FORMATION AND IMPLICATIONS OF INTERORGANIZATIONAL NETWORKS AMONG FISHERIES STAKEHOLDER ORGANIZATIONS IN MICHIGAN'S PERE MARQUETTE RIVER WATERSHED

By

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ABSTRACT

FORMATION AND IMPLICATIONS OF INTERORGANIZATIONAL NETWORKS AMONG FISHERIES STAKEHOLDER ORGANIZATIONS IN MICHIGAN'S PERE MARQUETTE RIVER WATERSHED

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Fisheries and aquatic resource managers increasingly recognize the importance of stakeholder collaboration and watershed-based management approaches, but managers may not always know the most effective and efficient way to integrate watershed stakeholders. These managers need tools that will enable them to better understand the potential for communication and collaboration among stakeholder groups in a watershed. Organized groups represent the collective interests of many fisheries stakeholders, and mangers need to know if, how, and why these stakeholder groups engage in management issues. To better understand these dynamics, we analyzed the communication and collaboration networks of 112 fisheries stakeholder organizations in and around Michigan's Pere Marquette (PM) River watershed. Using a mail survey, we collected data from each stakeholder group on their organizational attributes, organizational ties (or interactions) with other organizations, and attributes of these interorganizational ties. Using multi-level social network analysis, we analyzed if and how an organization's attributes influence the types of ties it has with other organizations as well as their position in the overall communication and collaboration network. We found that ties are likely between two organizations in the same county, from the same organizational domain (e.g., education, economic development, etc.), and more than 51 years old.

Interorganizational ties were most likely to be reported by organizations that are generalist in scope, satisfied with PM fisheries, unsatisfied with PM fisheries, located inside the watershed, and have a natural resource or environmental orientation. Within the greater fisheries network, sub-networks formed around counties and organizational domain areas, and organizations at the center of each sub-network tended to be concerned about habitat, have paid staff, more than 51 years old, generalists, satisfied with PM fisheries, and have a planning function in their cluster (either natural resources or local government). These findings have implications for enhancing fisheries managers' communication strategies, and we recommend a network-based framework for utilizing and enhancing stakeholder interactions. With a better understanding of how and why stakeholder organizations interact, fisheries managers can more effectively create opportunities for stakeholder interactions and develop the potential for meaningful watershed-scale communication and collaboration, thereby facilitating better fisheries management plans.

Dedicated to the memories of

Chris Vanderpool

and

Francis and Marguerite Baumgardner

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PROLOGUE

Introduction

Aquatic ecosystems function as holistic integrators of complex ecological and social processes, interrelationships, and dynamics throughout the landscape. Therefore, ecosystem management programs and policies must be based on holistic, integrative, multi-disciplinary, and collaborative strategies. For many natural resource management agencies, these ecosystem requirements pose significant challenges to conventional structures and processes for planning and implementing management activities. Management of fisheries ecosystems requires not only management of fish, but it also necessitates management of habitats and watershed processes (Alexander et al. 1995). These habitats and processes constitute the unique biological, physical, and chemical environments that support fish production (Hayes et al. 1993), and these systems are directly and indirectly affected by human activity. Fisheries ecosystem management therefore demands opportunities for collaboration and communication among those in the watershed whose activities affect water quality, water quantity, fish populations, and their habitats (Alexander et al. 1995; Selman and Wragg 1999). Organized groups represent the collective interests of many fisheries stakeholders in a watershed, and the characteristics of these organizations and the situations surrounding fisheries issues influence if and how they collaborate in fisheries management. By reviewing ecosystem management concepts, stakeholder theory, collaboration principles, and interorganizational network theory, we can better understand the potential for integrating

stakeholders in a collaborative fisheries management framework. Through learning about interorganizational stakeholder collaboration networks in a Michigan watershed, fisheries management agencies can more effectively develop and implement integrative and collaborative fisheries management strategies.

Fisheries Ecosystem Management

Key Concepts in an Ecosystem Approach

Ecosystem scientists have long demonstrated that aquatic ecosystems function as integrators of regional watershed and airshed dynamics (Hynes 1975). For example, the quality and quantity of water in aquatic ecosystems, the basis for fish production, is directly affected by physical, chemical, and biological inputs which are a result of watershed-specific environmental and social processes (Alexander et al. 1995; Lundqvist 2000; Taylor et al. 2001). These include inputs from processes such as erosion and sedimentation, landscape runoff, point and non-point source pollution, and atmospheric deposition. Diverse human activities, such as urbanization, deforestation, industrial manufacturing, energy production and consumption, and intensive agriculture, drive many of these processes and therefore affect ecosystem productivity and sustainability. Such land use and development activities are products of diverse and fragmented planning and policy-making bodies, which allow development to proceed with little or no coordination or consideration of the structure and function of ecological systems (Caldwell 1994; Ferreri et al. 1999; Selman and Wragg 1999).

A fishery is a system in which living aquatic resources are produced and harvested

(Clay and McGoodwin 1995). Fisheries management is an integrative process that seeks to ensure long term ecosystem productivity and the development of conservation and allocation systems that allow people to sustainably use the resource (Ferreri et al. 1999). For aquatic ecosystems and their fisheries resources to be effectively managed, they must be understood in context of their function as holistic integrators of regional social and ecological processes (Knight and Meffe 1997). This integration is a guiding principle of ecosystem management, a management philosophy that emphasizes: (1) the integration of the physical, chemical, biological, social, economic, and political components of resource systems; (2) the interactions of these components; and (3) how these components relate to ecosystem productivity and resource sustainability (Ferreri et al. 1999). Management based on these principles will help maintain and improve ecosystem sustainability.

While the concept of ecosystem management is commonly accepted by managers, scientists, and stakeholders as an appropriate management paradigm, it has undergone intense scrutiny and refinement throughout its evolution (Yaffee et al. 1996). A review of ecosystem management literature reveals a wide array of ecosystem management concepts and theories (Czech and Krausman 1997). Nevertheless, the majority of definitions emphasize certain common elements, such as *integration* of *dynamic* systems and processes in a region, *collaboration* among ecosystem scientists and stakeholders, and *adaptability* in management approaches (emphasis added; Christensen et al. 1996). Therefore, while the term 'ecosystem management' does not have a single operational definition, these commonly emphasized principles indicate that natural resource management is evolving away from single-species authoritarian management regimes

based on segregated management efforts developed in isolation from other ecosystem systems, processes, and stakeholders.

