Social-Cultural Benefits	Harvest opportunities	"More fishing, more available, to more people." Product.	Sustained through time, provide treaty guaranteed right
	Inform public	Information tool. "Public need and want to know"	
	Meeting community needs	N/A	Meets cultural and spiritual needs. "Augment being Indian", spiritual, social, cultural.
	Public Relations and Credibility	N/A	Public relations and credibility - exposure, communication, education, positive view.

Chapter 3[2]. Navigating towards successful partnerships between state and tribal agencies in fishery assessments and restoration

INTRODUCTION

The fisheries discipline has been criticized for disregarding management and knowledge systems alternative to those held within the scientific community (Jentoft 2007). In North America recent emphasis has been placed building partnerships with different races and cultures (Hughes 2013). Professional society conference themes have encouraged "Building Ecological, Social, and Professional Relationships", or "Bridges to understanding: linking multiple perspectives", and "Forging partnerships" all of which demonstrate efforts toward inclusion but further effort and follow-up post-conference are needed. A growing body of literature, both nationally and internationally, encourages development of adaptive co-management partnerships between indigenous and state (central unit of government) agencies (Pinkerton 1989; Reid et al. 2006; Armitage et al. 2007) with the reasoning that diverse values, knowledge systems and management perspectives will provide ecological, social and political benefits. For this paper we define adaptive co-management (hereafter referred to as co-management) using a modification of Berkes (2008) as "sharing power and responsibility" through institution building, social learning, problem solving and governance.

If the fisheries discipline commits to this charge they must recognize how indigenous rights to manage and make management decisions reach beyond natural resource issues and into the interconnected web of cultural, spiritual, social, and political

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elements (Nesper 2012). Accordingly, indigenous needs vary from state needs and include self-determination and sovereignty (Davis and Jentoft 2001; Ohlson *et al.* 2008), legitimacy (Notske 1995), research that uses indigenous paradigms (Wilson 2008; Hart 2010) and justice, equity and empowerment (Doubleday 1989; Brummel et al. 2012). The nature of scale also differs as indigenous agencies often manage smaller intimately known areas and people where as the state system manages large geographic units with often millions of people (Acheson and Wilson 1996). Co-management seems promising if fishery management outcomes benefit all groups and includes greater resource protection, new knowledge and innovations, and addresses broad environmental and social issues (Chompalov and Shrum 1999; Berkes 2009).

Critical components in fishery management are also important to multi-cultural co-management arrangements and include the collection and interpretation of data through *biological assessment activities* (hereafter *assessments*) and *restoration, reclamation and enhancement* (hereafter *restoration*) projects. Suggested operational benefits of co-management include less duplication of effort, greater efficiency through coordinated implementation, enhanced funding opportunities, increased knowledge base, greater sophistication for methods and modeling (because of diverse critical review), and better decision making (Hartley and Reid 2006). Socio-political enhancements include improved cultural relationships (Edwards et al. 2004; Brummel et al. 2012), creative group discussions (Skogen 2003), greater knowledge and understanding of socio-ecological systems to accommodate changing management issues (Tompkins and Adger 2004; Bodin et al. 2006), more research credibility (Ohlson et al. 2008), and development of shared norms and values (Plummer and FitzGibbon 2009; Armitage et al. 2009).

However, examples exist from North America and internationally where indigenous and state co-management arrangements were untenable and unsuccessful demonstrating the inherent risks of failure in co-management institution building (Jentoft 2007).

INLAND TREATY RIGHTS AND FISHERIES MANAGEMENT IN 1836 TREATY CEDED TERRITORY

A recent natural resources Treaty agreement, and the focus of this paper, concerns the 2007 Consent Decree (hereafter referred to as the '07 Decree), which deals with the inland portion of the geographic area of the 1836 Treaty of Washington (District of Columbia) Ceded Territory. This territory encompasses approximately 1/3 of the land and waters in what is now the State of Michigan (Figure 3.1). The '07 Decree was signed by five Native American tribes; the Bay Mills Indian Community (BMIC), Grand Traverse Band of Ottawa and Chippewa Indians (GTB), Little River Band of Ottawa Indians (LRBOI), Little Traverse Bay Bands of Odawa Indians (LTBB), Sault Ste. Marie Tribe of Chippewa Indians (SSMT), the State of Michigan (DNR) and the United States (US). Litigation initiated when the state filed a claim against the tribes to resolve whether the treaty continued to exist questioning the tribes' right to hunt, fish and gather. The state, tribes and US negotiated a settlement in good faith rather than have a court determine the extent of the treaty right and after two years of difficult and intense discussions an agreement was reached and deemed, "fair and equitable" (File No. 2: 73 CV 26).

The agreement recognized the tribes right to hunt, fish and gather in the entire territory with certain limitations. Similar to other treaty cases (Cohen 1989) it recognized

the tribes right to conduct assessments (Section XXI. Assessment Activities) and engage in restoration projects (Section XXII. Restoration, Reclamation, and Enhancement Projects). In order to coordinate assessment activities the parties agreed to meet annually. This provision recognized the tribes' right and ability to conduct assessments to benefit the unique needs of each tribal agency. For restoration activities (i.e. fish stocking, habitat improvements) the tribes agreed to request state approval. Approval could not be withheld unless a *legitimate state interest* was established. These two provisions established a co-management framework and formalized mechanisms for jointly performing management functions.

HISTORY OF DIFFERENCE

Characteristics of effective partnerships include trust, respect, legitimacy and common ground (Berkes 2009; Baral 2012), attributes not often found within colonial histories of indigenous and state relations where hegemonic control and unequal power has existed (Natcher et al. 2005). Therefore co-management systems are difficult endeavors between state and indigenous systems because of inequitable public policy and antagonism (MacLeod 1989; Jentoft 2003), numerous issues other than biological being present during discussions (Jentoft 2007), complexity within legal and institutional arrangements (Mattes and Kmiecik 2006; White et al. 2008), varying capacities of indigenous management agencies (Skogen 2003), and struggles for legitimacy of knowledge and rights (Rettig et al. 1989; Notske 1995; Hall and White 2008). Each of the above difficulties are present to varying degrees within the state/tribal institution of this paper and when combined with interactions during the '07 Decree have led to

individual bitterness and distrust (Holtgren, unpublished data). Therefore, to create favorable conditions for collaboration there is not simply a need to understand the cultural difference but cultural attributes and resulting relationship dynamics between group members (Natcher et al. 2005). The relationship is further complicated because many of the tribes biological staff are non-indigenous and may possess worldviews based upon western training and indigenous teaching.

Cultural and socio-political differences between indigenous and non-indigenous people have been discussed, specifically how each views the role of humans in the world and thus the legitimacy of each other's knowledge and authority (Notske 1995; Kimmerer 2000; Guilmet and Whited 2002). This has been referred to as cultural distance (Natcher et al. 2005) and is founded within the use of two cultural knowledge systems; Indigenous (IKS) and Western (WKS). Features of IKS are shared by indigenous communities worldwide with a fundamental principle being the system of knowledge is a way of life founded on forming a web of relationships with human and nonhuman parts of the environment (Holm et al. 2003). This system develops through a living, intergenerational knowledge between people in a common territory where there is intimate contact with nature and "all ideas are culturally based" (Wilson 2008) and form a sacred history where values are shaped, language developed, and customs followed (Holm et al. 2003; Lerma 2012). IKS is non-linear where spiritual and physical realities are encouraged and considered valid. Because IKS is associated with plants, animals and important locations within a territory or homeland, the knowledge system will be uniquely adapted for each community. WKS is characterized as empirical and positivist-reductionist where complex phenomenon and processes are knowable and should be reduced to simpler

forms for understanding (Patterson and Williams 1998). It is linear through a hypothetico-deductive method (hypothesis tested and verified or falsified) where establishing a cause and effect is often desirable (Berkes et al. 2007). In WKS the observer is removed from the phenomenon being studied to produce an objective, "value free" output (Mazzochi 2008; Weiss et al. 2013).

Management systems based upon the two systems are expectantly different. The basis of state fisheries management in the US relies on ownership of the fishery resource. Known as the common property principle, the fishery is owned by the entire populace and state governments have the right and responsibility of being the Trustee (Nielsen 1999; Henquinet and Dobson 2006). Within this framework states have the difficult task of maintaining open access to the fishery while ensuring protection, sustainability, and productivity (ecologically and economically) of the resource. The indigenous framework is largely based on stewardship and being a part of the natural world where humans have a relationship with all of creation, where they co-exist and interact in balance because of their inextricable link to all other creatures (Kimmerer 2000; Salmon 2000). Mitchell (2013) described *Baamaadziwin*, an Anishinaabek belief structure, which translated means, "living in a good and respectful way" where resource management uses knowledge and faith based on oral tradition passed down through generations by teachers to students participating in the spirit realm, and where wisdom is found through interacting in wilderness. Rigney (1997) characterized the differences by saying, "Indigenous peoples think and interpret the world and its realities in differing ways to non-indigenous peoples because of their experiences, histories, cultures, and values." This difference, or cultural distance, is acknowledged as being expansive but where it is

important to elucidate alternative worldviews so fundamental commitments to how knowledge and the world are viewed can co-exist within a single management institution (Houde 2007).

UNDERSTANDING PRIORITIES FOR ASSESSMENT AND RESTORATION

A benefit of collaboration is when the parties achieve mutual and exclusive goals. For tribes, the right to conduct assessment and restoration is interwoven with the right to self-govern and protects their cultural identities by focusing on projects important to their communities. Therefore, clarifying goals and expectations is an important initial step in collaboration partially because it allows partners to develop a common frame of reference (Willard and Norchi 1993). Understanding fishery management priorities, the values forming them, and types of assessment and restoration projects desired by each partnering agency should assist in establishing long-term partnerships and be a key component of research aimed at promoting collaboration.

For many state fishery agencies in the Great Lakes region assessment effort has shifted from local to broad scale where data can be applied statewide (Fayram et al. 2009). In the 1990's the State of Michigan Fisheries Division developed and applied a broad scale statewide sampling plan to 1) evaluate management actions, 2) provide information on status and trends of aquatic resources and to a lesser extent 3) allow for discretionary (localized) sampling (Hayes et al. 2003). Within this framework approximately 60% of sampling is centrally administered and approximately 40% allocated to local management unit discretion. This shift was predicated upon several issues including 1) staff reductions, 2) desire to increase standardized application of

survey methods, 3) too much effort expended on stocking evaluations and 4) a broadening of Fisheries Division mission. This sampling plan posed a difficult balance of meeting "the needs for information at a local scale with needs for larger data collections" and produced some conflict within the division because of decreasing time allocated to local scale assessments (Hayes et al. 2003). An important role of Fisheries Division is to "Protect natural and cultural resources" and "ensure sustainable recreation use and enjoyment" and this broader focus would help increase managers understanding of the overall abundance of game species but also non-game fishes and habitat (MDNR 2013).

Priorities for biological assessment activities of tribal fishery management agencies in the Great Lakes region are less well understood regarding scale, objectives, application of data, and focus of assessment types. In many cases where treaty litigation occurred the tribes have largely conducted biological assessments which inventoried fishery resources and assisted in development of regulations and quotas (Busiahn 1989; Cohen 1989; Mattes and Kmiecik 2006). Even with the increase in WKS biological staff working for tribes in the Great Lakes region tribal leaders have "stated that traditional Anishinaabe culture and values were to be infused in all aspects of its work" recognizing the unique management approach tribal people and agencies bring where their teachings and values "directs management to be holistic and integrated, respectful of all creation" (Mattes and Kmiecik 2006). Therefore, distinctive culturally derived management systems may project different management priorities, data needed, and assessments. Further, although regulation development and evaluation is a function for both state and tribal managers the objectives could differ dramatically because of vastly different end

uses, harvest methods, and values between tribal and state fishers (Busiahn 1989). It should be noted that although much tribal assessment effort has reactively focused on regulations due to treaty ligation, to assume this is or shall be a major desire of the tribes seems unwarranted. Rather, an understanding of tribal priorities developed without the need to battle for quotas and justify regulations may provide a much different picture of what the tribes desire.

The restoration provision of the '07 Decree includes fish stocking and rearing, habitat improvement and other methods. The state and tribes have initiated or been involved in wide ranging restoration activities including dam removal, fish stocking and rearing and stream bank improvements. The possibilities for collaboration within the provision are immense and range in scale and complexity (local and site-specific to ecosystem scale), purpose and socio-ecological benefit. Numerous authors have recognized how federal, state, and tribal partnerships can be mutually beneficial because of the unique role and perspectives indigenous people bring to ecological restoration. This is due in part to their unique knowledge, worldviews, cultural ties to the land and sacred stewardship responsibilities which are recognized to promote biological diversity, ecosystem persistence and management adaptability and resilience (Ohlson et al 2008; Schmidt and Peterson 2009; Wildcat 2009). However, developing multi-cultural partnerships for restoration and other facets of fishery management is not an easy task and often problematic because the end goals and values often are highly divergent and outside the scientific realm (Skogen 2003). Therefore, managers must deal with complexity in restoration partnerships and accept goals and objectives not based exclusively on ecological or scientific precepts but inclusive of socio-ecological attributes

including cultural identity (Stephenson 2008) and personal values (Hansen-Møller 2009) associated with the local landscape.

Successful planning and implementation of restoration projects have increasingly been recognized as having strong associations with multiple value systems (ecological, personal, socioeconomic and cultural). In fact, Clewell and Aronson (2007) make the case that key terminology (damage, repairs, integrity, health) used by managers and stakeholders when discussing restoration are value-laden and lack scientific objectivity. Naiman (2013) furthers this notion, "Effective conservation and restoration projects articulate what matters to people in the catchment…This is perhaps the most difficult issue to overcome for traditional science and management." This thinking necessitates that scientists, managers, stakeholders, and society engage each other, appreciate and understand the range of restoration values, and co-produce knowledge and values together. Those involved must be accepting and respecting of different realities (Hart 2010) and knowledge (Moller et al. 2009) including religious beliefs, traditions, and customs which bring potentially unfamiliar or contrasting epistemologies (Natcher et al. 2005). Understanding these different values and establishing multi-agency and multi-cultural priorities will be important for effective state, tribal and stakeholder restoration partnerships.

This research was sparked by discussion with leaders from the state and tribes who recognized an opportunity to work together and obtain outcomes protecting the fishery resource to the benefit of all; an opportunity that seems especially relevant considering current conditions where agencies are tasked to manage an overwhelming number of waterbodies with reduced personnel and funding (Hayes et al. 2003; Fayram et

al. 2009). Our objectives were to: (1) elucidate values and perspectives of state and tribal participants for assessment and restoration, (2) identify and assess common and exclusive assessment and restoration agency priorities, and (3) develop recommendations for efficient and mutually beneficial collaboration for assessment and restoration projects.

METHODS

We collected both qualitative data through semi-structured interviews during 2009 and 2010 and quantitative data through analysis of state and tribal work plans from 2010-2012 in order to understand participant and agency perspectives on fishery assessment and restoration. In the qualitative method we interviewed 14 participants from Fisheries Division, Michigan Department of Natural Resources (DNR) and 12 participants from five Tribal Nations of which eight were Tribal member employees (TME) and four were non-member employees (TNE). The participant list was developed purposively using "key informant" (Weiss 1995) methodologies to represent all institutional scales and assure broad representation of perspectives. We recruited key partners (informants) based on their ability to influence fisheries management policy and '07 Decree implementation. Additionally, tribal elders were used as key knowledge holders (Hart 2010) because of the respect, knowledge and influence held in tribal communities. These key partners for the state and tribes referred participants (chain-referral) from multiple institutional scales which reduced the population of research participants. One interviewer from this study had been employed by the DNR previously and currently for a tribal natural resources department which played a role in being allowed entry into the tribal communities. From the 12 tribal participants we

interviewed; two Ogema's (chairperson's), one natural resource commissioner, two natural resource directors, three biologists, two technicians, and two legal counselors. The four non-tribal members (TNE) were biologists and one legal counselor. The 14 state fisheries employees for the DNR we interviewed were 9 high level leaders or managers and five biologists.

Within the multicultural participant pool two research paradigms were present (western and indigenous) so we attempted to incorporate methods respectful of both paradigms and supported by the individual participant (Wilson 2008). Therefore, each participant selected meeting location, setting and time which gave them a partnership in the research, a culturally appropriate/personally comfortable setting where a knowledge relationship could be formed. Specifically for the indigenous participants the sharing of knowledge could be culturally positioned in the context of time, place and how they related to the ideas being shared (Wilson 2008). Most participants also inquired about the comfort of the interviewer when selecting their interview locale. TME interviews were held in differing locales and times including around a fire at night after a smudge ceremony, a tribal community center, and at offices during work hours. DNR interviews were held at offices and libraries during work hours.

Semi-structured interviews with open-ended questions lasted 35 to 90 minutes. A printed interview guide ensured all research topics were discussed and each interview focused on comparable topics. Probes were used to gather more detail on particular topics and for clarification. The participants were encouraged to share topics not covered in the guide and provide other relevant information with the topic covered (Weiss 1997).