Implications for Fisheries Management Agencies

Due to the diverse and dynamic nature of regional social and environmental processes, holistic management of aquatic ecosystems requires high levels of coordination and collaboration among those in the watershed whose activities affect water quality and quantity (Alexander et al. 1995; Selman and Wragg 1999). Those who manage fisheries are very often administratively, procedurally, and disciplinarily separated from those who manage other related ecosystem elements, such as forests, wildlife, water quality, and land use. These organizational and philosophical divisions within and between management agencies can render ecosystem management programs incomplete, inefficient, and ineffective (Knight and Meffe 1997; Cortner et al. 1998). Agency management activities are also usually separated from other watershed activities that influence aquatic ecosystems and fishery production; for example, activities by private landowners, non-governmental organizations, organized citizen groups, local planning boards, and commercial industries (Cortner and Moote 1999). These groups engage in a wide range of water- and land-based activities that directly and indirectly affect various components of aquatic ecosystems, such as nutrient cycling, temperature regulation, and flow rates (Alexander et al. 1995; Taylor et al. 2001). The management community clearly becomes larger and more diverse in ecosystem management approaches.

To achieve ecosystem management, agency-based management of fisheries and

aquatic ecosystems must often be transformed from a closed system of short-term fish production and habitat manipulation to a more open, dynamic, and integrative process based on long-term communication and collaboration with other ecosystem scientists, managers, and watershed stakeholders (Krueger and Decker 1993; Knight and Meffe 1997; Cortner et al. 1998; Danter et al. 1999; Imperial 1999). Implementation of ecosystem management will require natural resource agencies to re-evaluate their management institutions and philosophies, which will reveal ways in which their management structure and processes can be adapted to ecosystem concepts. Since management structures and processes influence how managers conceptualize and respond to resource issues, it is essential that agencies strive to create management systems that are congruent with watershed processes and ecosystem dynamics.

Collaborative Approaches to Fisheries Management

Collaboration and Resource Management

The availability, access, and use of fisheries and other resources are influenced by both ecological and social systems (Krueger and Decker 1993). The complexity of these interrelated systems, however, makes effective resource management an increasingly elusive goal, as natural resource managers are saddled with the difficult and challenging responsibilities of sustaining the productive bases of resources while managing for appropriate methods of resource use and extraction. Despite the importance of these responsibilities, however, most resource managers are constrained by a lack of time, funding, personnel, and authority—all of which are necessary to effectively manage

resources (Krueger and Decker 1993; Mersmann et al. 1994). They are becoming aware that they cannot meet their responsibilities without the input, cooperation, and support of resource stakeholders.

Managers of natural resources are increasingly recognizing the importance of collaboration among resource stakeholders, as they have indicated through surveys (Yaffee et al. 1996). The term 'stakeholder' refers to any person or group that has a role or interest in the status of a resource (Decker and Krueger 1993). In the case of fisheries, obvious stakeholders include fishers, processors, traders, managers, researchers, conservationists, and policy-makers. Yet in a less obvious way, fisheries stakeholders include those industries, landowners, and municipalities in the watershed that affect fish habitat (Clay and McGoodwin 1995). As long as these groups affect the quality and quantity of fish habitat, they may be subject to current and future habitat-conserving regulations and environmental liabilities. Whether they realize it or not, many of these groups in the watershed have a stake in the status of fish habitat and therefore, in a resource management context, they can be considered stakeholders.

Generally speaking, collaboration and cooperation are processes by which different persons or groups work together on a common interest. Individuals or groups may decide to collaborate or cooperate with others if they recognize that greater benefits are possible through collective (rather than individual) action. In the context of resource management, collaboration between stakeholder groups can facilitate the spread of information and support that is necessary to achieve resource management goals (Cortner and Moote 1999). Through their knowledge, opinions, beliefs, and behaviors, watershed stakeholder groups can provide resource managers with valuable information about how

they use and relate to natural resources (Krueger and Decker 1993; Selman and Wragg 1999). Their input can thus enhance the accuracy and relevance of management approaches. At the same time, resource managers can provide other stakeholders with information on resource status and access as well as appropriate methods of use and conservation; this should help promote appropriate forms of resource use. With the increased opportunities for mutual communication, education, and support, collaboration between stakeholders can increase the likelihood of achieving sustainable and productive resource management (Mersmann et al. 1994; Clay and McGoodwin 1995; Yaffee 1996; Cortner and Moote 1999; Selman and Wragg 1999). It is highly unlikely that effective resource management can occur without stakeholder collaboration.

Watershed-based Collaboration

A watershed is a geographic region in which all water (such as precipitation, overland flow, and river channels) flows to and eventually combines in a common outlet (Dzurik 1990). Thus, using a watershed approach, all the water, land, and air that is upstream to a point on a river potentially affects aquatic habitat and should therefore be incorporated into management efforts (Alexander et al. 1995; Selman and Wragg 1999). A watershed perspective in fisheries management allows managers to define natural boundaries for aquatic ecosystems (Taylor et al. 1995). Without a holistic view of how watershed processes affect fish and fish habitat, management actions narrowly focused on one aspect of an aquatic ecosystem can counteract other management initiatives in some other aspect of the ecosystem (Lundqvist 2000). For example, within a watershed, timber management can affect the quality and quantity of overland flow and thus alter aquatic

habitat (Alexander et al. 1995). In addition, narrow management actions can overlook many other important social and ecological processes in the watershed (Krueger and Decker 1993). To overcome such isolation and fragmentation in management and improve resource conditions, managers need to pursue opportunities for stakeholder collaboration and integrate watershed-wide input (Schweer 1987; Selman and Wragg 1999).

In a watershed context, jurisdictional boundaries and multiple types of property ownership pose significant challenges to resource managers (Schweer 1987; Ferreri et al. 1999; Selman and Wragg 1999). Watershed boundaries do not match political boundaries, such as those that define cities, townships, counties, states, and nations. As a result, any given watershed can contain dozens (even hundreds) of policy and planning bodies that independently direct various forms of regional land use and development. Any lack of coordination in land development planning can lead to excessive rates of urbanization, agricultural conversion, and habitat fragmentation—all of which directly and indirectly affect water quality and quantity (Alexander et al. 1995; Lundqvist 2000; Taylor et al. 2001). A watershed approach requires that these jurisdictional boundaries become secondary to the ecosystem boundaries, allowing more holistic and integrative management practices to be developed. In addition, watersheds usually contain a patchwork of public, private, and tribal-owned lands, thereby increasing the complexity of land use patterns and resource conservation incentives, which can lead to conflict among competing sectors and interests (Heissenbuttel 1996). For example, ecosystem management efforts on pubic lands can be largely negated by destructive uses of adjacent private lands, thereby requiring different conservation incentives for the private

landowner. In the interest of watershed management, managers must overcome fragmentation based on jurisdictions or land ownership patterns and move toward forming collaborative relationships with watershed stakeholders who impact aquatic and fisheries resources (Schweer 1987; Lundqvist 2000).