All interviews were recorded, transcribed and imported into NVIVO© qualitative data analysis software. Data were analyzed inductively using grounded theory concepts (Charmaz 2001) with bottom-up coding to assemble theoretical constructs by identifying and grouping repeating themes (Creswell and Plano Clark 2007). Data analysis was focused on finding thematic patterns between individuals and within and among groups to develop rich detail. We asked participants to discuss the importance, value, and difficulties of assessment and restoration in order for us to understand common and exclusive perspectives, priorities and values. To authenticate themes and concepts developed through this research we continued communication with many of the key partners and collaboratively discussed the ideas in select group settings and one-on-one. Emergent themes developed from this study often are supported with interview quotes to portray commonly held views from multiple participants. The quotes are intended to retain the ideas grounded in their context (and relationship) with other ideas especially important in indigenous research (Wilson 2008). The intent of comparing the groups and codifying perspectives was not to focus on disagreement but rather illuminate these conceptions for greater awareness and understanding, to find common values and interests, to produce useful information for institutions and staff involved in co-management within the ’07 Decree territory and to have a larger relevance beyond this study.

To more fully understand assessment priorities we conducted quantitative analyses on agency work plan data provided by LRBOI, LTBB and the DNR from 2010-2012. Three tribal agencies were not included in analysis due to SSMT and BMIC not conducting inland fishery assessments during that period and GTB not having sufficient

staff time to participate in detailed analysis of their work plan. Each agency work plan identified assessment (1) location by county and water body, (2) timing by month, (3) purpose, and (4) if applicable species targeted. DNR work plans also estimated assessment effort using worker days (8h per worker day).

The intent of the quantitative assessment was to provide information on effort expended for three different biological assessment components; 1) geographic distribution, 2) survey purpose, and 3) species targeted. Data were combined from 2010-2012 and summarized using three year averages. We calculated averages from the treaty area comprising the Lower Peninsula of Michigan; the Upper Peninsula area was omitted because LRBOI and LTBB expended <1% of effort there. We calculated effort in the 30 Lower Peninsula treaty area counties. The survey purpose was identified using categories originating from DNR work plan for standardization (Table 3.1). Only surveys comprising ≥2% of the average effort for each of the three agencies is presented in Table 3.1. We calculated effort placed on assessments targeting a specific fish species. On occasion the DNR work plan did not distinguish between trout species (often brook (Salvelinus fontinalis), brown (Salmo trutta) and rainbow (Oncorhynchus mykiss) trout) and we accordingly classified these species as trout. We discerned the purpose of targeted species assessments through personal communication with biologists to determine the role of harvest allocations and perceived overharvest risks influenced assessment selection.

RESULTS

Biological Assessment Activities

When discussing important assessments DNR participants often described types of assessments whereas tribal participants described conditions for assessments. Both groups shared the view that assessments which evaluated fishery management actions to reduce uncertainty in decision making should be a priority. In order to accomplish this important assessment activity the state described broad scale assessment *types* (such as those found in Table 3.1) while many tribal participants identified *issues* (existing conditions for when assessments should occur) that would need to be addressed broad scale. Tribal participants explained how their assessment priorities were often localized because of financial and logistical constraints. DNR leadership explained the importance of status and trends surveys (S&T) to meet the broad-scale objective due to the immense spatial area they managed, "We moved to S&T because we knew there's no way with 11,000 lakes and 36,000 miles of stream, we were ever going to know it all, but we should figure out a way to classify these systems into fairly homogeneous units." (DNR 1). The S&T surveys provide comprehensive evaluations (i.e. habitat and water quality) of water bodies which benefit statewide decision making although they were recognized as labor intensive. State and tribal biologists also recognized the importance of local "discretionary" assessments designed to inform on local issues (i.e. evaluating local management actions, addressing public concerns, or assessing fisheries not sampled for many years). Particularly, DNR biologists described increasing difficulty in accomplishing local surveys as S&T commitments increased.

Tribal participants frequently described three conditions where assessments were important and embodied a localized focus; 1) water bodies near tribal reservations, 2) systems accessed by tribal members and 3) systems where native (sometimes referred to

as "cultural") and/or subsistence fish had not been adequately assessed. The importance placed on assessments near tribal reservations or adjacent areas was largely because tribal people interfaced with the natural world and obtained sustenance in those places.

> *Overall I would look at it in the context of biodiversity and the interface between the water and the land because there is an interface there where tribal people live at, we are a riverine people. We live on those borders, on water bodies, and rivers, and where the land is at; so biological assessments need to be prioritized where the activities are happening. (TME 4)*

The importance of single species assessments varied by agency; although, a common tribal theme was native species. All tribal participants valued native species assessments (both TME and TNE) more so than non-native because of 1) tribal community's cultural connections with native species and 2) DNR's focus towards non-native species:

> *Other types of species the tribe would probably not focus on, like salmon or steelhead [non-native], they offer us opportunities but it's not part of our work plan…there are some species Indian people rely on to augment their beings of being Indian people. Indigenous types of fish, they enhance our beings more so than non-indigenous species. We understand the needs of membership and focus on species of cultural importance and necessity and base that as the foundation for what we focus on.*

Half of DNR participants explained assessments were often focused on fish community not species level but important species were mostly unit specific. Both DNR and tribal participants described important species assessment criteria as those 1) people showed interest for, 2) needed protection or 3) possessed intrinsic value. The first criteria centered upon harvest, while the second and third on non-consumptive purposes including protection of rare, native (tribal) or intrinsically (DNR and tribal) valued. Several DNR participants described obligations to focus on species important to sport fishers who purchased fishing licenses and largely funded their work activities whereas tribal participants were often based on upholding subsistence rights of their fishers.

Information Needs

Biological information needs could be distilled into five broad-scale categories of how it would be used to; 1) understand factors influencing the fishery, 2) predict how fisheries respond to impacts, 3) evaluate restoration techniques, 4) refine ’07 Decree fish population models, and 5) evaluate harvest. The first two were based on the perception of risks to the ecosystem and how appropriate information could guide proactive management to address uncertainty and protect the fishery. One information need identified by the majority of tribal and state groups was invasive species. Notably, a few TME identified needing to understand “invasive” effects of stocking non-native sport-fish into native fish populations. Both DNR and tribal participants described the need to understand fish community dynamics (sometimes described as year-class production) and

biotic and abiotic factors that influence them. This included identifying processes impeding sustainable function (i.e. degraded habitat). In the category of restoration techniques both groups expressed a need to better understand how and if restoration (i.e. habitat and stocking) effects were meeting management objectives.

Refining population models and evaluating harvest revolved around state/tribal harvest model assumptions for walleye (Sander vitrus), lake sturgeon (Acipenser fulvescens) and steelhead trout (Oncorhynchus mykiss) populations that were developed for the '07 Decree and harvest allocations. Tribal participants solely viewed the models as unreasonably limiting tribal harvest opportunities, especially for steelhead, where parameters had been accepted with little ground-truth evaluation.

> *We are really unhappy as a department about the steelhead part of the '07 Decree. The 30 fish allocation for 5 tribes is disturbing so we want to develop a better way of looking at that fishery to allow for more harvest in the future so we need data for those systems.*
>
> - TNE 3

For the walleye population estimate model inter-agency participants were unified in that it likely didn't fully represent accurate population values because it was derived from Wisconsin lake systems. However, tribal participant views varied on the need for model refining because some believed low tribal exploitation did not warrant the large time expenditures required for authentication. Participants identified the need to understand state and tribal fish exploitation levels in order to respond quickly to overharvest. DNR

and tribal participants disagreed on what the needs were as both groups expressed the other agency's exploitation was the unknown variable. Tribal participants expressed how they must disprove state assumptions that tribal harvest through "efficient gears" and seasons (ex. Spearing during spawning seasons) was more detrimental and risk laden.

> *When you are managing with an agency that has tournaments and other activities that are so hard to control, the detriment can come quick over just normal subsistence/ recreational activities.*
>
> - TME 5

> *For walleye we need to narrow down state assumptions of our success rate in spearing and there is not much data for that and we are using Wisconsin's rates. If that is information used in development of the model for confidence or comfort level maybe we can get a better idea from our fisherman what their success is…there is an assumption now that it is 100%; that we give 10 fish and they harvest 10 that very very rarely happens…we are in the position where we may have to disprove that to get our opportunity to fish.*
>
> - TME 7

Some state participants believed a risk of overharvest was posed from tribal exploitation.

> *Right now tribal harvest does not appear significant, but I don't know*

what's going to happen 20, 30, 40 years from now, and I have to think about worst case scenario…If it's going to happen I want the info I need.

- DNR 9

Conditions Where Collaboration is Important for Biological Assessments

Six conditions were identified by state and tribal agencies where assessment collaboration was important with three commonly held conditions being on: 1) systems where high visibility management occurred, 2) allocated fisheries, and 3) large-scale fisheries. For *systems of high visibility management* the benefit of joint work was recognized as improving public perception of the agencies and how the public may realize and appreciate the good-faith effort of agencies working together.

Where there's perception, true or not, that there's a problem and whether that problem's due to state harvest, tribal harvest, state management, tribal management, those are one's where you might as well go through it together, because they're [the public] going to be asking each side and be interested to what each is doing.

- DNR 9

Participants valued collaboration on systems with joint *harvest allocation* (the second condition above) largely because of public perception and assessments were usually large in scale. For large-scale assessments (third above) collaboration was valued because without pooling resources few assessments could be accomplished per year. Numerous

examples for collaborative assessments were given and included assessing dam relicensing projects (large-scale), status and trends (large-scale) and walleye assessments (allocated fishery). State participants identified two unique conditions for collaboration; 1) when common goals were shared between them and at least one tribe and 2) where work plans overlapped. Tribal participants exclusively identified assessments with a direct benefit to resource users.

Quantitative Evaluation of Agency Work Plan Effort (2010-2012)

Geographic distribution of assessment effort differed by agency with DNR's broadly distributed over the state with fairly even effort per county while LRBOI and LTBB distribution was more local to reservations (Figure 3.2). DNR's effort ranged from >0-10% in 27 of 30 with a portion of two southern counties with no effort and Cheboygan (a northernmost county) composing 18% over the three year period. LRBOI and LTBB effort clustered with efforts of 89% in Manistee County and 63% in Charlevoix and Emmet Counties respectively (although not analyzed quantitatively GTB work plan effort also clustered). These counties were locations of their reservations and governmental offices (Figure 3.2). LRBOI and LTBB effort occurred in six and five counties respectively. When all three agency work plans were combined Cheboygan County received the most effort due to a collaborative large-scale walleye population estimate between LTBB and DNR as well as LRBOI's lake sturgeon harvest monitoring. Effort varied widely by agency based on purpose of assessments (Figure 3.3). DNR effort mainly centered on S&T's (37%±0.17SD), population estimates (17%±0.08SD) and fish community assessments (14%±0.07SD) with all others <10%. Their effort also

varied considerably by year (Figure 3.3). In contrast, LRBOI's highest assessment purposes were population evaluations (28%±0.09SD) (focused largely on lake sturgeon), fish community assessments (25%±0.09SD), habitat evaluations (13%±0.08SD) and population estimates (12%±0.11SD). LTBB's highest efforts included recruitment evaluations (38%±0.03SD) and population estimates (28%±0.08SD) for walleye, and fish community assessments (19%±0.09). Of note, although agencies spent a minor amount of time assessing stream temperatures through placement of temperature recording monitors all four agencies (including GTB) had consistently done so. The small percentage of time allocated may be more a function of the activity taking little time to implement not a lack of focus.

Agency effort on certain species also differed (Figure 3.4). Walleye was a major component of the LTBB work plan (>90%) and second for the state (38.6%) only to resident trout (43%). LRBOI effort was focused on lake sturgeon (59%) and rainbow trout (23%) but had recently shifted towards burbot (Lota lota) instead of a trout species. LTBB and DNR walleye assessments were largely focused either on systems where data was inadequate for allocation or there were model classification issues. LRBOI's focus on rainbow trout was due to tribal harvest limitations negotiated during the '07 Decree while their focus on lake sturgeon was to rehabilitate a native species within the reservation and to understand broader lake sturgeon life-history dynamics.

RESTORATION, RECLAMATION AND ENHANCEMENT PRIORITIES

Restoration priorities were identified along with problems and management actions that could be taken (Table 3.2). Notably, a tribal participant cautioned, "You

have to focus on areas that have the most impact but always be mindful that all of it is important." *Stream connectivity* was a shared high priority for most participants because of abundant unnatural barriers and water level control structures impeding fish movement and stream function (i.e. causing increased temperature, unnatural flows, and degradation of spawning habitat). The state specifically recognized the importance of tribal input during dam decommission negotiations and permitting.

> *I think tribes have special privileges for federal projects and have opportunities to require conditions that states typically don't … that's an area I could see [coordination] increasing.*
>
> - DNR 2

The priority of *minimizing impact of invasive species*, similar to connectivity, was largely associated with the problem of increasing spread of invasive species while balancing the need to increase habitat for more desirable species through dam removal or fish passage. *Sustainable stocking practices* were commonly viewed as needing to be ecologically and economically evaluated. Some DNR and tribal participants suggested discontinuing them if they were not sustainable under both criteria. Many participants from tribal agencies described how non-native stocking practices, (i.e. introducing Pacific salmon into Lake Michigan to decrease Alewife populations) threatened native fish populations:

> *It is not lined up with our basic sensibilities. We are not trying to do work*

[with salmon] other than looking at how the salmon fisheries impact our [native] fisheries.

- TME 4

Protect and increase habitat was also identified as priorities buy the DNR and tribal participants. Both groups viewed degraded riparian habitat as a major problem and listed numerous improvement options including addition of in-stream and lake habitat. The DNRs believed that for both habitat protection and supplementation, tribal coordination would be particularly beneficial, especially commenting on forestry compartment reviews and permits for land development projects. While *protect and increase water quantity and quality* was noted by both groups, tribal participants were particularly concerned about water withdrawal proposals and how decreasing river flows would impact treaty protected subsistence rights. Exclusive to Tribal participants was *enhancing native species* and concerns with the state stocking non-native fish.

There is a natural approach we need to look at, nature has a way of taking care of itself and we look from a cultural standpoint and to continuing these stocking efforts and putting non-native species into the systems you are depleting resources for species that are native.

- TME 6

Our committee has taken a position on a regular basis that if you are going to stock something it should be native species.

- TNE 4

Characterizing Successful Restoration

State and tribal participants shared common values for successful restoration projects (Table 3.3). An *observed positive ecological response* (including an improved fishery) for the public was a primary criteria. One state participant questioned the value if it didn't benefit public use.

> *The public has an opinion if something matters to some degree. If you do a habitat project and nobody can use it did you really accomplish something?*
>
> - DNR 4

Other common criteria were recognizing *accomplished objectives* that were *quantifiably measurable* and established prior to project implementation. A *visually observable* improvement was valued by a few state and tribal participants when they noticed an increase in people experiencing the fishery or environment. A few state participants believed projects were successful only when *evaluated for adaptive management* purposes, where the restoration technique was understood and did not need to be evaluated again so economic and human capital could be reduced.

Another common criterion was if *project benefits are protected and sustained* where natural function had been restored and the aquatic system could "take care itself"; however, a difference between DNR and tribal participants existed in their views of a

natural system. Many tribal descriptions defined natural as minimally changed from a reference condition of pre-colonialism while the state participants believed success was maintaining natural function of the system such as sustainable fish reproduction, channel morphology, and flow dynamics regardless of the presence of native fish or non-natives. Although not a restoration a few state participants described how protecting critical undeveloped lands should be a high priority.

Participants also shared how success was increasing fish *harvest opportunities*. Tribal participants viewed success through protection of treaty rights for their members to subsist from fish and "fit" the natural world back into their lives while the state view diverged as their success was providing increased "opportunities for fishing" and described fishers having reasonable expectation and access to diverse fishing opportunities (i.e. larger fish, diverse species). Both groups included how success was also gauged through the human values of *existence and intrinsic* qualities. This view for state participants was described as preserving non-game and non-consumptive opportunities, such as watching large spawning congregations, seeing large sized fish or simply knowing a rare fish species was still present. Most participants described *public 'buy-in' and fostering of relationships* as important for gauging success. State participants valued groups and communities coming together for the common good. Tribes expressed establishing community support with credibility, and long-lasting, positive relationships.

A unique and strongly held characteristic of success for tribal member participants was if *cultural connections* (interfaces with the natural world) had been restored for seven generations. They commonly expressed how the natural world and

fisheries enhanced their experience, knowledge and memories as Indian people and how it strengthened their connection to sacred ceremonies, songs, and traditions. They described how native ecosystem components (i.e. species, landscape characteristics) were a reason tribal communities had been drawn to their respective geographic areas and how the native conditions and tribal people had co-adapted in a shared history. They described a sacred responsibility to protect the native species that may not be a focus of DNR management. Sturgeon were recognized as rare yet an important part in making the local landscape whole.

> *[The tribe] initiated the [projects] because of our stories and cultural background; I know we came here because this is where the food grows in the water. Our creation stories and as a little kid I was aware of it.*
>
> - TME 4

DISCUSSION

Across the United States and Canada the rights of tribes and First Nations have increasingly been recognized throughout the courts and have placed governments alongside each other in co-management arrangements (Pinkerton 1989). In many of these cases the indigenous and state groups have unique rights, obligations, and opportunities to make decisions that provide ecological, socio-cultural and political improvements. In this investigation state and tribal participants in Michigan shared their values about sustainable, interconnected, ecological systems and how assessment and restoration projects could enhance this. Outcomes of assessments and restoration are a

change to ecosystems and landscapes, and anticipated or not a change to local distinctive cultural meanings and identities (personal and collective) that communities have within their landscape (Stephenson 2008). Many of the study participants described that success of fishery (or ecosystem) management was *if it mattered to people* – a concept shared within multiple research disciplines including indigenous, fisheries, and restoration ecology (Lackey 2005; Clewell and Aronson 2007; Naiman 2013). This has also been identified as one of the most difficult issues to overcome for traditional science and management; the merger of human subjective values and scientific "objectiveness". How fisheries management matters to people was one focus of this research and although we found encouraging similarities in the responses to this overarching theme we also noticed how a subtle difference in values or perspectives could become a divide in appropriateness of a management decision.

Throughout the natural resources literature authors have called for managers to consider and incorporate their own "expert" knowledge alongside knowledge and values from people intimately connected to the landscape (Stephenson 2008; Hansen-Møller 2009). A risk exists when there is not a clear understanding of what is valued or the background nature of those values because unintended changes to how communities interact with the landscape may occur as "events and history" are associated with the environment. This may be especially true when two distinct cultural histories exist as is the case for the '07 Decree participants. As an illustration we use the following example identified in this study by TME participants where a management action provided significant benefit to one culture yet damaged the other. In 1886, only fifty years after Michigan's recognition as a state by Federal land acquisition through treaties with the

tribes, brown trout were introduced into the inland waters of Michigan. Many more stocking events followed until the large-scale introduction of salmon and steelhead into the Great Lakes in the 1960's and 1970's; actions which distinctively changed the fishery and the surrounding communities (Kuehn 2005). The relatively new state government and citizens of Michigan, who temporally had a shorter attachment to the ecosystem, identified the management action a success and communities in Michigan were revitalized and found pride in a fishery which was recognized Nationwide as exceptional and economically valuable. However, for many tribal communities in the Great Lakes whose ancestors occupied the lands from time immemorial, there was a value to keeping the original conditions before statehood and the locally distinctive characteristics and cultural meanings it provided. Stocking disrupted their cultural connections (ceremonies, stories, and songs) and identity as a people from which they are still attempting to recover. This example demonstrates the breadth of socio-ecological impacts.

How restoration matters to management agencies includes political, economic, and ecological elements in addition to social/cultural perspectives. The DNR participant perspective was often guided by the public trust doctrine (Holtgren, unpublished data) and legislative authorities designed to promote broad environmental understanding, protection, recreational opportunities and economics. The tribal perspective was guided through a sacred Seventh-generation philosophy and a treaty right and to promote their communities connections to the natural world and opportunities for subsistence. However, if common assessment and restoration values are developed with established goals and an understanding of the diversity of values, there is an opportunity to navigate towards agency and cultural understanding with a broad multi-disciplinary approach to

knowledge and science. This was reinforced in one response from a DNR participant, "Maybe the cultural change and educational process [for the public] can be further put to rest by [them] seeing us cooperate instead of being adversarial all the time. Maybe doing joint habitat projects, surveys or some indication we're working together…but maybe working together could reduce some stress. (DNR4)"

A primary focus of this investigation was to determine areas where collaboration would be most effective in meeting the goals and objectives of the respective agencies for assessment and restoration. Within adaptive co-management research three strategies have been identified that recognize the benefit of partnering on assessment and restoration; participatory research, scenario building (mutual reflection on what is and is not known) and collaborative monitoring. It is believed if the participants are equal partners they can enrich the range of information and capacity for decision making, decide together what and how to monitor, and design management strategies that are locally adapted (Berkes 2009). Focusing on shared goals and perspectives (Pinkerton 2007) and building problem solving networks at the lowest levels of organization (Berkes 2007) is important to establishing group trust and legitimacy. We found commonality in some goals and values for both assessment and restoration which could serve as a starting point to equitable collaboration.

Partnership Opportunities for Biological Assessments

Our findings suggest common priorities and opportunities exist (Figure 3.5) and may represent a starting point for realizing respective needs and goals. Figure 3.5a is designed to guide state and tribal agencies in finding potential collaborative opportunities. The outer ring demonstrates overarching principles that were commonly identified for beneficial assessment collaboration and the inner circle specific information needs. The four overarching principles are mostly unique needs founded on the local context of the state/tribal collaboration while the inner circle largely is consistent with standard fishery management objectives. It is the values behind these objectives where differences reside as evidenced by the differing views regarding the appropriateness of '07 Decree models or monitoring exploitation rates. The second circle of exclusive agency priorities (Figure 3.5b) is less easily characterized using overarching fishery management principles yet partnering seems alluring because both groups could meet each other's unique needs and enhance the fishery and ecological conditions if they could find mutual benefit in doing so. This is the hope for co-management where integrative solutions are created and partners recognize and reconcile differences; especially if presumed incommensurability turns into an asset. To further these points we give examples from Figure 3.5a and b to demonstrate where collaboration for common and exclusive priorities may benefit.

Example Partnership on Common Priority - Asian Carp Rapid Response Assessment

In 2013 the DNR implemented an Early Detection Prudent Response exercise to train their staff on conducting assessments to quickly detect and enumerate Asian carp

invasions and follow strategies for eradication, containment or management if they would become established (Clapp et al. 2012). Collaboration by state and tribal agencies could meet three of the four commonly held overarching goals; 1) focusing on a project with similar goals, 2) was large-scale and 3) was highly visible management (outer ring, Figure 3.5). The value within high-visibility management would be the public viewing the tribes' as credible partners and demonstrate a unified approach where the state and tribes were in agreement and committed to protection of the fishery. Further, agencies agreed that invasive species were a great risk and this collaboration would evaluate factors affecting the fishery and increase predictive capabilities regarding invasive species invasions (inside circle, Figure 3.5). The state would benefit from additional tribal staff alleviating difficulties for large-scale assessments because technicians from all over the state would not be required to participate. The tribes benefit because the project is a broad-scale, "big-picture" issue and staff could be trained alongside the state workers. Also, they could apply overarching methods to local systems near reservations. This illustration could increase social capital by providing interaction amongst multiple-scales of state and tribal departments and build networks of communication and learning.

Example Partnership on Exclusive Priorities

In this research it was noted how state work plans had shifted to more broad-scale status &trends while most tribal effort was near reservations and focused on native species. Although the work plans and participants showed numerous exclusive priorities, not pursuing common ground would seem parochial when connections appear to be simple to establish. A major focus of DNR work plans is S&T (Figure 3.3) while for

tribes, assessments close to reservation areas and/or ecosystems, at intimately known locations by their members (Acheson and Wilson 1996), providing tribal subsistence harvest are a priority. Using these exclusive priorities it is reasonable (and supported through discussion with tribal biologists) that the tribes could conduct assessments using the S&T protocol on systems near reservations or on systems with member harvest. This would require tribal agreement to use state developed protocols or the state's willingness for protocol modification if the tribes deemed it necessary. The tribes (or the state) could potentially add additional components on a case by case basis that would meet their respective data needs. Tribal benefit could be involvement in broad-scale planning and decision making through the statewide perspective of S&T while conducting comprehensive assessments to meet local management needs. Further, strategic planning, joint decision making and capacity building could occur where new fixed or (stratified) random sites could be added close to reservations while furthering the treaty-wide data set.

Beyond the S&T example we suggest an opportunity for the DNR to partner with tribal agencies on their discretionary surveys designed to meet a local management need. Many DNR biologists expressed frustration in the decreasing focus on discretionary surveys because they were not able to adequately address pressing local issues. It seems reasonable that management needs identified by tribal departments may often be state needs as well. A recognized benefit to participants of both DNR and tribal agencies would be biologists from local units working directly with tribal biologists in strategic planning and value sharing.

Partnership Opportunities for Restoration, Reclamation and Enhancement

Especially for restoration actions that may change an ecosystem, it is critical for fishery managers to understand the different cultural values held within the affected area. Cultural values are generally considered as social constructs dependent upon physical landscape attributes, where a group assigns common values within the context of time and place (Stedman 2003; Stephenson 2008). Because of this complexity, and the potential detrimental impacts to communities, the avoidance of heuristic approaches is needed and rather multi-disciplinary approaches for understanding "group" (individual, community and agency) values should be used (Stephenson 2008; Hansen-Møller 2009). In the case of the '07 Decree, agencies manage for the respective values of their communities and therefore collaboration should represent the range of cultural values. Our findings suggest common and exclusive priorities exist with opportunities for collaboration in restoration (Figure 3.6). Six elements are identified in the center column of Figure 3.6 which represents overlapping restoration priorities developed from Table 3.2. The shared priorities of *river connectivity*, *sustainable stocking* and *protection against invasive species* may involve integration of inland and Great Lakes waters because management actions in either influence the other. This furthers the complexity for potential projects but also enhances the spatial possibility for greater positive impacts on the fishery resources. For *connectivity* and *invasive species* DNR participants recognized the tribes unique legal rights and legitimacy (not simply stakeholders). This recognition is critical for state/tribal partnerships which is often lacking (Rettig et al. 1989; Jentoft et al. 2003; Houde 2007). Due to this recognition, collaborating on these common priorities could provide enhancements to the relationship. Another shared

priority was using restoration to manage systems for *natural function*, viewed as self-sustaining after the action is complete. This perspective is found throughout agencies across the United States and would appear to be an ideal focus for collaboration. We found in this study participants described natural function by quite different means; some tribal participants (TNE and TME) described it as a minimal change in structure from an original (native) reference condition whereas some DNR participants described evident and moderate changes from a prior condition with ecosystem function intact. Many indigenous societies worldwide assess ecosystem and community health using pre-colonization reference conditions because of their interrelated and interdependent heritage (Salmon 2000; Holm et al. 2003; Lerma 2012) and there is current debate in the scientific community if non-native species should be viewed as an ecosystem degradation (Hermoso and Clavero 2013). The degree to which the tribes would gauge success of a project on whether native or non-native species would benefit should be further understood and strengthens the participant's views that clear objectives be set, ideally collectively, before implementation of a restoration project occurs.

Exclusive priorities were also recognized (outer columns, Figure 3.6) and could be mutually beneficial when near a reservation area. The state identified the priority of protecting intrinsic resources for non-consumptive and aesthetic purposes while the tribes identified native species and associated cultural connections. An example where both agencies could benefit would be lake sturgeon restoration within the treaty area. Both groups conduct fishery restoration for lake sturgeon, a species described by DNR as important beyond harvest opportunities but through existence and intrinsic values while the fish holds a position in tribal societies as a Clan animal and reverenced spiritually.

Beyond the respective agencies restoration activities the state has implemented a "sturgeon in the classroom" program in K-12 curriculum for public outreach/education while the LRBOI annually hosts a community ceremony for releasing lake sturgeon back into a river (Holtgren 2013). Projects that enhance ecological and societal values such as aesthetic and cultural could hold vast potential for unified restoration approaches.

Restorations Values

We developed and discussed typologies for several priorities and alluded to general values held for biotic and abiotic elements and functions of the ecosystem. We recognize the limitations of typologies, especially within indigenous research, because the significance (or value) of success is value-laden and embedded in the context of place, history and socio-ecological adaptions. To illuminate motives for ecological restoration we present a sample of values described in this study (Figure 3.7). The four quadrant model of values include ecological, socio-economic, personal and cultural as presented by Clewell and Aronson (2007) modified from Wilber (2001) where each value maintains some autonomy while the intersection of values at the center of the circle represents the interconnectedness. The circle consists of four axes (dashed lines) where an initial characteristic is placed and each preceding element incorporates attributes from those earlier until the outside edge is reached with an ideal state. We populated this model by using participant descriptions of success for restoration and categorizing them as one of the four values (recognizing the inherent overlap). Although this model does not detail each characteristic, and is beyond the scope of this manuscript, it is included to demonstrate the breadth of multi-dimensional values for restoration.

We found similarities in value characteristics in the *ecological* and *personal* categories between the state and tribal participants. For example, in the ecological value participants shared how restoration could improve integrity of the abiotic environment (first elements from center) and identified an ideal success as ecosystem integrity (last element from center, Figure 3.7). Along this continuum we see similarities and differences with the characteristic "fish people" and "fish community" for the tribes and the DNR, respectively. This indicates that a healthy "fish community" and "healthy fish people" are a valued outcome of restoration. To the DNR they shared how this meant maintaining fish diversity, key species, and sustainability and this was common with tribal responses as well. However, a few of the TME used the terminology of "fish people" indicating a value attribute not present in DNR responses. In order for managers to elucidate the range of values this difference would need to be understood. Further, the ideal state found on the end of the axis was ecosystem integrity and as we mentioned previously the meaning "ecosystem integrity" varies by agency. Another difference noted was the complexity of cultural values for the tribal participants. The use of this type of model borrowed from restoration ecology seems useful in pursuit of understanding each other's priorities and ideal outcomes for restoration.

MANAGEMENT IMPLICATIONS

Current recommendations in adaptive co-management for multi-cultural institutions stress iterative social learning opportunities in order to adapt, find common ground and co-produce knowledge where common problems and solutions are identified

(Berkes 2009). Assessment and restoration activities could be used to foster these opportunities. Many points of commonality were found for assessments and restoration and could serve as a starting point for collaboration. Further, agencies recognized specific benefits in collaborating because of unique rights, knowledge and abilities. Even where differences exist we believe they provide opportunity for mutual benefit because each agency could meet their own needs, develop commonly held ones, and promote learning opportunities not possible under conditions where similar ideals and priorities existed.

Collaborating on projects and developing shared objectives also pose great challenges as evidenced in participant divergent views on the need for harvest information (exploitation rates). This is similar to other state/tribal cases where there was inter-agency disagreement because the harvest by the other party was viewed as a risk to sustainable fishing and an impingement on their own management rights (Dale 1989). Specifically tribal participants shared how they focused assessments on allocation issues in order to refute unrealistic perceptions that their community's exploitation would be harmful to the fishery instead of focusing on more preferred assessments. Distinguishing between perception and legitimate concern will be difficult but could potentially decrease effort spent on the often large-scale allocation assessments.

Finally, a tremendous amount of human and financial capital is committed annually by the State and Tribes towards understanding, protecting and improving the treaty fishery, where collaboration on assessments and restoration could produce further enhancements to the ecological, social, cultural and personal values held by agencies and

their constituents. It seems prudent for the agencies to develop institutional and personal learning networks designed to co-produce knowledge and shared meanings, communicate that each other's values are important to the whole (Halvorsen 2006) and lead to strategic planning of equitably agreed upon objectives.

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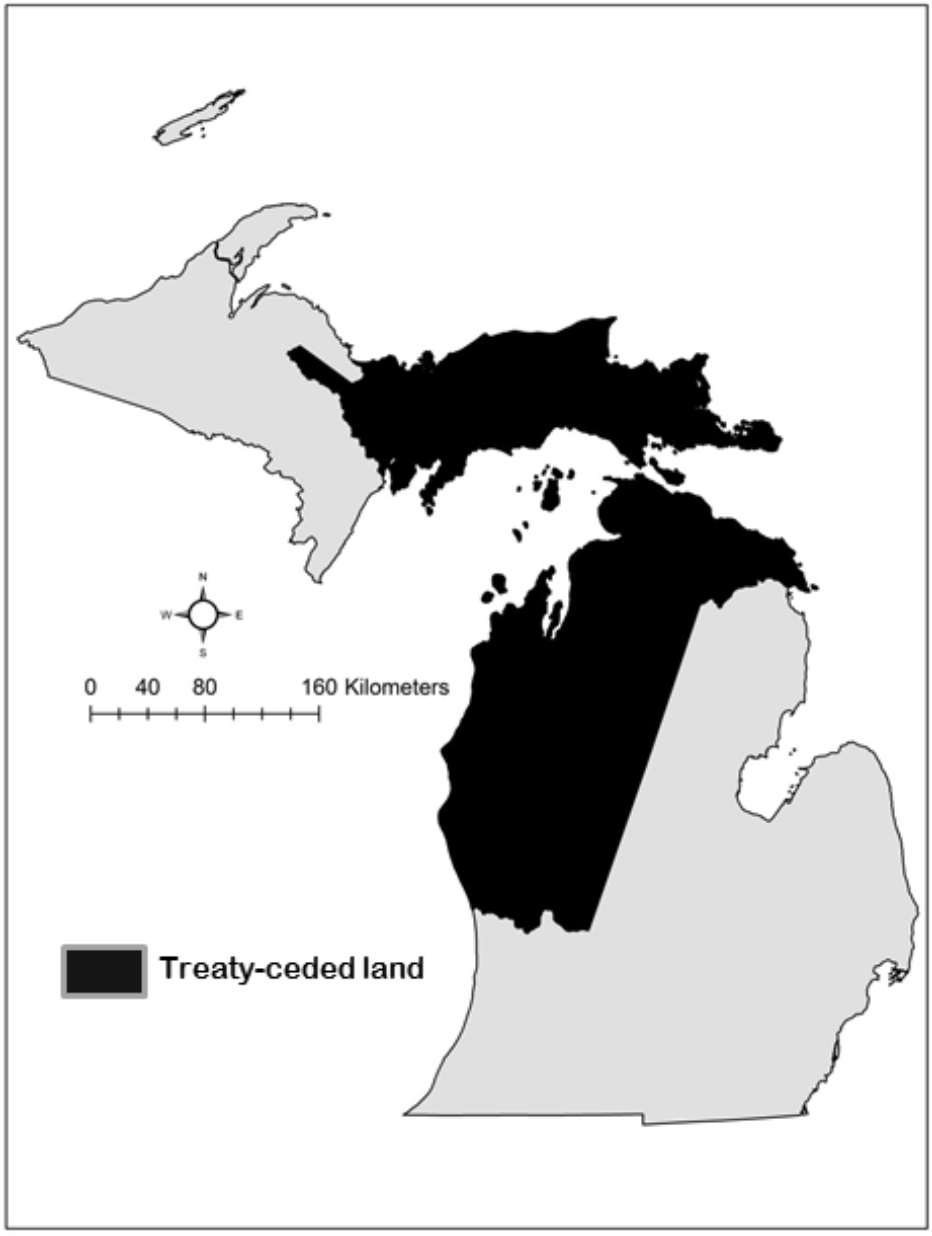

Figure 3.1. Inland portion of the 1836 Treaty of Washington ceded territory (excluding Great Lakes boundary).