Managers also face challenges in understanding and identifying the stakeholders in each watershed. Every watershed is unique in terms of its ecological conditions, social (and political and economic) systems, and stakeholder composition. Stakeholder groups in any given watershed have distinct ideologies, attitudes, and behaviors, although individuals within any stakeholder group are not necessarily homogeneous (Clay and McGoodwin 1995). Nevertheless, affiliation with a stakeholder group is assumed to be associated with an individual's attitudes and behaviors. Managers, therefore, can assume that organized stakeholder groups adequately (although not completely) represent most of the diverse interests and desires of individuals in a watershed (Clay and McGoodwin 1995). Since each watershed is different, however, managers must still invest time and effort in becoming familiar with each watershed's stakeholder population.

Managers of fisheries and aquatic resources need a framework which will allow them to understand the potential for communication and collaboration among stakeholder groups in a watershed (Cortner and Moote 1999; Selman and Wragg 1999). While this framework needs to be comprehensive enough to provide a profile of stakeholder interactions, it should also be flexible enough to be applied to the unique stakeholder compositions in different watersheds. First, managers need to know what kinds of stakeholders are present, how many there are, and how they relate to resource management. It is very likely that many of these stakeholder groups maintain certain

kinds of interactions and relationships; therefore, managers need to understand how groups relate to each other. This will help managers identify existing areas of communication and collaboration, and it will also identify which groups do not interact with other groups. Having this information, managers can then more efficiently and effectively create opportunities for increasing stakeholder interaction and develop the potential for watershed-wide collaboration.

Interorganizational Stakeholder Networks

Beginning in the early 1970s, sociologists and anthropologists devoted great attention to the development of theories and tools to study social networks (Lincoln 1982; Cook and Whitmeyer 1992; Mizruchi and Galaskiewicz 1993). The term 'networks' refers to the patterns of ties or relationships that link members of some group or population (Lincoln 1982; Wellman 1983). By studying social networks, sociologists are recognizing that social actors affect—and are affected by—their structural relationships with other actors. Instead of analyzing only the motivations of individual social actors, network analysts also study how patterns of interaction, or networks, relate to social behavior and social change (Wellman 1983). The unit of analysis in social network analysis is the relationship or interaction (referred to as a 'tie') between social actors (or 'nodes'; Knoke and Rogers 1979; Lincoln 1982). A tie can be any kind of relationship between actors (such as friendship or the exchange of resources); very often network analysts study multiple kinds of ties to understand the diverse ways that actors may be networked (Lincoln 1982; Wellman 1983). The social actors may be persons, groups, or organizations; in the case of inter-organizational network analysis the population under

study includes all organizations which have some common functional interest (Knoke and Rogers 1979).

In studying the potential fisheries collaboration networks in a watershed, the population includes all stakeholder organizations that have an interest or role in fisheries management. We are interested in understanding the patterns of communication and collaboration between watershed stakeholders; therefore, our ties will focus on network patterns such as the presence of information exchanges, resource exchanges, and joint programs. By studying the direction and symmetry of these network ties, we can understand how an organization's relative position in the watershed network determines their potential role in an integrative management framework. More recent developments in network analysis allow us to also collect data on organizational attributes for these watershed stakeholder groups, so that we can determine if and how these attributes are related to their position in the watershed networks. Managers of fisheries and aquatic resources in the watershed will then have a comprehensive assessment of what stakeholder groups are present, whether they are (and are not) interacting with each other, how they are interacting, and how organizational attributes are associated with their level of interaction. This assessment will allow managers to most efficiently and effectively develop an integrative management framework that facilitates stakeholder collaboration and, therefore, better resource management. It is provides a general framework for later analyzing other aspects of the stakeholder community, such as (but not limited to) the formation of expectations and attitudes, the distribution of influence and power, decision-making processes and outcomes, and conflict resolution strategies.

Research Approach

Research Setting

The Pere Marquette (PM) River has long been the site of one of Michigan's most important recreational fisheries (Krueger 1985; Cassuto 1994; Supinski 1994). Located in the center of Michigan's western lower peninsula, the river and its tributaries (Big South Branch, Little South Branch, Middle Branch, and Baldwin River) span 153 miles and feed into Lake Michigan (Figure 1; USDA Forest Service 1976). Having unique ecological and aesthetic features, it has the distinction of being a 'wild and scenic' or natural river under both state and federal agencies. As one of the last remaining free-flowing river systems in Michigan with limited shoreline development, it is an ideal site to study lotic ecosystems (Cassuto 1994). This coldwater river system is well-known for its resident and anadromous salmonid populations that attract numerous anglers to the region (Krueger 1985; Cassuto 1994; Supinski 1994). The outstanding natural features of this river system also attract many canoeists, hunters, hikers, campers, and other recreation and nature enthusiasts (USDAFS 1976; Nelson and Smith 1998).

The PM watershed covers 740 mi^2 and contains numerous jurisdictions and property types (USDAFS 1976). As a relatively small Michigan watershed, it spans sections of four counties (Mason, Lake, Oceana, and Newaygo Counties). Ludington (population 8816), at the mouth of the river, is the largest city in the watershed and serves as the port for the *Badger*, the car-passenger ferry that crosses Lake Michigan. Baldwin (population 1337) and Scottville (population 842) are other small towns. The watershed covers sections of the Pere Marquette State Forest and the Manistee National Forest; the