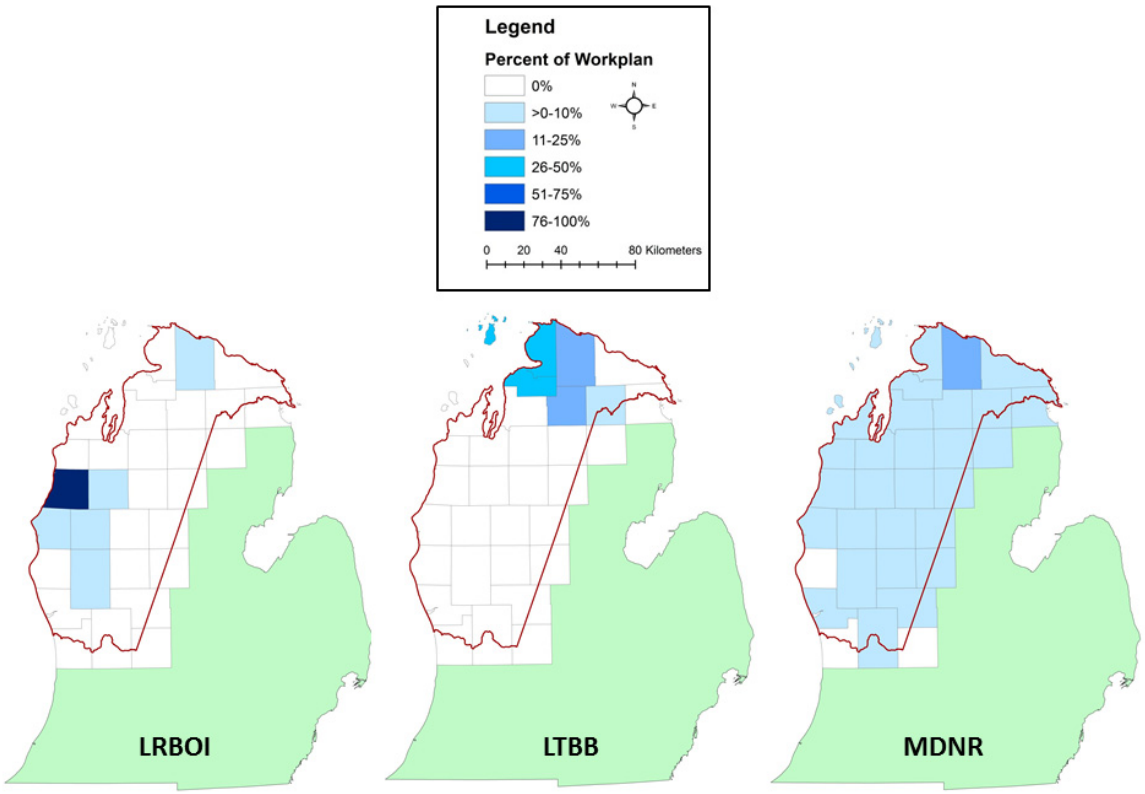

Figure 3.2. Percent inland assessment effort per county by Little River Band of Ottawa Indians (LRBOI), Little Traverse Bay Bands of Odawa Indians (LTBB) and Michigan Department of Natural Resources (MDNR) for the 1836 Treaty ceded lands in the Lower Peninsula of Michigan from 2010-2012.

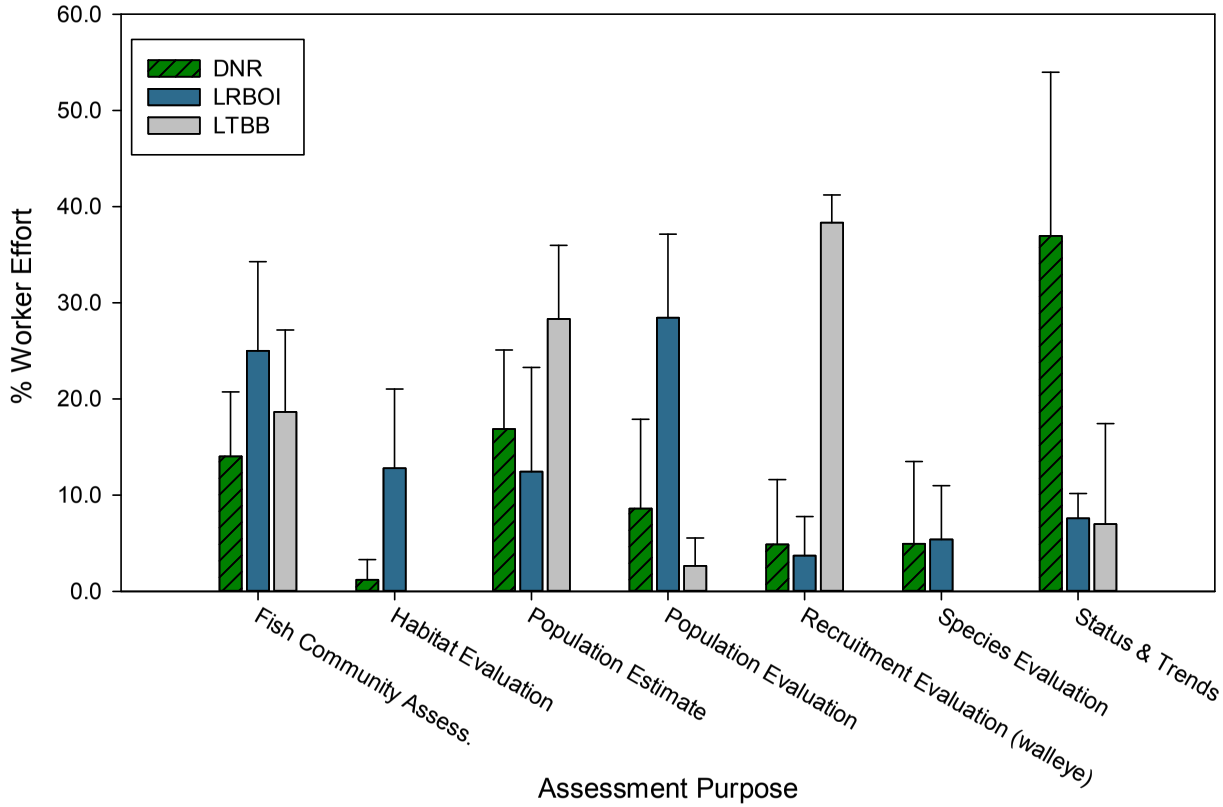

Figure 3.3. Average percent worker effort for specified biological assessment purposes from 2010-2012 by Little River Band of Ottawa Indians (LRBOI), Little Traverse Bay Bands of Odawa Indians (LTBB) and Michigan Department of Natural Resources (DNR). If effort for an activity comprised <4% for all three agencies it was excluded. Error bars represent standard deviations.

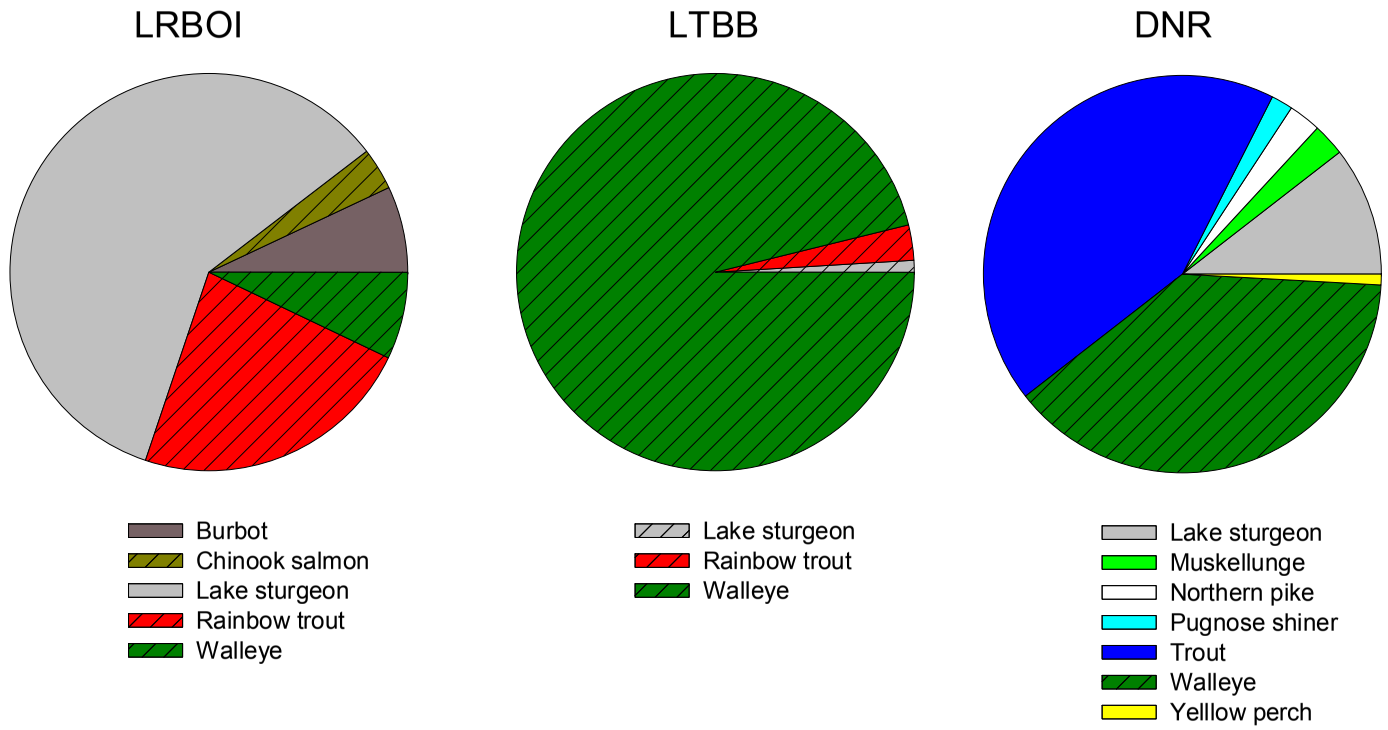

Figure 3.4. Average percent worker effort for specified biological assessment purposes from 2010-2012 by Little River Band of Ottawa Indians (LRBOI), Little Traverse Bay Bands of Odawa Indians (LTBB) and Michigan Department of Natural Resources (DNR). If effort for an activity comprised <4% for all three agencies it was excluded. Error bars represent standard deviations.

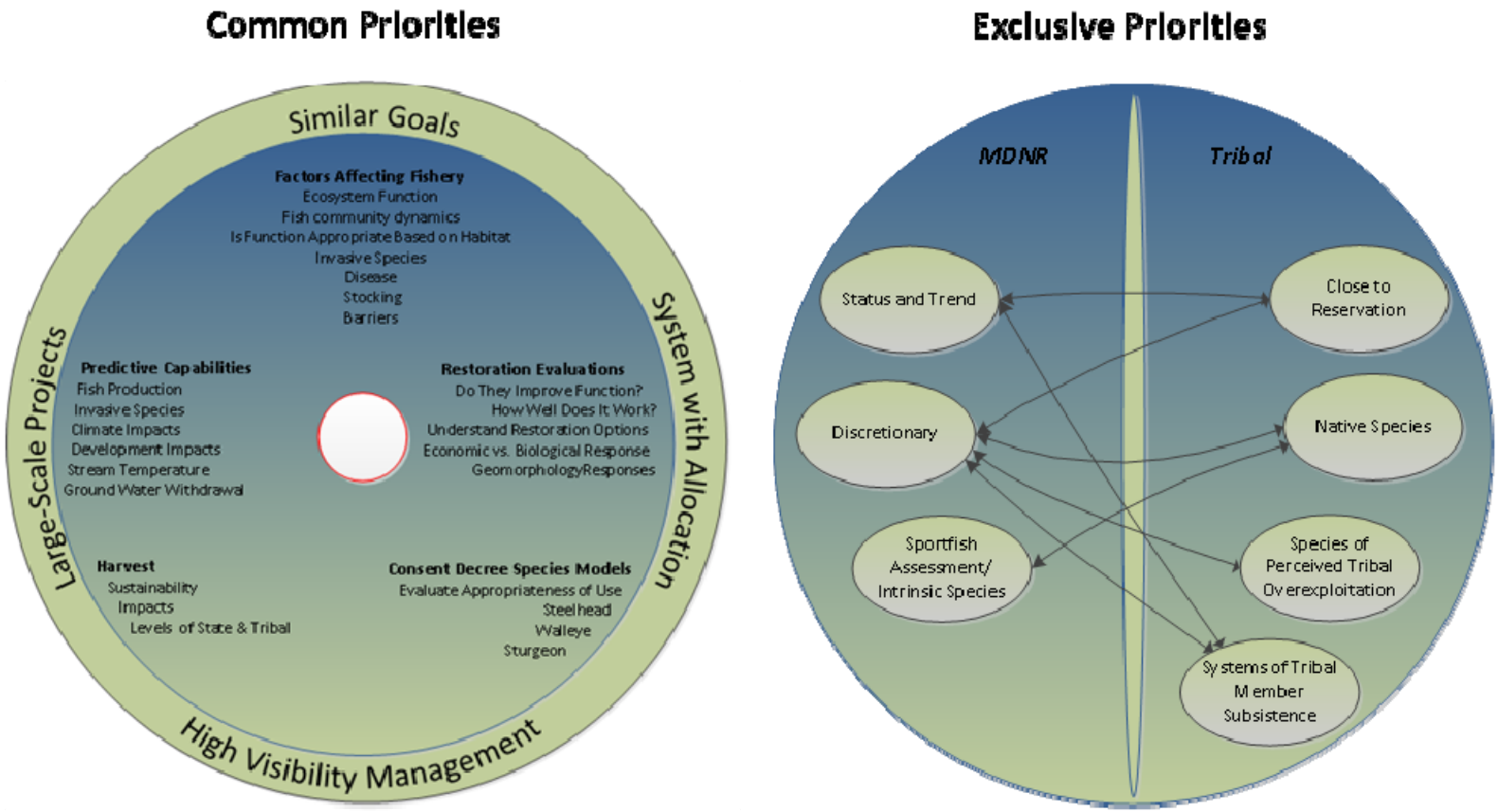

Figure 3.5. Average percent worker effort for species assessments by Little River Band of Ottawa Indians (LRBOI), Little Traverse Bay Bands of Odawa Indians (LTBB) and Michigan Department of Natural Resources (DNR) during 2010-2012. Patterned pieces represent species assessed because of allocation and exploitation issues.

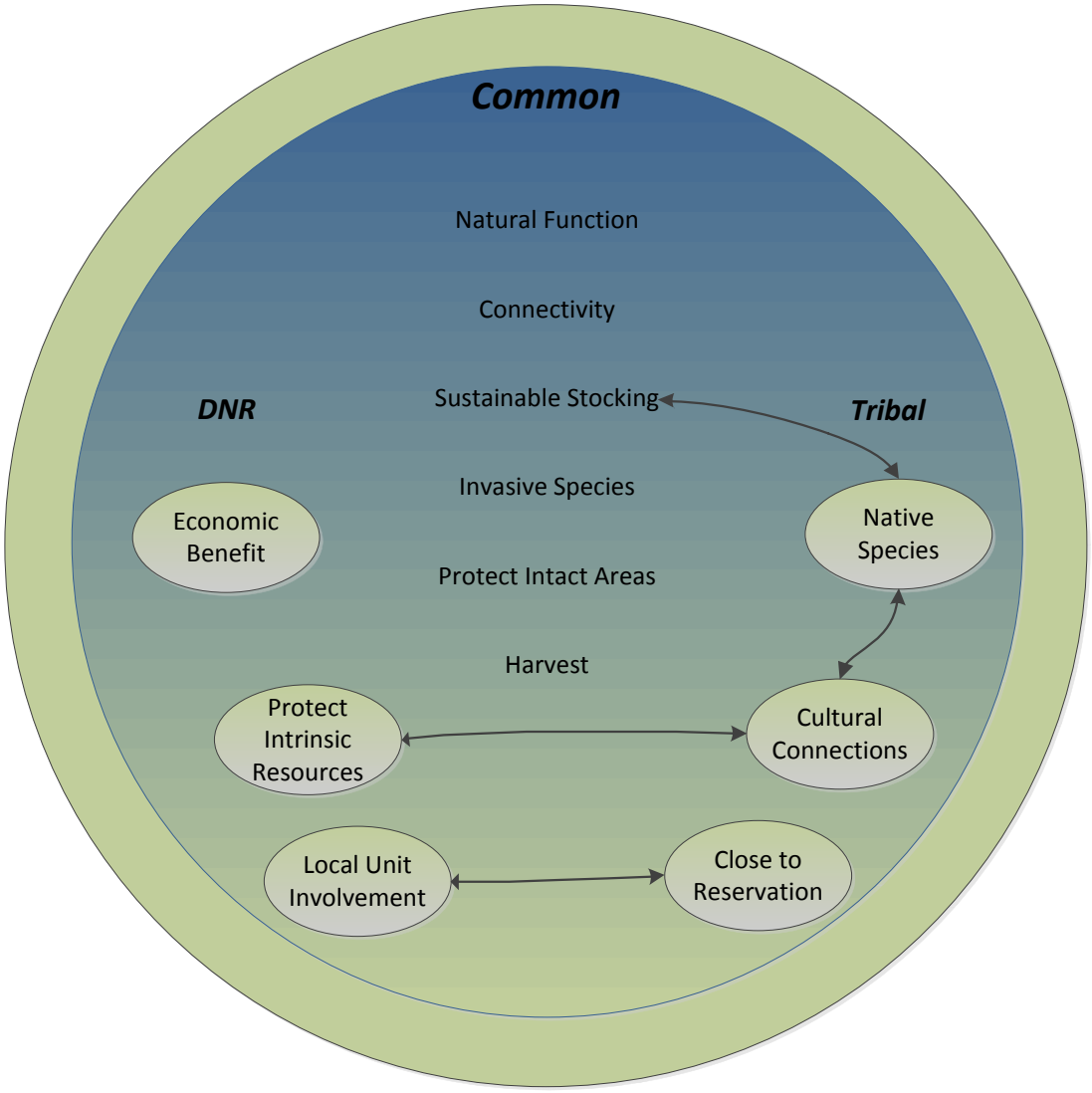

Figure 3.6. Common and exclusive priorities for restoration activities identified by Michigan Department of Natural Resources (DNR) and tribal participants. Connecting lines illustrate potential beneficial collaboration.

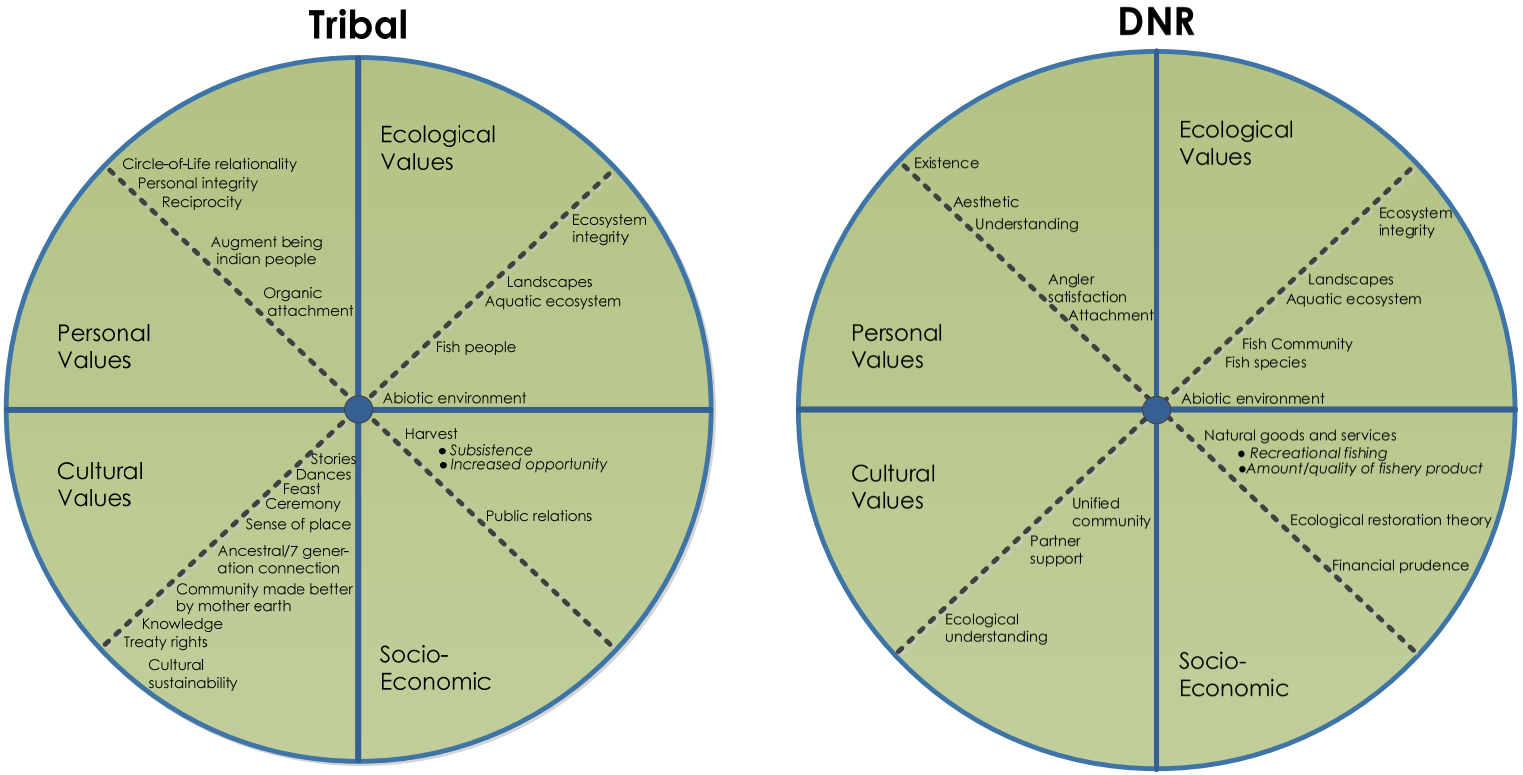

Figure 3.7. Typologies of restoration values described by Michigan DNR and tribal participants displayed using a four quadrant model as modified from Clewell and Aronson (2007).

Table 3.1. Purpose and descriptions of select biological assessment in Michigan DNR and tribal work plans.

Assessment Purpose	Description
Fish Community Assessment	Discretionary survey to assess fish community, relative abundance, size structure and growth.
Habitat Evaluation	Survey to assess habitat and may include channel morphology, substrate, aquatic vegetation and woody debris.
Large Lake Surveys	Spring survey on lakes >1,000 acres to estimate fish abundance, growth, and mortality. Usually accompanied by creel survey.
Population Estimates	Survey using mark and recapture methods to estimate fish species abundance.
Recruitment Evaluations	Survey to evaluate young (age-0 or age-1) recruits, majority are fall walleye evaluations.
Species Evaluations	Survey directed towards evaluating a certain fish species, may include information on abundance, recruitment, and behavior.
Status and Trends	Designed to provide information for local and regional management issues and includes data collection for fish (sportfish/non-game), habitat, and water quality. DNR procedures: Stream sites are randomly selected and fixed (subjectively). Random selection occurs in a single year, fixed sites three years on and three years off. Lake sites all randomly selected and stratified based on size. Standardized data collection techniques. Tribal site selection and protocols have been independent of state using discretionary and fixed site selection.
Stocking Evaluations	Lake or stream survey designed to evaluate contribution/survival of stocked fish.

** Descriptions modified from Department of Natural Resources Fisheries Division work plan.*

Table 3.2. Participant priorities for fishery restoration, issues needing addressed, and restoration activities that should be implemented. If a priority was exclusive to DNR or tribal participants it was noted in general priorities with parentheticals.

General Priorities	Specific Problems	RRE Activity
Stream connectivity and fish passage	Unnatural barriers and control structures	Remove/improve barriers if benefit outweighs risks of invasive species. Involvement in dam decommissioning negotiations and permitting*
	Poorly designed road crossings	Improve road crossings-culverts. Consult during permitting of new crossing
Minimize impact of invasive species	Loss of habitat due to invasive species (i.e. zebra mussels, aquatic plants)	Add or improve habitat (specifically spawning and nursery habitat), protect during dam decommissioning
Sustainable stocking practices	Natural reproduction is inadequate to sustain fishery and requires stocking	Address identified problems (sedimentation, erosion, excessive temperature, biotic interactions) to manage sustainably
		Discontinue stocking if habitat is not appropriate for species
(Issue only identified by tribal participants)	Negative impacts of stocking non-native fish on ecosystems and native species	Prioritize native species, decrease non-native stocking
Protect and increase habitat	Degraded riparian habitat that increases water temperature, sediment, erosion and nutrients	Improve riparian areas by collaboration of fisheries programs and forest management division. Comment on forestry compartment reviews.*
		Increase in-stream and lake habitat (i.e. large woody debris),
		To minimize sediment implement appropriate road-stream crossings and bank stabilizations
	Intact quality habitat under risk of degradation due to development and increasing population pressures	Protect from development by purchasing land and commenting on development permits, educate public on importance of natural shorelines with vegetation*
Protect and increase water quantity and quality *(Issue only identified by tribal participants)*	High stream temperatures and inappropriate flows	Decrease unnatural function by removing failing or inappropriate control structures (dams)
	Decreasing water levels	Protect water levels by political action during legislation and water withdrawal proposals
Enhance native species	Tribal participants described how native species were not prioritized highly by DNR and this posed a cultural/ecological risk (see text)	

* State participants expressed how tribes have unique political rights they could exercise.

Table 3.3. Select excerpts from Michigan DNR and tribal employees characterizing successful restoration.

Attributes of Success	State and tribal agency feedback
Accomplished Objectives	*It's important to come up with good objectives before you do the project. It's got to be objective driven, that's what you try to analyze. Did you meet your objectives or not? (DNR4)*
Evaluated for adaptive management	*You set the objective and do assessments…there's things we've done and said it worked or didn't, but you are shooting from the hip, and that's why we do pre- and post-assessment. It's more but better, it makes us be more thoughtful in projects we want to do, and more honest with what happens (DNR12)*
	One that's evaluated. If it's not it's not successful in my mind…if you realize it didn't work don't spend more money doing it that way. (DNR3)
Observed positive ecological response	*If I have data showing a [fish] population increase…It is easy to look at a restoration project, where pre conditions are a nasty culvert, impounded with a fish passage issue – afterwards a natural channel design and good flow. That doesn't necessarily evaluate an improvement of the biological community. If stream morphology changes, more natural occurrence of habitat, and the stream becomes more stable then I'm happy because the result will probably be better fisheries. (TNE2)*
	To be able to measure its success in following years, a measurable impact. (DNR5)
Quantifiably measurable	*The project significantly enhanced or restored aquatic value and measured not just with pictures. (DNR7)*
	If we are looking at a restoration, have a decent baseline and do post assessment work we would like to determine if it did what it was supposed to. (DNR7)
Visually observable	*You see toward the evening those dots of boats, you know they are fishing boats out there. (DNR8)*
	By getting my canoe in the water and seeing the wild rice...so success, the wild rice is there, it was just amazing and I got goose bumps just thinking about it just knowing I had a small part. (TME4)
Project benefits protected and sustained	*Is it sustainable? You've done well if you have a self-sustaining population you can walk away from and protect through regulation and land use… because you've protected the habitat and critters from over harvest. If you can rehabilitate, stock for a few years to get it rolling, protect it, walk away and just check it once in a while. (DNR1)*
	Habitat restoration that gives fish communities the ability to populate on their own. (TME5)
	If you restore processes to where things take back on their own, an example is reproduction. We would rather have natural reproduction than stocking. A system that takes care of itself and we don't have to stock, that's ideal. If you can back off and it's fine, then you've succeeded. (DNR9)
Cultural connections restored	*There is a cultural component [to wild rice restoration and harvesting] as to why we try to bring it back to this area. All of our stories and some of our traditions…that is really the reason to do that. (TME1)*
	"The restoration has been successful", how are we going to interface? We thought about this with sturgeon, the interface - the dances, ceremonies, feasts. "The resource is back", how do we fit this back into our lives. (TME4)

	It is not just for today but to ensure for the next 7 generations of Indian people have these species to enhance their spiritual connection to mother earth, to appreciate the bounty, and be made better by them. (TME5)
Ensuring 'Existence-intrinsic value' fish	*Only ten percent of our public hunts or fishes so you need to engage others who focus on aesthetics or non-consumptive uses of fish and wildlife. They want to see big fish or a sucker run. Existence value is a unique and interesting concept that has huge implications. (DNR2)*
	Our work gets paid for by anglers, so it's a fine line of doing projects that have some use for anglers, but not only anglers, it's non-game fish that we've kind of overlooked. I don't want to just say its total success if an anglers happy. (DNR9)
Harvest opportunities	*If you've protected that resource and provide fairly reasonable expectations for [fishing] opportunity. (DNR1)*
	Have you increased your membership's ability to access that resource? All these rights we argued are predicated on a subsistence right and this is the Usual Right of Occupancy for our people to access these resources. (TNE4)
Partner-public 'Buy-in' and fostering of relationships	*When I see a project with different groups cooperating…all these people that contributed something, because they believed it was doing something beneficial for the community. (DNR3)*
	Value in terms of community relations, it gives the Tribe more credibility...so this is a good mechanism to foster that relationship of positive resource work. (TNE2)
	Community support and buy-in has grown so much now that the sturgeon are starting to come up we receive calls from citizens in the community saying ,"We are seeing sturgeon at this location" and that really helps when we have community buy-in because it helps move initiatives forward. (TME6)

Chapter 4[3]. Co-management was a word you just didn't say: Forming an equitable state/tribal co-management institution

During the 1970's Tribal Treaty rights in the Pacific Northwest of the United States were reaffirmed in court cases resulting in The Boldt Decision, which initiated the co-management pairing of tribal and state agencies (Dale 1989). Of all possible co-management arrangements that of indigenous and state groups may be one of the most difficult because of profoundly different values, worldviews, knowledge systems and underlying risks to indigenous people over resource use (Berkes 2009). Further, indigenous/state co-management institutions in North America have navigated through a history of conflict, resistance and dispute beginning with colonial inequities to modern legal agreements based on claims of rights and natural resource conflict (Silvern 1999; Castro and Nielsen 2001, Holm et al. 2003). However, through these difficulties, legal agreements that specify natural resource rights and obligations continue to develop and be clarified.

Unique Co-management Needs

No collectively accepted definition of co-management exists (Armitage et al. 2007) because of the institutional "continuum of co-management arrangements" (Notske 1995). However, the term often is applied to a centralized government and stakeholders partnering, through institution building, with some degree of sharing of rights and responsibility (Castro and Nielsen 2001; Ryan and Plummer 2004). We define the term

[3] Submitted for publication in the journal Society & Natural Resources

"institution" as the rules used to informally and formally structure interaction (Ostrom 1990, 2005). In the United States the more than 500 Federally recognized indigenous groups are termed "tribes" and possess different rules for institution building than other groups often termed as stakeholders; thus when current global co-management terminology is applied to tribes it often lacks clarity. For instance, indigenous people are described through at least three criteria (local, user group or community) with terminologies including stakeholders, partners, indigenous communal systems, indigenous peoples and governments (Corntassel 2003; Plummer and FitzGibbon 2004; Lackey 2005; Ohlson 2008). Berkes and Henley (1997) recognize legal agreements as an important distinction because it stipulates rights, responsibilities, and obligations. Therefore, although these terms describing indigenous people may seem incidental, the ambiguity in usage may diminish the importance of legal rights. Jentoft (2003) articulates how terms such as stakeholder do not adequately characterize indigenous groups because it "admits no levels, or degrees of rights" and compartmentalizes them into "general public". It is well recognized that to tribes the right to manage their own needs and affairs through treaty rights and as sovereign nations is a necessity (Bohensky and Maru 2011; Nesper 2012).