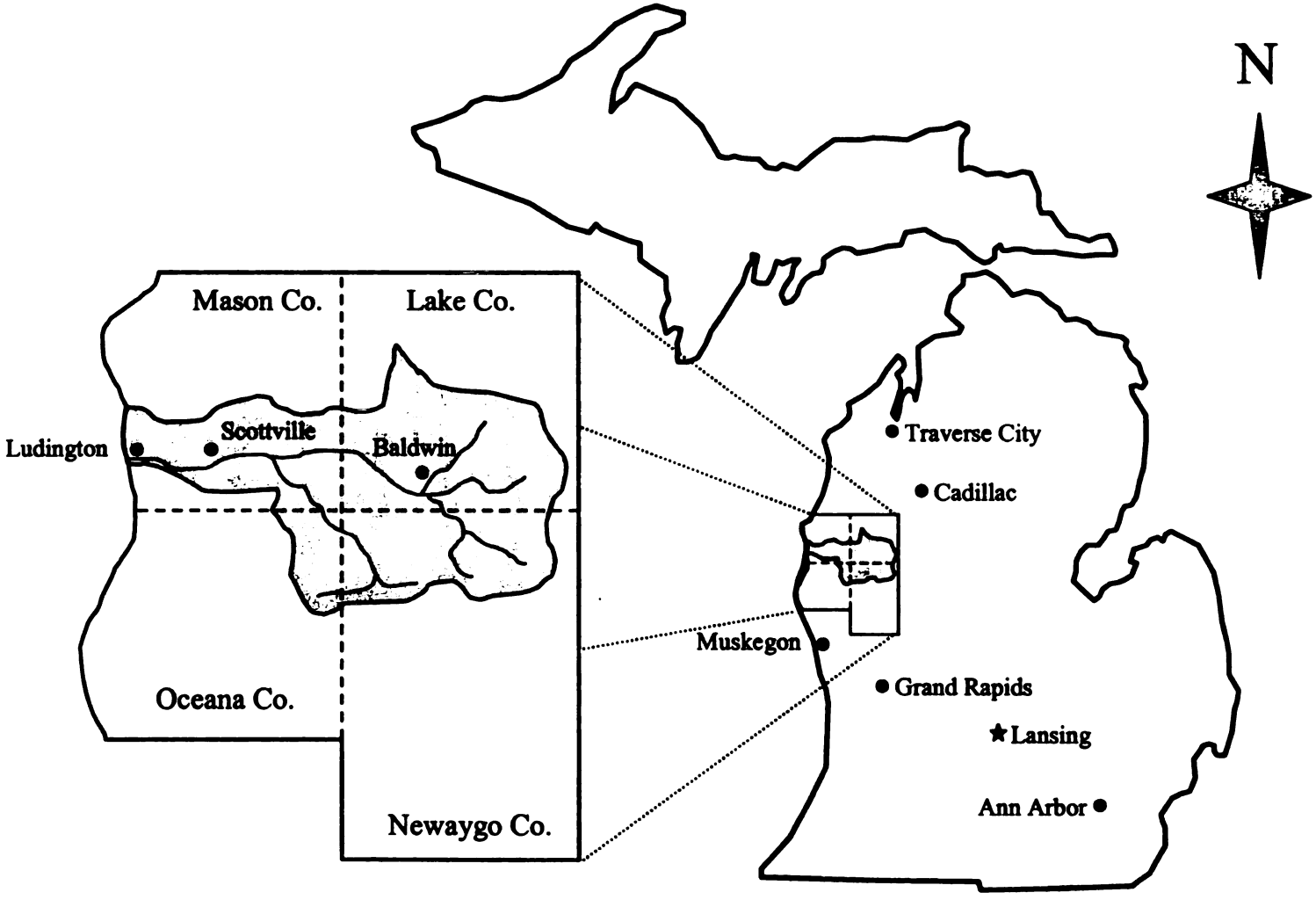

Figure 1. Approximate locations of the Pere Marquette River watershed and select counties and cities in Michigan.

remaining land is mostly privately-owned (USDAFS 1976).

Many watershed residents (both seasonal and permanent) are keenly aware of the important natural features of this river system, and many have strong—and sometimes conflicting—opinions about using, conserving, and protecting this great regional resource (Cassuto 1994; Supinski 1994). Watershed-based conservation activities are relatively well developed as compared to other Michigan watersheds, largely due to the efforts of the Pere Marquette Watershed Council and other recreation-oriented conservation organizations (i.e., Trout Unlimited; Supinski 1994; Nelson and Smith 1998).

Several features of this watershed make it an ideal case study for analyzing stakeholder collaboration networks. First, through the records and documentation of watershed organizations, historians, fisheries managers, and wild and scenic river designators, a great deal is known about the ecological, social, economic, and political features of this watershed. This information will make our research more accurate and relevant. Second, the limited size and scope of activities within this watershed will help focus our analysis on relevant variables; a larger watershed with extensive land use impacts would introduce numerous confounding variables which would weaken our abilities to draw accurate conclusions. This PM study can serve as a prototype which can help identify ways to develop a more robust analysis of a larger system. Third, the ecological significance and increasing social demands surrounding the PM fishery compel managers to seek inclusive approaches to watershed management. If we can demonstrate more effective and efficient ways to integrate stakeholder collaboration in management of this fishery, managers would be able improve this and other fisheries management programs.

Goals and Objectives

The goals of this research are to understand the watershed-based stakeholder collaboration network and incorporate this information in an integrative fisheries management framework. To achieve these goals, we have developed four objectives, each intended to answer several questions:

1. To identify aquatic- and fisheries-related organizations in the PM watershed and describe their communication and collaboration interactions:

   - who's interacting with whom?
   - what kinds of organizations are interacting with others?
   - how often are they interacting?
   - what kind of interactions are they having?
   - what is the tone of the interactions (i.e., positive or negative?)
   - how important do they think it is to interact with other organizations?

2. To determine attributes of stakeholder organizations in the PM watershed and assess if these are related to their degree of communication and collaboration with other groups:

   - when were they founded?
   - how many members are in the organization?
   - what is the organizational mission?
   - what is their philosophy about natural resources management?
   - to what extent are they concerned about natural resources in the watershed?
   - are they satisfied with fisheries management in the watershed?
   - what kind of fisheries issues (if any) are they concerned about?
   - to what degree are these attributes related to their level of interactions?

3. To compare the network patterns, positions, and organizational attributes observed in the PM watershed to theory and literature on interorganizational communications and collaboration:

   - is there an 'ideal' network pattern to compare the observed to?
   - what organizational attributes facilitate communication and collaboration?
   - what types of organizations serve as information sources/gatekeepers/sinks?
   - are there opportunities to create relationships and bridges among organizations?
   - what organizations should be included in the management network? how?
   - what network properties should we incorporate into a recommended network?

4. To recommend a collaborative fisheries management framework that integrates

watershed-based stakeholder organizations:

- what is our recommended collaboration network for the watershed?
- what network features are transferrable and can be applied to other watersheds?
- what lessons can be learned from experiences in this watershed?
- what problems should managers expect/overcome?
- is network analysis useful for promoting collaborative fisheries management?

Overall, we are interested in understanding the relationships among social actors in the PM watershed that serve as potential pathways of collaboration, what organizational attributes facilitate these relationships, and how these relationships can be utilized or re-structured in the development and implementation of an integrated fisheries ecosystem management approach. We will not attempt to determine how stakeholder collaboration and communication are actually affecting or contributing to current management decisions; research on decision-making processes would be a second phase of the research that depends on the outcome of this phase of the research.

Research Overview

In the following three chapters, we will explore these objectives and questions in detail. Chapter 1 presents an overview of stakeholder theory and describes our criteria for identifying fisheries stakeholder organizations in the PM watershed. The results of this identification process establish our stakeholder population, which is the subject of analysis in Chapter 2. In the second chapter, we review literature on interorganizational relations and apply network analysis to our study of the interactions between stakeholder organizations. For this study, we undertook a quantitative survey of organizations' attributes and interactions with each other, which enables us to describe their communication and collaboration patterns and assess how organizations' attributes are

related to their degree of interorganizational relations. In Chapter 3, we discuss how this information can be understood and utilized watershed-based collaborative fisheries management. We discuss how organizational attributes, interaction dynamics, and network properties have implications for integrative forms of fisheries management. We describe various approaches for stakeholder involvement in resource management and explore how network information can enhance communication and collaboration, thereby promoting integrative, comprehensive, and more effective management approaches.

CHAPTER 1

USING ECOSYSTEM CONCEPTS TO DEFINE A POPULATION OF FISHERIES STAKEHOLDER ORGANIZATIONS FOR A MICHIGAN WATERSHED

Introduction

To understand the role of humans in natural resource management, one needs to first define some basic management concepts. Ecosystem features become 'resources' when they are used and managed to meet people's specific wants and needs. In cases where organisms are the resource to be managed (e.g., fish or wildlife), the term 'management' refers to the attempted control of species populations, their abundance, their habitats, and the people that somehow affect these populations and habitats (Taylor et al. 1997). Managers attempt to manipulate these ecosystem features in order to meet their goals for appropriate forms of resource use, allocation, and conservation. Although specific goals will vary among management issues and settings, management goals are rooted in the interests of resource stakeholders. In the context of natural resources management, 'stakeholders' can include any person or group that has a role or interest in the status of a resource to be managed (Decker and Krueger 1993).

Managers of fisheries and other natural resources have long recognized the need to consider how stakeholders relate to resource management (Grimble and Wellard 1997). Studies of the human dimensions of natural resources management have explored various facets of stakeholders' knowledge, attitudes, opinions, perceptions, and behaviors

regarding resource use and management (see Jolma 1994 and Duda et al. 1998 for numerous examples and reviews of such studies). Information obtained through these studies can help managers determine appropriate management goals, strategies, and techniques; assess public communication, education, and outreach needs; understand humans' roles in ecosystem processes; and otherwise gauge stakeholders' general awareness of and involvement in natural resource issues (Grimble and Wellard 1997; Duda et al. 1998). Given the inherent links between resource stakeholders and resource management, the importance of understanding natural resource stakeholders and their potential roles in management cannot be overestimated.

Natural resource managers have generally considered stakeholders to be those who directly use the resource (e.g., fishers and hunters), members of resource-related organizations (e.g., conservation or recreation clubs), and others that have some direct impact on or interest in the status of the resource (e.g., landowners who control access to a use site). Considering the great variability that surrounds different management issues and settings, however, the specific population of relevant stakeholders will likewise vary among management situations. Managers may experience difficulty in determining, for each management scenario, who the stakeholders are and which ones should become involved with the management process (Grimble and Wellard 1997).

The purpose of this chapter is to explore the concept of natural resource management stakeholders, considering how the composition of a stakeholder population may vary with different management issues, goals, settings, and circumstances. Our study will focus on the Pere Marquette (PM) River watershed (see Prologue Figure 1), a geographic area (740 mi^2) in western lower Michigan with a popular recreational

salmonid fishery. This watershed contains a mix of property types (public and private); land use activities (agriculture, forestry, urban development, etc.); socioeconomic issues (tourism, poverty, etc.); and environmental issues (conservation, protection, and management of fish, water, forests, and wildlife; USDAFS 1976; Kruger 1985; Cassuto 1994; Supinski 1994; Nelson and Smith 1998). By evaluating the potential stakeholder population in the PM River watershed, we can explore how the 'stakeholder' concept can be more effectively applied to a specific fisheries management setting. We develop criteria for defining a fisheries stakeholder population, apply these criteria to fisheries management in the PM watershed, and explore the management implications of this stakeholder identification approach.

Stakeholder Theory

The Decker and Krueger (1993) stakeholder definition includes any person or group that has a role or interest in natural resource management. Considering the myriad ways in which humans interact with and depend upon their environment, however, this means that *virtually anyone* can be considered a stakeholder in natural resources management. Furthermore, natural resources like fish, wildlife, air, water, and public lands belong to the public, and, under the public trust doctrine, managers are responsible for managing resources in the interest of the greatest public good (Plater et al. 1992; Sax 1993; Lundqvist 2000). In this sense, managers can consider all current and future members of the general public to be resource management stakeholders.

This broad concept of stakeholders is generally reflected in the managers' mission

statements and is often embraced as a management tenet. For most management activities and operations, however, managers need to refine the stakeholder concept to include a more practical set of stakeholders (Mitchell et al. 1997). Natural resource managers have finite staffing, funding, time, and other resources, and it is not practical or possible to involve or consult with *all* stakeholders in *all* management decisions or activities. Conversely, managers must not use overly restrictive or narrow criteria to identify management stakeholders (e.g., limited to anglers, hunters, or other primary user groups); this will cause managers to overlook the resource-related interests of other sectors of the public. Managers need a framework for identifying a practical, relevant, and representative population of stakeholders that can then be meaningfully incorporated into natural resource management and communication processes (e.g., outreach; Grimble and Wellard 1997).

Mitchell, Agle, and Wood (1997) provide a comprehensive review of stakeholder identification literature, including broad, narrow, and intermediate definitions of stakeholders. In developing their stakeholder concept, they begin with a broad definition, "...so that no stakeholders, potential or actual, are excluded from analysis arbitrarily or a priori" (Mitchell et al. 1997, p. 854). They start with Freeman's now-classic definition: a stakeholder is "any group or individual who can affect or is affected by the achievement of the organization's objectives" (1984, p. 46). They acknowledge that such a broad definition potentially includes everyone, but it is a necessary starting point from which to identify a meaningful set of stakeholders:

> "The idea of comprehensively identifying stakeholder types, then, is to equip managers with the ability to recognize and respond to a disparate, yet systematically comprehensible, set of entities who may or may not

> have legitimate claims, but who may be able to affect or are affected by the firm nonetheless, and thus affect the interests of those who do have legitimate claims" (Mitchell et al. 1997, p. 857).

Furthermore, they believe that stakeholders do not need to maintain an active relationship with a managing organization; they believe that "the *potential* relationship can be as relevant as the actual one" (Mitchell et al. 1997, p. 859). Identification of latent, or potential, stakeholders can help organizations anticipate issues, concerns, or problems and possibly improve their effectiveness (Grimble and Wellard 1997). Building on this idea of potential stakeholders, they establish that one does not necessarily need to currently be aware or conscious of their potential stake in management to be considered a stakeholder (Gray 1985; Mitchell et al. 1997). Managers should, therefore, not limit their stakeholder population only to those that are actively aware of their potential stake.