Legal rights denote power sharing and their arrangements establish participants, process, and responsibility (Dale 1989; Pinkerton 1992); an important basis for natural resource rights agreements amongst federal, state and tribal governments in the United States. Power and authority, shared or held, is recognized as a critical component needed to be understood and considered when formalizing co-management institutions because it can serve as a "constructive" or "destructive" source (Jentoft 2007). Plummer and

FitzGibbon (2004) propose a multi-dimensional definition for co-management using power sharing, process and representation as the three dimensions where the centralized government lies as the unifying linkage. In the case of US legal agreements, tribes and state co-management institutions often possess all of the attributes, albeit with varying levels, of power (Information exchange, advisory committees, management boards) and process (Informal to formal institutional and operational) with mandated and optional representation. Pinkerton (1989) proposed seven joint co-management functions and similarly the state/tribal institutions in the US to varying extents possess the seven components of institutional and operational power sharing which theoretically provides equitable management arrangements.

No one-size-fits-all model exists for developing successful co-management institutions and recently a point of convergence seems to exist on the importance of tailoring flexible arrangements to the context of the specific case which considers the history, knowledge systems and affected communities (Gray 1985; Ostrom 1990; Armitage et al. 2009). Accordingly, any new arrangement should be adaptable and viewed as an iterative learning process with constant adjustments and revisioning based on changing socio-ecological conditions (Armitage et al. 2007). As the relationship matures (where trust, legitimacy, and success develops) the arrangement will and should take on different adaptive characteristics. Berkes et al. (2007) poses progressive stages of co-management arrangements where "Different maturity stages of co-management can be identified in terms of the degree of power sharing, shifts in worldview, rules and norms, the building of trust and respect, and the elaboration of network arrangements." There are many strategies proposed to work towards mature management and largely focus on

social learning where institutions are transformed into “learning systems”, “learning communities” and “communities of practice” (Berkes 2009). Many authors have suggested a lack of understanding and social learning between many state and indigenous groups while calling this a great need because the groups do not have cohesive social systems because of different culturally derived schema and the inability to find common ground (Natcher 2005, Lerma 2012).

In order to fit a specific co-management arrangement it is important for the agencies to understand the multi-cultural group attributes; who to involve, diverse needs, the perceived difficulties faced in the relationship and the respective indicators of success (Ostrom 1990; Chomopalov and Shrum 1999; Plummer and FitzGibbon 2004; Berkes 2009). Specific group needs and perceived attributes of success in terms of the arrangement and individual goals and objectives are often unknown variables but are a recognized initial step for guiding collaborating agencies towards a common understanding of issues (Willard and Norchi 1993; Chompalov and Shrum 1999). There are many pitfalls for the states and tribes and revealing specific difficulties and impairments present within the relationship can provide a starting point for discussions on how to work through these issues. Further, by finding what each agency views as ideal in a relationship it may position them to find common values and ways to meet each other’s needs that may benefit both.

Case Study and Methods

The focus of this paper concerns a recent natural resources legal agreement, the 2007 Inland Consent Decree (’07 Decree), which deals with the inland portion of the

geographic area of the 1836 Treaty of Washington (District of Columbia) Ceded Territory. This territory encompasses approximately 1/3 of the land and waters in what is now the State of Michigan. The signatory parties included five Native American tribes (tribes); the Bay Mills Indian Community, Grand Traverse Band of Ottawa and Chippewa Indians, Little River Band of Ottawa Indians, Little Traverse Bay Bands of Odawa Indians, Sault Ste. Marie Tribe of Chippewa Indians, the State of Michigan (SOM) and the United States (US). Litigation initiated when the SOM filed a claim to resolve whether the tribes 1836 Treaty continued to exist thus questioning their right to hunt, fish and gather. The parties negotiated a settlement rather than have a court determine the extent of the Treaty right and after two years of difficult discussions an agreement was reached and deemed, "fair and equitable" (File No. 2: 73 CV 26). The '07 Decree establish co-management through formal information exchange, consultation, committees and management boards, as well as opportunities for the parties to partner on biological assessments (Section XXI. Assessment Activities) and restoration, reclamation and enhancement (Section XXII. Restoration, Reclamation, and Enhancement Projects). For the purpose of this case the term co-management is used as government to government relations of the SOM and tribes.

This research was initiated after discussion with leaders from the SOM and tribes who recognized an opportunity *to form a "new history*" and *work together to protect the fishery resource*. Further, they recognized the large cultural distance which existed and desired to more fully understand each other, including 1) the cultural differences, 2) agency priorities for fishery management, and 3) needs for successful co-management. We focus here on the third component, co-management, with the objectives to: (a)

describe benefits of working together, (b) identify and assess difficulties and (c) describe the ideal relationship as expressed by the agency participants.

We used a qualitative strategy to gather interview data from 26 participants during 2009 and 2010. Twelve tribal agency employees were interviewed (three participants from one tribe were interviewed together); two Ogema's (chairperson's), two Natural Resource Directors, three biologists, three technicians, and two legal counselors. All tribal employee participants were tribal members (TME) except for four non-tribal members (TNE) which included all biologists and one legal counselor. The 14 state Department of Natural Resources (DNR) fisheries division participants included the fisheries chief, four section coordinators, a research biology manager, three unit managers, and five biologists. The participant list was developed purposively with "key informants" (Weiss 1995) to represent all institutional scales yet reduce the population of participants. Informants were selected based on their position in influencing '07 Decree implementation. For tribal agencies elders were valued as key knowledge holders and informants (Hart 2010).

Because of the multicultural participant pool, two research paradigms were present (western and indigenous), and we attempted to incorporate methods respectful of both and supported by the individual participant. Accordingly, each participant selected location, setting and preferred time for interviews. This gave participants a partnership in the research, a culturally appropriate and personally comfortable setting, where a knowledge relationship could be formed. Specifically for the indigenous participants the sharing of knowledge could be culturally positioned in the context of time, place and how

they related to the ideas being shared (Wilson 2008). Tribal member interviews were held in differing locales and times including around a fire at night after a smudge ceremony, a tribal community center, and at offices during work hours. DNR interviews were held at offices and libraries during work hours.

Semi-structured interviews with open-ended questions were conducted and lasted between 35 to 90 minutes. An interview guide was used to ensure each interview focused on comparable topics. Probes were used to elucidate further detail on particular topics and for clarification. Participants were also encouraged to share topics not covered in the interview guide and provide information from their associations with the topic covered.

All interviews were recorded, transcribed and imported into NVIVO© qualitative data analysis software where narratives were sorted and coded. To authenticate the concepts described in this research we continued communication with many participants and collaboratively analyzed the ideas in group settings and one-on-one. The emergent themes from this study are often supported with quotations and excerpts from within the interviews, to present a commonly held view of multiple participants. The quotations describe themes and were intended to keep ideas grounded within their context (and relationship) with other ideas. We also provide quotations to present parts of stories and metaphors commonly used and critical within indigenous discourse (Wilson 2008).

Results

A) Benefits of Collaboration

Collaboration was viewed as essential by participants in part because no single agency could manage the fishery resource alone due to the large spatial scale, inadequate financial resources, decreased employee numbers and varied agency and constituent needs and desires. To describe the benefits of co-management participants used ecological, institutional, and social themes (Figure 4.1).

A1) Ecological Benefits. The ecological benefit was described as *greater protection through enhanced management* (Figure 4.1) because participants believed group heterogeneity, diverse perspectives and co-production of knowledge would strengthen strategic planning and broaden goals while improving efficiency. Tribal participants identified how applying indigenous knowledge was needed:

> *I think non-tribal people should work as much as possible with the tribes to understand how the tradition and spiritual parts tie-in to the natural resources they work on because it has importance to why it was in such good shape a long time ago. (TME3)*

DNR administrators believed because tribes had unique legal standing during federal and state permitting it could increase environmental protection; specifically for water diversion, control structures (dams), land development, and habitat protection. For greater management efficiency participants identified that they could collectively consider issues rather than confront each other after completion of policy positions and stall an initiative designed to improve the natural resources.

A2) Institutional Benefits. A*ccomplish more with better results* (Figure 4.1) largely explained how pooling human and financial capital could increase work accomplished and agency understanding of the fishery.

> *When I look at the Inland Decree, working with five new natural resource departments or new to us, … it's a win-win, we're getting a survey done that otherwise may not have, and then you've got someone from their department maybe being out on water that they've never been on, learning about the resource. (DNR9)*

Increased and pooled capital were mechanisms identified as being essential to better productivity. Increased capital was described as an agency independently accomplishing projects or acquiring funding while pooled capital was physically working together on biological assessments or restoration projects and combining funding especially on larger spatial and temporal scale projects. Additionally, participants recognized how broader assessment activities and restoration projects would occur because DNR often focused on recreational (often non-native) sport fish while tribal agencies on native species.

Participants shared how the fishery could be understood more completely with improved and innovative techniques because they could learn from each other by sharing ideas and experiences.

> *Every time we do something with a different agency we have learned a better technique or easier way of doing something. (TME7)*

Although DNRs did not specifically identify increased cultural perspectives as a benefit (and tribal participants did) all agencies valued the addition of outside experiences to improve survey techniques and protocols because of more robust scientific interpretations. Participants also identified economic benefits through diverse funding sources and increased leverage on grants.

A3) Social Benefit. A good relationship with a collective identity between the DNR and the tribes founded on trust and cultural understanding was the basis for *social benefit*. Most participants believed trust could increase agreement in decision making. All biologists agreed collaboration could help forge personal relationships and lead to viewing each other as legitimate professionals and colleagues. Another shared benefit was improved community relations; tribal biologists particularly believed collaboration fostered positive public perceptions of tribes as credible managers thus increasing buy-in and reducing conflict for tribal biological staff during assessments and tribal members during harvest activities. DNR participants cited reduced social conflict and decreases in phone calls and questions regarding tribal activities.

> *Coordinating with the state or other tribes helps public buy-in because when you do a large-scale fishery project, people are interested what you are doing in their backyard. Having the DNR boat alongside yours can make a big difference in how they view the work. (TNE4)*

> *Big issues that are all of a sudden in the public, I think that's where coordination's important. Where it doesn't look like one party or the other…because they're going to be asking and interested in what each side is*

doing. (DNR9)

B) Co-management Difficulties

Strong negative terms were used by the DNR and tribes; "bitterness", "guarded", "distrust", "critical", "bad feelings", "egos" and "ownership" when describing their current relationship (Figure 4.2). These terms were attributed to prior legal negotiations and poor communication.

B1) Affects from Legal Negotiations. A difference between DNR and tribal participants was how prior negotiations (Great Lakes and '07 Decree) influenced their relationships. Most DNR participants did not express negative negotiation effects directly from the negotiations while tribal participants unanimously described strong negative experiences and believed it produced limited and guarded communication.

I see a limiting factor right now residual from the '07 Decree negotiations hindering communication and discourse among the agencies and that is just the simple bitter anger related to the view we gave up these or capitulated on that, and this is all agencies. It is extreme in terms of reactions. Instead of trying to find middle ground and openly communicating, and working and seeing the positive there is, "We are going to get you for this" and "So you did that so we are going to do this." Wounds are still fresh and raw. (TNE2)

It was hard for me to sit in those meetings and have to listen to all the things said to take away our right and most were social issues that drove it and that was the hard part to take. (TME3)

Specifically tribal participants perceived state resistance to co-management during (and after) negotiations as "primacy" and "superiority".

> *We have partners in the state that really believe in the co-management concept of the tribe but there are also that portion we haven't gotten buy-in from yet and it is important because if we don't we are constantly going to fight. We will be self-defeating. (TME6)*

> *Co-management was a word you just didn't say, some individuals and groups are still angry and bitter. (TNE1)*

Only three DNR participants had been heavily involved in negotiations and one recognized the animosity produced by "not wanting to lose to the other side". (DNR9) DNR unit managers and biologists who had not been involved in the '07 Decree described how it had led to poor communication and misunderstanding internally and with the tribes.

> *I can't [describe how we work with tribes] because other than my few meetings with the [DNR] Tribal Coordination Team it seems like it is way above me and this angers me…I don't see us being heavily involved. We are told "We represent you guys, but I don't know if I feel it yet. (DNR11)*

B2) Poor Communication. For many participants the reluctance to collaborate stemmed from poor communication after '07 Decree implementation, specifically "lack of face to face interaction" which had perpetuated unfamiliarity with each other and lack of trust. Communication was often regarded as the "number one"

area for improvement by DNR participants while most all participants described communications as "guarded", with a "natural hesitancy". A few tribal participants described how social, cultural and political motives behind DNR management decisions were not discussed openly. Tribal participants also believed the DNR often withheld information unless formally requested which necessitated the tribes needing to know exactly what information to request and the process to do so. Both DNR and tribal participants identified a lack of interaction among tribal and local DNR management units, including during work planning and development of DNR management plans. A DNR participant acknowledged how internal protocols directed tribal communications to specific key DNR staff therefore bypassing local units and reducing interactions.

Poor communication likely resulted in at least four shared difficulties illustrated in Figure 4.2; condescending views, protectiveness and egos, distrust of data, biology not at the forefront during scientific discussions and unfamiliarity with the others motives and views. Condescending views were described by tribal participants as not being viewed as equals by DNR workers. A tribal biologist described hearing rumors how tribes were viewed as "freeloaders" by DNR employees and called it unprofessional and closed minded while another described the general DNR attitude as a "culture or mentality" of being above the tribes. A tribal policy administrator gave the example of how a tribal chairman may go to a meeting and no one of their position (such as DNR director or state governor) would be present. A DNR biologist believed the tribes possessed these attitudes as well because they were often questioning DNR data and the biologist suggested the tribes

shouldn't be critical of "stuff they are not fully immersed or involved in." (DNR11)

Participants recognized how certain employees had egos driven by personal agendas and led to "protectiveness", "unwillingness to open up", "arrogance" and "ownership". Tribal participants perceived hesitancy by DNR biologists to engage in co-management; this idea was supported by some DNR administrators:

> *For the longest time we thought we were the people managing for the State of Michigan, that's starting to change with the tribes getting organized and us noticing that other people are managing as well. (DNR9)*

> *In anything there can be ownership. I think Unit Managers have no right to take ownership of the resource but they do…but I expect Tribal governments take ownership of their areas too, it is a natural thing. (DNR5)*

Poor inter-tribal coordination and disagreement was commonly viewed as one of the biggest problems.

> *I still am very frustrated that the tribes although they are five independent sovereigns, cannot coalesce on issues. (DNR1)*

There was widespread recognition on how inter-tribal and DNR/tribal relations slowed decision making. Many DNR participants suggested this occurred because of the complex multi-agency (5 tribal sovereigns) governance structure and the lack of decision making authority by tribal biologists at meetings. Numerous DNR and tribal biologists expressed that biology was often not at forefront of decision making but inter-twined with social and political pressures that "pigeon-

holed" science based discussions.

Finally, tribal participants emphasized how the DNR's western ideologies were narrow and lacked the broadness of native perspectives.

> *People don't look from the native perspective - the traditions and spiritual aspects of those tie into how you should manage. When it comes to management people with degrees [biologists] tend to look from institutional [perspectives], that is why it is important to talk to old folks that may not have graduated from high school but have lived a life. (TME3)*

> *The analytic part, data collection, information, they are trying to enter into other realms with an incomplete set of information gained from only one way of looking at the world. (TME4)*

C) Ideal Relationship and Needs

In describing the ideal relationship many participants said they desired mutually beneficial collaboration and believed it could be founded in trusting and respectful relationships (Figure 4.3). The ideal relationship would be to "engage" each other through "open" and "transparent" dialogue with a willingness to "share" ideas (bottom box in Figure 4.3). Personal relationships between individual DNR and tribal workers at varying levels were ubiquitously mentioned as critical. Although a few participants described how a successful ideal outcome would be building "a history of striving for consensus" and establishing legitimacy it was more so building buy-in and striving for understanding rather than consensus which was

often viewed as unrealistic. Voluntary collaboration, understanding of goals, legitimacy, and equitable and efficient decision making (Figure 4.3) were the main themes when describing the ideal relationship; the latter seen as achievable only with the first three established.

Voluntary Collaboration. Ideal collaboration was considered voluntary where communications "just happened". Two biologists independently recounted how this had occurred in their relationship, first is the tribal member the second is the DNR worker.

> *The relationship I established with the local biologist is ideal. I can call him up, personally and we just talk…that kind of relationship is key because then you're just people, the egos, all the politics goes out the window… and from that a tremendous amount of respect built and collaboration naturally evolves. The fact I could walk in his office and dig into his files or ask to see his work plan, that is what needs to happen and the way I did it was the day he was hired I drove to his office and took him on a tour of the area and showed him projects I was working on, the key natural features and the values of them and we talked about tribal stuff. (TME1)*

> *It's tough for me to describe. I've never been told to do that [meet with tribal biologists]. We would meet informally and say, "These are surveys I'm planning." For the '07 Decree I don't know what the standard is because we just have done it. (DNR7)*

Biologists emphasized coordinating work plans and discussing management issues locally without intermediaries, so that relationships would not be altered by politics. Joint meeting attendance, was recommended as a tool to "allow wounds to heal" and form equitable scientific relationships where ideas could be shared and expertise expanded. Tribal biologists suggested integrating tribal employees into statewide meetings so they could communicate their findings, hear statewide information, and be involved in decision making. Inter-agency biologists desired co-participation during public meetings, especially where issues of mutual interest were present because of the expanded expertise and demonstration of agency solidarity to the public. One DNR biologist suggested developing a method for coordinating attendance between the state and tribal biologists while another suggestion was to establish working groups to facilitate relationship building with clear goals and deliverables to meet management purposes.