While Mitchell et al. (1997) start with a broad definition of actual and potential stakeholders, they recognize the need to develop acceptable and justifiable criteria for differentiating stakeholders from non-stakeholders. They propose that a 'stakeholder' (whether a person, group, organization, society, etc.) has at least one of the following attributes: power, legitimacy, and/or urgency (Mitchell et al. 1997); these attributes more explicitly describe how a stakeholder affects (or is affected by) management. They establish that *power* enables social actors to impose their will on others (see also Gray and Hay 1986; Jamal and Getz 1994). A social actor has *legitimacy*, to the extent that their actions "...are considered desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman 1995, p. 574) and they are perceived to have the right and capacity to participate (Gray 1985; Gray and Hay 1986; Jamal and Getz 1994; Lawrence et al. 1999). *Urgency* exists to the extent that

a social actor has a concern, relationship, or stake that is important, critical, or time-sensitive. The degree of each of these attributes is based on the perceptions of managers and other stakeholders; therefore, these attributes exist in a subjective reality and may vary as time, issues, and relationships change (Gray 1985; Lawrence et al. 1999). Whether alone or in combination, these attributes allow managers to determine *who* is a stakeholder. As we will see later, the salience or relative importance of a stakeholder varies according to how many of these attributes they possess (i.e., a stakeholder with all three attributes is more salient that one with a single attribute; Mitchell et al. 1997).

While some stakeholder theorists argue that the natural environment can also be considered a stakeholder (Stone 1974; Starik 1995; Worrell and Appleby 2000), we are limiting this study to humans and their social units due to unresolved philosophical questions surrounding non-human attainment of stakeholder status (see Phillips and Reichart 2000). For example, although the environment is affected by management actions, does it have interests and concerns? Can it determine how to impose its power, enhance its legitimacy, or assess its urgency? It may not matter. The intrinsic and instrumental values of environmental resources are widely recognized, and humans have moral and ethical reasons to maintain environmental quality and sustainability *regardless* of stakeholders' environmental interests (or lack thereof; Phillips and Reichart 2000). While we do not attempt to resolve these debates, we assume that interests regarding the use, conservation, and protection of the natural environment will be represented by the environmental interests and concerns of some stakeholders.

Although most of Mitchell et al.'s (1997) literature review is rooted in business management theory, their proposed criteria for identifying stakeholders are applicable to

any management setting, including natural resources. These criteria, which maintain a potentially large and diverse set of stakeholders, are based on the growing recognition that managers have some degree of social responsibility and responsiveness for the claims and interests of multiple social actors, including those outside their 'firm' (Mitchell et al. 1997; Argandona 1998). Natural resource management, operating under the public trust doctrine, is a field with strong roots in public service and social responsibility; therefore, the above criteria are highly applicable to identifying natural resource stakeholders.

In the case of natural resources management, the word 'organization' in Freeman's (1984) definition would refer to the resource management agency (i.e., the state's Department of Natural Resources), and 'managers' are those who are responsible for planning, implementing, and evaluating natural resource use, allocation, and conservation. Many sectors of the general public have power, legitimacy, and/or urgency regarding resource management issues, as resources like water, land, minerals, wildlife, soil, air, and vegetation are widely utilized and enjoyed by multiple, often competing, stakeholders (Grimble and Wellard 1997). Whether resources are local or distant, humans and their social systems are highly and inextricably dependent on the continued access to and use of natural resources and their ecosystems; therefore, the stakeholder population is potentially extensive, diverse, and intensely committed to their resource management interest. For complex social problems, like natural resources management, a well-defined stakeholder population will "match the complexity inherent in the issue itself" (Gray 1985, p. 919).

In this study, we are specifically interested in identifying the stakeholder population for a specific kind of natural resource: recreational fisheries. In Michigan,

where the study site is located, fish and their water bodies are public property. Applying the above stakeholder identification principles to the topic of recreational fishing, anyone who wants to fish or is concerned about fish or fishing can be considered a stakeholder. Additionally, when fisheries are considered in context of their role in the landscape, anyone who engages in land- or water-based activities that affect fish populations or habitats can be considered a stakeholder (Selman and Wragg 1999). These groups are included because "[t]he collection of stakeholders must include those whose expertise is essential to building a solution" (Gray 1985, p. 918). Anyone in these groups can affect managers' abilities to do their jobs, and they can, in turn, be affected by managers' activities. In this sense, such people have some degree of power, legitimacy, and urgency regarding the management of the recreational fishery; these are our stakeholders.

Instead of trying to identify *each* individual person or social unit with fisheries stakeholder attributes, however, we are limiting our study to fisheries stakeholders at the organizational level. We believe this will facilitate an efficient, yet still effective, stakeholder identification process. Organizations serve and represent the collective interests, concerns, and values of its members (Scott and Lane 2000); therefore, most fisheries stakeholders' interests and concerns will be reflected at the organizational level. Furthermore, the principles of power, legitimacy, and urgency apply to stakeholders organizations, as they apply to any social unit (Mitchell et al. 1997). We do not propose that managers *only* consider stakeholder *organizations*; nevertheless, organizational-level studies enable resource managers to understand the breadth and depth of stakeholder interests, concerns, and impacts.

Stakeholder Identification

Stakeholder Criteria

Using the principles of stakeholder theory and ecosystem-based management, we developed four criteria to be consistently applied in the evaluation of organizational characteristics; these criteria will guide the fisheries stakeholder organization (FSO) identification process for the PM watershed. First, FSOs must meet the following criteria: (1) they are organized as a group, serving or representing the interests of individuals or businesses, and (2) they are located or interested in the PM watershed. The first criterion includes clubs with voluntary membership as well as government agencies, universities, and other groups of people brought together for some common purpose. The second criterion enables us to capture those organizations that are physically located in the watershed, those that have a jurisdictional or geographic scope that encompasses the watershed, and other groups that are interested in PM watershed-specific issues. Watershed boundaries in this study are based on those identified in the USDA Forest Service's (1976) wild and scenic river study report.

In addition to the first two criteria, either or both of the following criteria must apply: (3) they have an interest in fisheries and/or (4) they have an impact on aquatic habitat and fisheries. While the first two criteria capture all organizations in or interested in the PM watershed, these criteria narrow the FSO set to those that have interests in or impacts on the fishery (i.e., they have power, legitimacy, and/or urgency regarding this fishery). While some stakeholder organizations would almost certainly be aware of their interest in fisheries issues, some organizations may or may not be aware of their impacts

on the fishery or fish habitat. As long as an organization may affect the quality and quantity of fish habitat (e.g., a county road commission), they may be subject to habitat-conserving regulations and environmental liabilities (e.g., related to road maintenance or bridge construction). Whether realizing it or not, many groups in the watershed have such a stake in the status of fish habitat and therefore, in an ecosystem-based resource management context, they can be considered stakeholders.