Understand Goals. In order to identify where and how to coordinate participants' recognized understanding common goals was essential.

> *I can't make assumptions my priorities are the tribes' and vice a versa, certainly coming from different perspectives. Common sense suggests we have common management goals. It starts with identifying goals and objectives and things we want to do and determine the commonalities that exist and if we find common areas we can pool resources and coordinate. (DNR12)*

Many participants described how exclusive agency goals were important to understand

because it may help other agencies achieve their goals too. Another ideal was understanding broad goals ("at the policy-making level") so agreement on management issues could develop.

Participants recognizing they didn't know each other's goals but believed the expectant differences were derived by such attributes as "values", "issues of concern" and "culture and spirituality". They suggested the need to show "total openness" and "transparency in terms of where each agency wants to go with management." Because of the lack of understanding for any of the goal deriving attributes participants suggested developing an initial pilot project where a common goal seemed to exist in order to guide collaboration towards common goals where data would be jointly collected, analyzed and presented. One state participant suggested, "pick an initiative and work through", others suggested selecting small projects focused on "just getting through it" and as relationships developed the scale and agencies involved could increase, as well as, learning each other's values.

Legitimacy and Respect. Ideally participants wanted to be equals (legitimate and credible managers), have respect for each other's knowledge, cultural, and management views, and work product. Participants frequently mentioned importance of trust and respect.

> *All five Tribes would sit at the table as equals looking out for the common good of the resource. (TNE1)*

You can't have a working relationship without respecting the person across the table…if you call them in they're going to be there to help and not screw me. (DNR2)

Ideally, they would just be equal with no discussion about the relationship because it just is. It would be natural. (DNR5)

I think 5 to 10 years out it would look like there is recognition across the board that we are co-managers and we are working side-by-side. (DNR4)

For tribal participants co-management meant legitimacy and was vitally important to them, in part, so they could protect treaty rights and participate in a sacred responsibility of reciprocity and balance with the natural world.

In our language we talk about birds, animals, plants and trees as peoples also of their own nations and that we live with these nations; the tree nations, the fish nations, the animal nations, we have to represent their interest…we have always been a part of the natural world and we need to be working together and their rights to live here are no less equal than our rights. (TME4)

Although many state participants recognized legal rights and benefits of tribal co-management some viewed the ideal as maintaining state authority.

There needs to be maintained a distinct separation. The '07 Decree recognizes the state's management authority but that the tribes have management rights and responsibilities, so that distinction always needs to be made, maybe in an

ideal world one hundred years from now there wouldn't be any demarcation or line. (DNR3)

To create legitimacy participants believed they needed to get past feelings of possessiveness and hoped for a time they could "look to each other for answers" based on trusting each other's data and expertise as colleagues.

Equitable and Efficient Decision Making. Efficient decision making was considered ideal by most participants. They described the need to understand political, social, biological and cultural differences through cross-scale learning opportunities.

Most people in the state don't understand tribal management objectives, so discuss the various tribal values and objectives for different natural resources; that would be beneficial. How do we work well with people we live with? We need to understand their culture and we don't…if you understand cultural differences, backgrounds, heritage and reasons then it might give people more empathy or understanding why they [tribes] may be doing what they're doing and that gives us the ability to adjust because that's what we do. (DNRE3)

Some tribal leaders expressed willingness to facilitate exchange of cross-cultural knowledge so state employees would understand their values and the purpose behind certain decisions although they believed this would be difficult to achieve.

Efficiency in policy decisions was believed to occur only if appropriate people attended meetings and where the parties would speak for themselves and not through legal counsel. Many tribal leaders suggested that respect, equality and

legitimacy would increase if high level leaders from all agencies attended and this would increase decision making. Tribal participants recognized inter-tribal agreement could increase efficiency and how they must "come up with a way for the tribes to agree they can do this together." DNR participants described how expedited decision making could occur if tribal biologists were empowered to make biological recommendations during DNR/tribal biologist meetings and suggested this could be accomplished with inter-tribal preparation and agreement prior to meeting with the DNR. As one participant said,

> *If all tribes agree on the general direction and give representatives [biologists] the ability, even a range to negotiate in, to have authority to say "we can do that and don't have to get approval for it." (DNR4)*

DNR and tribal biologists were unified in how biological work groups should be established where high level policy makers would not attend, and political issues would be directed elsewhere. They also expressed a desire for timeliness and completeness in information sharing where parties would not wait until deadlines and all related information would be provided, even if not specifically requested.

Discussion

A key to successful co-management is understood to be when group members are valued and their contributions recognized by the other members (Rettig et al. 1989). In our investigation participants recognized the value of DNR/tribal partnering in fishery management which stands as evidence that even after turbulent and

adversarial shared histories hope can remain for conflict resolution and cooperation towards common goals. Another important recognition was how successful collaboration depended upon negotiating equitable social and environmental relationships which supports the idea that social learning is important to environmental action (Ryan and FitzGibbon 2007). This was defined clearly by participants when they contextualized how the ideal multi-agency relationship was built upon interpersonal attributes of trust, respect and legitimacy (Figure 4.1) and how this would lead to socio-ecological benefits (Figure 4.3).

Participants described how inter-personal and agency relationships needed to be transformed from uncertainty to resilience where there is a sense of effectiveness in collaboration and decision making. The route to this ideal was described through forming voluntary cross-scale social networks that would bond group members through personal relationships, joint ventures and alliances, formalized meeting attendance and cultural/social learning activities; these are attributes found in collaborative governance models (Chompalov and Shrum 1999, Brummel 2012). As in other state/indigenous co-management arrangements stability was viewed as critical where there was consistent respect for each other's worldviews, norms and values (Armitage et al. 2007) while forming a history of striving for understanding and respecting each other's management perspectives while adjusting to long-term socio-ecological disturbances.

Ideal attributes described in this case are recognized within the co-management literature and particularly important for indigenous/state co-

management arrangements; sharing of power and responsibility, building equitable institutions, trust and legitimacy, and developing processes that adapt with problem solving and social learning (Berkes 2007, 2009). However, this study shows how ideals, when juxtaposed were similar to what were viewed as barriers, and represent significant areas of work. For instance the four categories we observed for the ideal relationship were *voluntary collaboration*, *understanding and sharing goals*, *legitimacy*, and *equitable and efficient decision making*. These could be reworked to characterize how participants described barriers; *involuntary (mandatory) collaboration*, *misunderstanding and disagreement of goals*, *lack of legitimacy* and *inequitable decision making with asymmetric power*. This juxtaposition suggests that to understand either favorable conditions or barriers in a co-management arrangement the unique historical context through which the institution was formed must be considered (Gray 1985). As an example it has been suggested, and observed, that favorable conditions for co-management are through mandates (i.e. legally binding with defined rights (legitimacy)) and developed out of crisis or rights claims (Pinkerton 1989); although it has been dually noted battles and resistance also occur (Pinkerton 1992).

In this case some participants, especially tribal, believed that '07 Decree mandates had decreased their legitimacy and hindered inter- and intra-agency communication. Further, a few TME participants described how the '07 Decree did not mesh with their "native sensibilities" because of its contextualization in western scientific and political sensibilities, and it did not use their meanings or understandings because it was written in the English language rather than their own,

and was steeped in a foreign, hegemonic, legal system. This cultural incongruence has been observed in many other state/indigenous cases as well (Wilson 2008; Weiss et al. 2012; Watson 2013). Therefore, although the '07 Decree had recognized co-management rights some tribal participants viewed the legal arrangement as having defined the extent of tribal rights (i.e. harvest opportunities and regulations) and not those of the DNR (although DNR abilities were also impacted). This example illustrates how although legal agreements have certain advantages the limitations posed by the agreements may initiate attitudes of self-defense and fighting against hegemonic control.

We would argue that the '07 Decree parties largely owe the barriers directly to the negotiation and colonial histories; thus magnifying feelings of ownership, the struggle to co-manage, inadequacy of cultural understanding and sensitivity, poor communication and ulterior motives. It seems important to note that these barriers persisted even after thousands of hours of negotiations and face-to-face meetings demonstrating that even though learning likely occurred during these interactions it didn't guarantee understanding, acceptance or adaptability towards co-management or equitable interactions. Interestingly, the perception of power differentials and inequality produced by the '07 Decree was also described by a few DNR biologists who acknowledged intra-agency struggles and poor communication and less control at the local unit level.

Agencies have been found to respond to negative or positive historical experiences by passing on to new employees certain beliefs, values and norms

(Halvorsen 2006) which may interfere with improving relationships and perpetuate old ones. Further, most of the barriers recognized by other researchers are present in this case. In Table 4.1 we suggest the nature of these barriers through five categories, give specific descriptions and identify if recognized by both DNR and Tribal agency participants. The barriers appear to be largely based upon a cultural distance from their shared history of conflict. Accordingly, the barriers effect perceptions of legitimacy, worldviews and values while ultimately impeding institutional and operational function. Participants from all agencies and institutional levels described how they felt mistrust from the other group(s) and confusion in their relationship; this will be a major obstacle to navigate. A primary barrier identified by tribal participants was pervasive resistance by the DNR towards co-management, to the extent that even the word "co-management" rendered concealed yet strong emotions during interviews. Legitimacy and equality has been recognized as critical to successful co-management and the views of both tribal and DNR participants on the issue of co-management corroborate this belief. A suggestion from Mattes and Kmiecik (2006) seems especially salient to the '07 Decree parties, "Regardless of whether one government is viewed as the primary manager or whether the right is shared, each government must act as a manager because each has its own right and its own responsibility for decisions and actions that affect the shared resources."

Conclusion

The successes and failures of co-management arrangements are believed to be linked to the specific *history* of the case which would suggest the ’07 Decree parties have a momentous task to transform socio-ecological relationships. However, the shared commitment (outside of legal mandates) to collaboratively develop institutional, social, and ecological benefits out of the complex multi-agency arrangement is a strong advantage. Berkes et al. (2007, p. 324) identifies early, middle and mature stages of adaptive co-management and for each of his criterion the ’07 Decree institution would be placed into the early maturity arrangement. If we consider the ideal relationship proposed in this case most of the criterion proposed in Berkes et al. (2007) for a mature relationship were recognized including partnering on common goals, being equals, developing a shared vision, building personal trust and respectful relationships, and facilitating multi-scale communication networks sharing and valuing each other’s knowledge and contributions. The instruments to learning were not often explicitly mentioned, however, applying techniques of transformative learning with iterative reflection can be a good place to start (Mezirow 1997; Armitage et al. 2007). Encouragement comes from examples that exist for similar institutional arrangements where co-management relationships have progressed from early stage (Kofinas et al. 2007; Nesper 2012) as observed following the Boldt Decision (Dale 1989).

Finding and sharing success in the collective action of co-management is critical (Chompalov and Shrum 1999; Hartley and Read 2006) and ’07 Decree participants recognized this in interviews although few successes were shared. This is partially

due to newness of the ’07 Decree but because the tribal and DNR agencies are experiencing institutional transformation co-management may provide opportunities for change (Olsson 2007). Numerous authors have suggested that innovation is necessary for successful co-management of complex socio-ecological systems where a focus is placed on creative thinking and problem solving, development of novel solutions and taking time to reflect on lessons that can be learned (Kofinas et al. 2007). It appears very few of these opportunities have occurred and effort should be expended towards development.

Finally, at the core of successful tribal and DNR co-management is decreasing cultural distance, forming a collective identity and creating opportunities for social learning and cultural understanding where trust and legitimacy can develop at all institutional scales (Natcher et al. 2005). Recently, numerous techniques have been suggested including boundary organizations, knowledge sharing protocols and cultural planning frameworks, practicing “learning-by-doing” or “learning by watching and doing” (Hill et al. 2006; Plummer 2006; White et al. 2008; Wilson 2008; Berkes 2009), and employing multiple learning feedback loops (Plummer 2006). One opportunity participants suggested was identifying a few skilled and committed individuals which could facilitate change towards a mutually rewarding relationship; this strategy has been mentioned by others (Hartley and Read 2006, Armitage et al. 2009) and is consistent with the idea of bridging organizations that work throughout multi-institutional scales to enhance learning, guide innovative problem solving and relationship building. This recognition, that cross-cultural learning where key agency staff and knowledge holders from both

cultures share expertise (Carolan 2006) and work throughout levels of governance and communities, seems of the utmost importance. Continuing this view, Graham (2006) described the idea through a government/stakeholder research arrangement as "Not every scientist or not every fisherman is suitable for cooperative research. It is important, however, that those who are to be linked up." Central to successful co-management is power sharing where the needs of all can be met; even withstanding the different sets of cultural, social, political, economic and ecological values. Understanding these values, and institutionally incorporating them by both partners, is imperative as is committing to structured learning with side-by-side participation during biological meetings and assessments, within communities, at public gatherings and even at sport-fishing tournaments and ceremonies. These interactions must not remain elusive but rather become normative.

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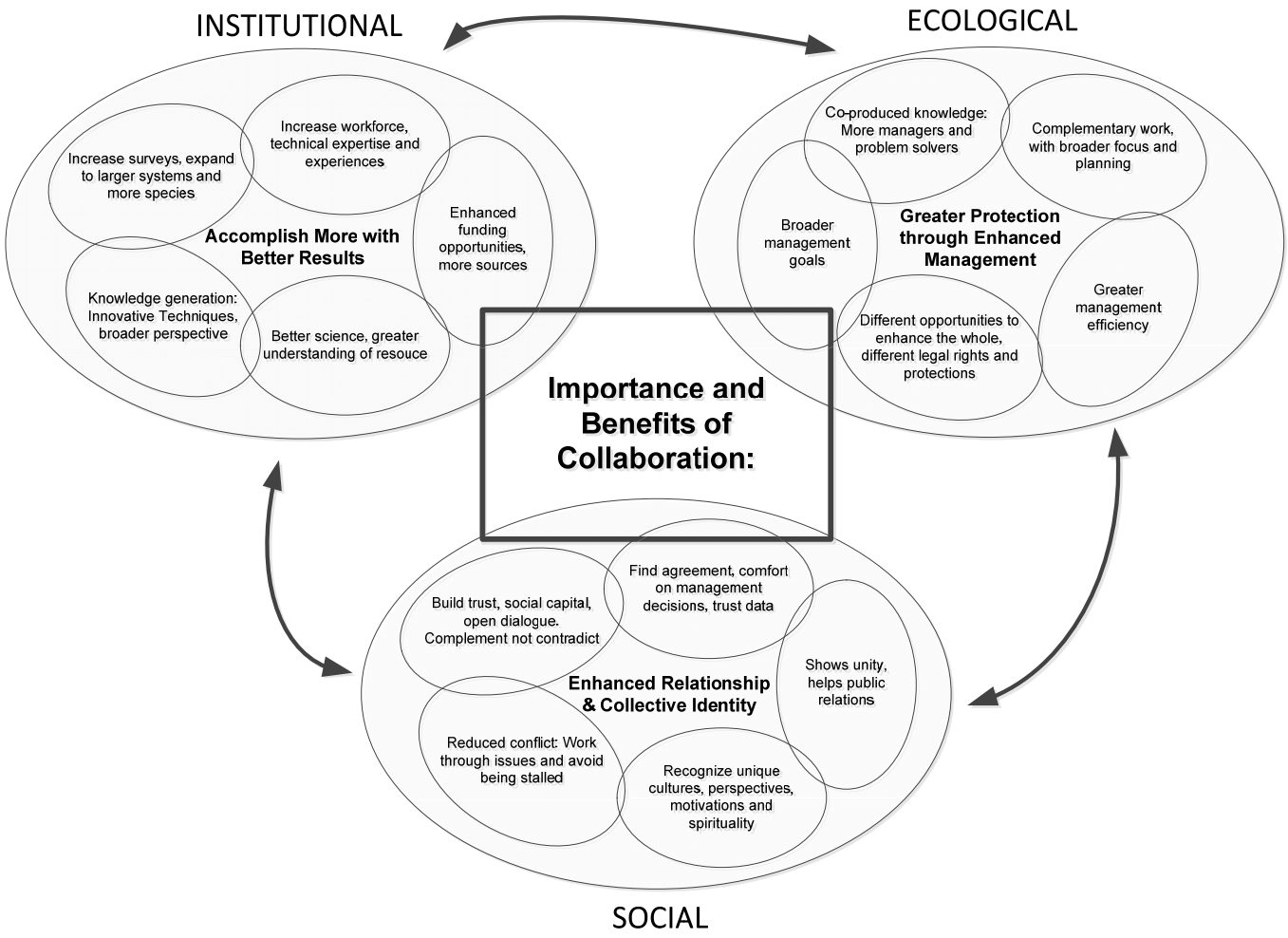

Figure 4.1. The institutional, ecological and social importance and potential benefits from collaboration between the 2007 Consent Decree parties as identified by research participants.

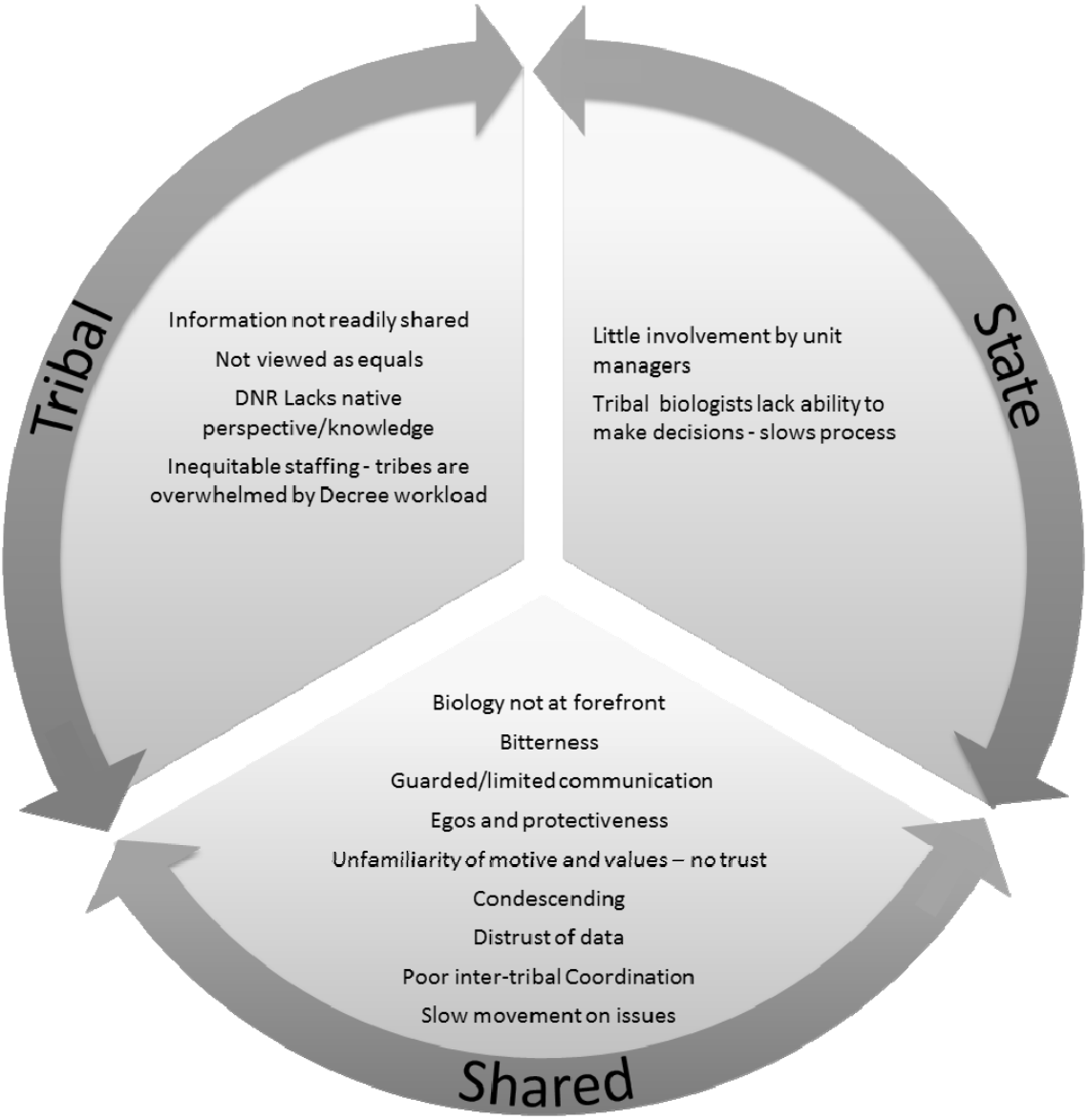

Figure 4.2. Attributes of difficulties that were recognized by state and tribal agency participants as being present within their co-management relationship. Chart with bolded terms of "Tribal" and "State" represent attributes uniquely recognized by participants of those groups while the "Shared" term represents attributes recognized by state and tribal participants.

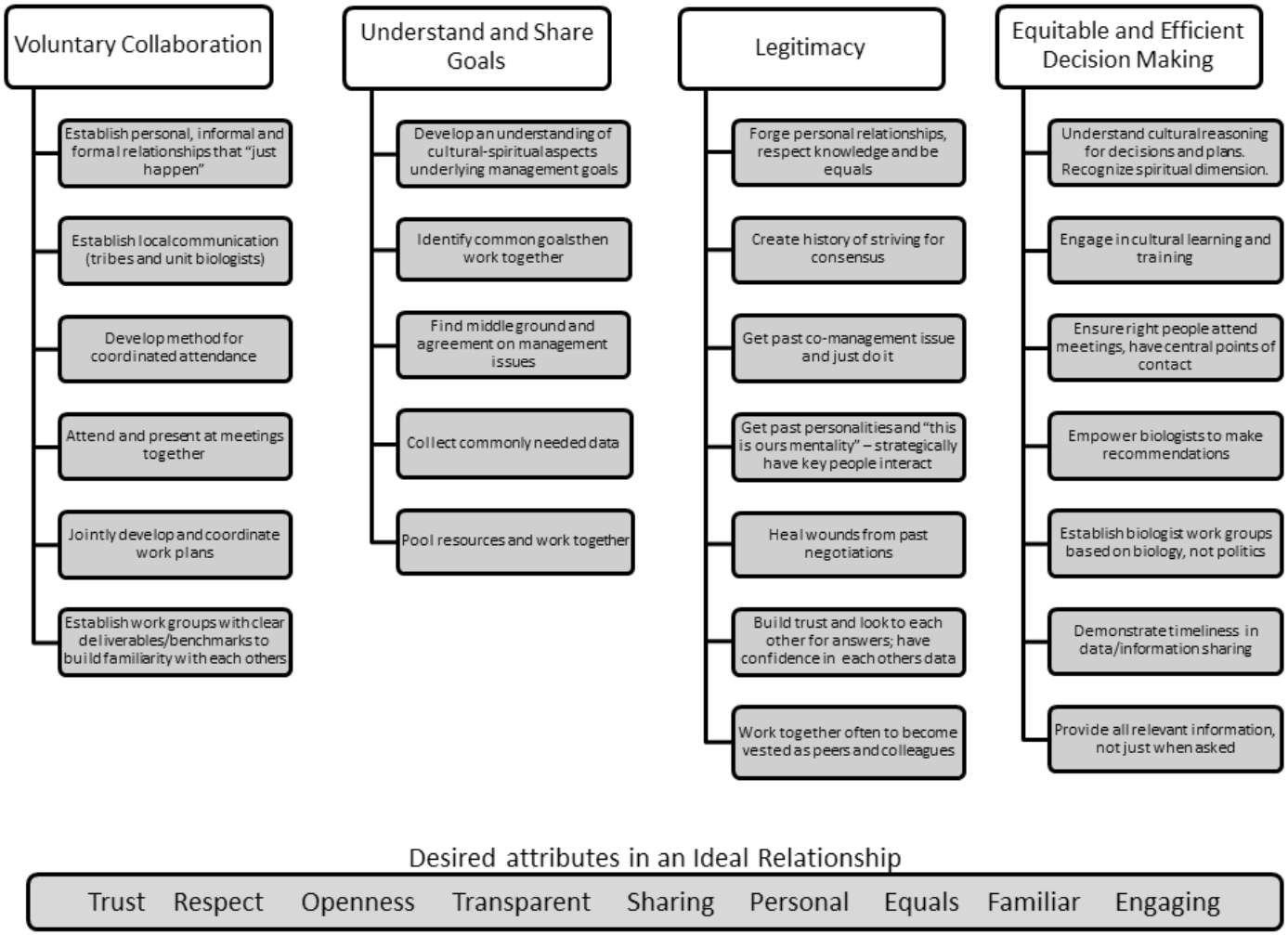

Figure 4.3. How research participants characterized the ideal relationship among the agencies and the actions they suggested could be implemented for achieving it.

Table 4.1. Conditions recognized by study participants that act as barriers to successful co-management. The list of barriers was populated from outside sources. Check marks identify the barriers recognized during this study.

Nature of Barrier	Barrier	Presence	
		State	Tribal
Culture	Cultural distance. Different perceptions of social and ecological concepts	√	√
	Value of each other's knowledge	√	√
	Sacrificing own worldviews for norms outside		√
	Multiple issues at stake other than biological	√	√
Legitimacy	Distrust - "Universal determinant"	√	√
	Lack of recognition of the others value and contribution to co-management	√	√
	State resistance to co-management	√	√
Historical Relationship	Norm of conflict, resistance, antagonism and inequitable negotiations	√	√
	Colonial institutional structure	N/A	√
Institutional	Great complexity in institutional arrangements	√	√
	No collective identity	√	√
	Power differential and inequality in decision making	√	√
	Political and selfish interests, ownership	√	√
	Stalling decision making, power through "non-decision" and not disclosing data	√	√
	Hiding prominent issues through problem framing	√	√
Operational	Minimal cross-cultural, cross-level forums for sharing	√	√
	Working groups lack clear membership boundaries	√	√
	Absence of forums for collaborative decision making and problem solving	√	√
	Lack of dedicated people and core groups to initiate the process		
	Inadequate staff & support, institutional resources	N/A	√

Sources: Barriers are synthesized from Berkes (2007, 2009); Busiahn (1989); Cohen (1989); Corntassel (2003); Dale (1989); Hall and White (2008); Hart (2010); Holm (2003); Kendrick and Manseau (2008); Kimmerer (2000); Mattes and Kmiecik (2006); Natcher et al. (2005); Notske (1995); Patterson and Williams (1998); Pinkerton (1989); Rettig et al. (1989); Selin and Chavez (1995); Skogen (2003); Weiss et al. (2012); Wilson (2008).

Appendix 1. Interview guide.

Interviewee (Code #): _____

Survey Sections:

A: Participant Background

B: Decision Making Process for Biological Assessments and Fishery Improvement Activities

C: Priorities/Focus Areas for Biological Assessments and Fishery Improvement Activities

D: Expectations of Coordination and Partnerships

A. Interviewee Background

1. How long have you been at this organization? _____ . Describe your background and experiences that prepared you for this position.

2. Briefly describe your role in development and implementation of the 2007 Consent Decree.

B. Decision Making Process for Biological Assessments and Fishery Improvement Activities

1. Describe how you (or your agency) select what biological assessments and fishery improvement projects you will conduct?

2. Does the (tribal or state) public influence your work plans for biological assessments and fishery improvement activities? How? What comments from the public do you commonly hear?

3. Will or have your work plans and fishery improvement activities changed because of the Consent Decree? Why? How much change would you expect?

C. Priorities/Focus Areas for Fishery Improvement Activities and Biological Assessments

Questions specific to Biological Assessments

1. Is conducting biological assessments important to your agency? In what ways? What types of assessment are important? Why? Do you focus on certain species or systems?

2. Do you believe new biological *information* is needed to maintain or improve fishery management in the 2007 Consent Decree area? What types (*of information*)? What types of biological assessments should be conducted to gather this information?

3. Does a lack of biological *information* hinder implementing the 2007 Consent Decree? What type of information? How does it affect implementation?

4. Does your organization work with the other agencies (tribes or state) on biological assessments? How? Is coordination important? Do you work with non-governmental agencies on biological assessments? Which ones?

5. Are there assessments that would be beneficial for your agency to coordinate with the other 2007 Consent Decree agencies? Please describe? Are there assessments less important to coordinate?

6. Do you face difficulties in trying to conduct needed biological assessments? What are they?

Questions specific to Restoration, Reclamation, and Enhancement

1. What are the major fishery *problems* that should be addressed through improvement activities? What activities *should be done* to address these problems?

2. What types of fishery improvement activities are important to your agency? In what ways are these important?

3. How would you characterize a successful fishery improvement project? How do you know that you have done it well?

4. Does your organization work with the other agencies on fishery improvement activities? How? Are there any other groups, governmental or non-governmental, that you work with or would like to work with?

5. Do you face difficulties if you were to initiate large fishery improvement (RRE) projects? What ones? How important is coordination among the Tribal and State agencies in accomplishing large projects?

D. Expectations of Coordination and Partnerships

1. Do you understand the priorities of the other 2007 Consent Decree agencies for biological assessments and fishery improvement activities? How?

2. Could you describe how the six agencies work together now from your perspective? What works well? Are there areas that could be improved?

3. How would an "ideal" relationship between the six agencies look?

4. Could your agency benefit from coordinating biological assessments and fishery improvement activities? How?

Appendix 2. State and tribal participant excerpts as referenced in Chapter 2.

1 - If somebody has a master's degree that is a biologist for the tribe, and somebody has a master's degree that works for the state, they probably have similar training in school and between the two probably don't have huge differences in what ought to be done. (DNRE)

2 - Well, I think the pipe is probably what opened all the doors for me, to give me the experience based on protecting and preserving the culture of our people. (TME)

3 - You are a perfect fit. You fish, you know everybody, you are blood, part of the Tribe…So I was brought into the Treaty stuff and it was a natural fit so the job is easy for me. (TME)

4 - I was just an Indian guy out in the woods with friends…fishing, hunting, gathering materials…always sought out people who knew these things and tried to learn from them. (TME)

5 - I got to know a lot of people within the tribal community and really enjoyed it and they had a position open up for a fish and wildlife biologist to kind of a get the ball rolling for hunting and fishing, tribal treaty rights. (TNE)

6 - I won't say I understood the struggles but I knew of the struggles so I wasn't completely blind thinking I was coming into a job where I would just be a biologist. (TNE)

7 - I think our individual managers have this Public Trust idea that we've got to make sure, and it's in our Mission Statements, that these fisheries resources are here, going to stay for the future, and to provide some product. That's not simple to state…but the general idea and the importance of the surveys are completing that Public Trust of making sure the fish are there for the future. (DNRE)

8 - We are the ones that have been given the public trust to take care of for the State and so it's inherent in our job that it's our responsibility to ultimately make the decision as to what's best for the resource. And we won't have a problem in saying that contrary to what the public might think. After an exhaustive review. (DNRE)

9 - Before the State of Michigan was conceived Tribal people had daily interaction, this interface, so the assessments were anecdotal… it wasn't rigid, schematic, spelled out in the way that we view things now but intuitively native peoples have been observers of natural phenomenon's forever and we come to conclusions based on our observances of natural phenomena based on an intimate relationship with the natural world…You had people engaged in a very intimate relationship in those areas and that is what we relied upon…and not just for ourselves but for future generations. As modern times have

encroached upon our sensibilities we don't have as much time to continue that so biological assessments help quantify those experiences. I know that [Tribal] biologists talk to people [Tribal members] on the ground that are actually doing things [interfacing in the Circle] and there are alignments of those issues. Somebody might spot something that nobody has seen before and hopefully they will be able to let you know about that and you will be able to find what is going on with that population. (TME)

10 - They are literally playing games with the fish, they are not respecting the fish as an integral part of our sustenance, an interplay, the western way of looking at human beings…There is this separation between what is natural and what is human and they draw a very sharp line… I think that is a very different way of looking at the world than the native peoples are, yet to think of yourself as not natural number one, to draw that line and to step on one side…I think we have always been a part of the natural world and need to be working together and their rights [non-human] to live there are no less equal than our rights…they [State] look at it from a hierarchy and that things are not the nations; the tree nations, the fish nations; they aren't equal to our nation…an anthropogenic perspective and it is easy to fall into that way of thinking. I try to understand that part and to stand against those things, it is more effort to think the way I would like to think and act than it is to go with the flow and look at the world like everyone else is because you can communicate with a person from that level, I can, it is how the world is viewed. Wouldn't it be nice if we had written the Treaty negotiations in Anishinaabemowin and let them deal with the translations. I thought of getting that Consent Decree translated as an example because it will then be kept in different places within our heads and hearts and maybe bring some sensibilities with it and the translations that where you just can't say resource. I don't think you can say that word in Anishinaabemowin so that is why I have problems with those words…So how to get that conceptual framework when you are standing in the English speaking world… You hold the same standard to the western world you are not legitimate unless you look like George Washington, you are wearing tight knickers, white pants and false teeth that is traditional, right. That is because the western world thinks that they own the notions of progress, and that played into the Consent Decree, that is the primacy that they [State] have on issues so they are looking at it from their perspective and it is all stuck in the English language, we are speaking their language and trying to reach back into another ethic developed outside the English language and trying to have a sense of it. I know a lot of people that spoke very fluently, a lot of them are gone now, but I remember them talking about these things...I can get closer to think what they think [ancestors] if I eat what they eat [wild rice]…That is why the Consent Decree we always had to maintain our ability to interface with the land to feed our people and to provide the things that we need…but I really think areas for [Tribal] people should be living on the river, should be living in the appropriate houses that are sympathetic or empathetic to the area. (TME)