These four criteria exclude individual stakeholders that are unaffiliated with an organization and those that have only transient or temporary concerns about the watershed (e.g., tourists). The criteria also exclude individual for-profit private businesses that are not already represented by a chamber of commerce or other economic development organization. Including these individual stakeholders would have produced an unmanageably large population and would have introduced numerous additional variables that would complicate any further analysis. Nevertheless, these criteria likely capture and represent most of the stakeholders concerned about or having impacts on fisheries issues in the PM watershed. We assume that these FSOs are capable of representing most of the fishery-related interests and concerns of individuals and businesses in the PM area.

Identification Process

Using these four criteria, we developed a list of FSOs in or concerned about fisheries in the PM watershed. First, based on previous studies related to natural resource stakeholder organizations, we generated a list of the types of organizations that would meet the criteria. For example, we expected to find special interest organizations

(focused on conservation or outdoor recreation), various levels of government agencies (from local units to national agencies), university-based extension and information groups, and economic development groups interested in fishing-based tourism. Second, we used the criteria to look for the names of organizations that would fit in each category. In doing this, we consulted environmental directories, government directories, and management documents (e.g., meeting records) about the fishery and the PM river area. We also searched on the Internet and by word-of-mouth. As we performed this search, we examined the mission statement or purpose of each organization to verify that it meets our criteria. This search enabled us to prepare a preliminary list of FSOs.

In the next phase of identifying stakeholders, we used a theoretical, or purposive (as opposed to random), sampling design to identify a set of reviewers who could help further refine this preliminary list. This qualitative approach, similar to the Delphi Technique (Patton 1997, p. 151), involves: 1) selecting participants to review and expand upon information already obtained; 2) refining the information based on participants' input; and 3) repeating the review stage of the process until no additional changes are recommended, indicating the participants' consensus (Lawrence et al. 1999). Accordingly, we had our preliminary list reviewed by people familiar with the PM watershed and its fisheries issues. For example, the list was reviewed by scientists who conduct research in the area, professionals who work in the area, and by private citizens who live in the area. Many reviewers also recommended knowledgeable others who could review the list. In their examination of the list, we asked reviewers to add organizations that they felt would meet the four criteria, and we asked them to delete those organizations that they felt did not meet the criteria. We collected information

(e.g., about their purpose, mission statement, etc.) on the added organizations to verify that they met our criteria. This review process was repeated until the reviewers recommended that no further changes be made to the list.

Results: Fisheries Stakeholder Organizations

Using this stakeholder identification and review process, we generated a list of 101 FSOs. These organizations fell under the categories of federal, state, county, township, and city government; local and regional economic development organizations; conservation- and recreation-oriented organizations; education and information organizations; partnership organizations; and other special interest organizations. A complete list of these FSOs can be found in Appendix A.

Several types of government agencies are represented by the nine FSOs in the federal government category (Table 1.1). The U.S. Fish and Wildlife Service, under the Department of the Interior, operates the Ludington Biological Station. This office, located at the mouth of the PM River, primarily conducts research and activities to control populations of sea lamprey, a non-native parasitic species that reproduces in Great Lakes tributaries (including the PM River). The U.S. Department of Agriculture houses agencies such as the U.S. Forest Service, the Natural Resource Conservation Service, and the Farm Service Agency, all of which have offices in the PM watershed. The Forest Service manages the Huron-Manistee National Forest, which is largely located in the PM watershed. The Natural Resource Conservation Service provides technical expertise and support for conservation of soil, water, wetlands, and other resources, both public and

private. Their network of local Conservation Districts includes offices in Mason-Lake, Oceana, and Newaygo Counties, all of which include portions of the PM watershed. The Farm Service Agency also has a network of county-based offices that encompass parts of the PM watershed, via Mason-Oceana, Osceola-Lake, and Newaygo Counties. These offices provide a range of agriculture support programs, including conservation programs that give farmers incentive to engage in land stewardship behaviors such as planting vegetation for wildlife habitat, reducing erosion, maintaining buffer strips, and reducing waste production. The Tribal Council of the Little River Band of Ottawa Indians oversees a wide range of tribal interests, including their stake in fisheries management in their "home waters" in western lower Michigan. The Little River Band of Ottawa Indians is included in the federal government category of FSOs because of their status as a sovereign nation and their association with other agencies in the U.S. federal government (e.g., the Bureau of Indian Affairs).

Table 1.1. Federal government agencies and offices concerned about or having impacts on PM watershed and/or fisheries.

US Fish and Wildlife Service, Ludington Biological Station
USDA Forest Service, Baldwin Ranger Station
USDA Natural Resource Conservation Service, Mason-Lake Conservation District
USDA Natural Resource Conservation Service, Oceana Conservation District
USDA Natural Resource Conservation Service, Newaygo Conservation District
USDA Farm Service Agency, Mason-Oceana County Office
USDA Farm Service Agency, Osceola-Lake County Office
USDA Farm Service Agency, Newaygo County Office
Tribal Council, Little River Band of Ottawa Indians

The State of Michigan has twelve agencies and offices that are responsible for various aspects of the PM watershed and fisheries (Table 1.2). Seven of these are associated with the Michigan Department of Natural Resources (MDNR), which manages

the state's natural resources of behalf of its citizens. The MDNR is organized into several different Divisions or Bureaus that are responsible for different resource types, and each Division maintains management units and field offices through which they carry out management activities. Several MDNR Divisions and management units encompass portions of the PM watershed, including the Fisheries Division, Forest Management Division, and Parks & Recreation Bureau, which work out of a field office in Cadillac, MI. The Wildlife Division maintains a field office in Baldwin, MI. The Law Enforcement Division has two Districts, 6 and 9, that operate from offices in Cadillac and Grand Rapids, MI, respectively (multiple offices of the same division are considered separate FSOs, due to differences in local issues, perspectives, and staffing). The Natural Rivers Program, administered from MDNR headquarters in Lansing, MI, runs the state's program for designating 'Natural River' systems, which includes the PM River and its tributaries. Through this program, the state works with local governments and riparian landowners to protect and enhance the rivers' wild and scenic qualities through zoning rules and other land use regulations. Collectively, these MDNR units manage fish, forest, wildlife, and river resources; provide outdoor recreation opportunities; maintain public safety and resource protection; and minimize conflicts between resource users. In addition to the MDNR, three other state agencies are responsible for or somehow affect areas of the PM watershed: the Department of Environmental Quality (DEQ), the Department of Agriculture (MDA), and the Department of Transportation (DOT). The DEQ is responsible for many aspects of water, air, and land quality throughout the state, yet most of their resource protection activities applicable to the PM watershed are managed by the Land and Water Management Division, with offices in Grand Rapids and

Cadillac. The MDA is also organized into multiple divisions and regions, and the PM watershed is entirely located in Region 3. This region's office is in Grand Rapids, and it houses parts of the Food & Dairy Division, Pesticide & Plant Pest Management Division, and TB Unit (related to bovine tuberculosis disease). The DOT has two Regions that encompass parts of the PM watershed, the North and the Grand; these regions have Transportation Service Centers in Cadillac and Muskegon, MI, respectively. Through these service centers, the DOT engages in maintenance and construction activities for state roads and bridges; these activities can affect river quality through bank erosion and pavement runoff and by altering land use patterns in the watershed.

Table 1.2. State government agencies and offices concerned about or having impacts on PM watershed and/or fisheries.

MDNR Fisheries Division, Cadillac Field Office
MDNR Forest Management Division, Cadillac Field Office
MDNR Wildlife Division, Baldwin Field Office
MDNR Parks & Recreation Bureau, Cadillac Field Office
MDNR Law Enforcement Division, District 6, Cadillac Field Office
MDNR Law Enforcement Division, District 9, Grand Rapids Field Office
MDNR Natural Rivers Program, Lansing
MDEQ Land & Water Management Division, Cadillac
MDEQ Land & Water Management Division, Grand Rapids
MDA, Region 3 Office, Grand Rapids
MDOT, North Region, Cadillac Transportation Service Center
MDOT, Grand Region, Muskegon Transportation Service Center

Four counties encompass parts of the PM watershed: Mason, Lake, Oceana, and Newaygo. County governments engage in a wide range of local planning and governance issues, although only certain county offices engage more directly in land use and other activities that affect watersheds and fisheries. Therefore, instead of listing each county government as a single FSO, we focused on those county offices that more clearly met

our criteria. We identified seven resource-related offices within the four county governments as FSOs (Table 1.3). These county offices include Drain Commissioners and Road Commissioners (these are combined in one office for Lake County). Drain Commissioners oversee patterns and types of water consumption, discharge, and drainage. Road Commissioners oversee the maintenance and construction of county roads and bridges, thereby affecting water quality through erosion and runoff processes. Both types of offices affect development and land use patterns in the landscape, which in turn produce other impacts on land and water resource quality.

Table 1.3. County government offices concerned about or having impacts on PM watershed and/or fisheries.

Mason County Drain Commissioner
Mason County Road Commissioner
Lake County Road and Drain Commissioner
Oceana County Drain Commissioner
Oceana County Road Commissioner
Newaygo County Drain Commissioner
Newaygo County Road Commissioner

Twenty-eight townships are located entirely or partially in the PM watershed (Table 1.4). Although local activities may vary from township to township, they generally provide for local governance and services that are not met by county or city offices. Since townships also perform some land use planning and development functions, they can affect the quality of local land and water resources. Township governments generally have a small staff (some may be volunteers), and they do not tend to have separate offices or departments for resource-related functions (as are seen at the county level). We are therefore able to meet our criteria by counting each township government as a single FSO.

Table 1.4. Township governments concerned about or having impacts on PM watershed and/or fisheries.	
Pere Marquette Township	Pleasant Plains Township
Amber Township	Yates Township
Custer Township	Chase Township
Branch Township	Crystal Township
Sweetwater Township	Colfax Township
Peacock Township	Troy Township
Webber Township	Lilley Township
Cherry Valley Township	Home Township
Pinora Township	Barton Township
Summit Township	Leavitt Township
Riverton Township	Beaver Township
Eden Township	Merrill Township
Logan Township	Monroe Township
Lake Township	Norwich Township

The PM watershed is generally a rural environment, and there are only three cities or villages in the PM watershed that have a population more than 500 people: Ludington, Scottville, and Baldwin (Table 1.5). Cities and villages are other layers of local government, providing schools, libraries, parks, police and emergency response, waste management, and other public services. Like townships, city councils and committees also engage in local planning issues such as zoning, land development, and infrastructure development; therefore, they also affect the quality of land and water resources through some of their activities. Also like townships, these city governments are fairly small, and they tend to have most planning functions concentrated in a central office. Our criteria were satisfied by considering each city government as a single FSO.

Table 1.5. City governments concerned about or having impacts on PM watershed and/or fisheries.
City of Ludington
City of Scottville
Village of Baldwin

Within the region, counties, and cities that overlap with the PM watershed, there are 10 organizations that promote tourism, development, and other forms of economic activity for the PM area (Table 1.6). These organizations, generally government/non-profit hybrids, support and represent the interests of private enterprises; promote the benefits of engaging in business locally; and attract customers, tourists, and investors to the region. Such organizations include chambers of commerce, tourism councils, and economic development corporations for local cities and counties. Two organizations, the West Michigan Shoreline Regional Development Commission and the West Michigan Tourist Association, perform these functions at a broader regional scale. We consider these organizations to be FSOs, because by attracting businesses and investment they influence patterns of land, water, and infrastructure use and development, thereby affecting resource quality in the landscape. In addition, they attract tourists to the PM river who seek to fish, canoe, hunt, camp, hike, snowmobile, and engage in other forms of outdoor recreation. Through their access to and interactions with land and water resources, these recreationists affect the status of resources and may become involved in resource-related issues and conflicts.

Table 1.6. Local and regional economic development organizations concerned about or having impacts on PM watershed and/or fisheries.

Ludington Chamber of Commerce and Convention & Visitors Bureau
Scottville Chamber of Commerce
Mason County Economic Development Corporation
Lake County Enterprise Community Board
Lake County Chamber of Commerce and Tourist Center
Oceana County Economic Development Corporation
Oceana County Tourism Bureau
Newaygo County Tourist Council
West Michigan Shoreline Regional Development Commission
West Michigan Tourist Association

We identified six organizations that are interested in promoting resource conservation and protection for the PM watershed and its fisheries (Table 1.7). These non-government, non-profit organizations consist of private citizens with similar interests and concerns. Organization members voluntarily engage in activities that support their common interests; in this case, their interests focus on resource protection and conservation. Specifically, the Pere Marquette Watershed Council is a grassroots organization whose members are dedicated to preserving the natural resources of the PM watershed. They engage in a wide range of activities and projects, many in cooperation with other agencies and organizations, to protect and enhance fish habitat and other natural features in the area. One of their partners is the Ruby Creek Conservation and Recreation Club, named after a small tributary of the PM River, which also promotes education, stewardship, and protection of the PM watershed. Other local groups are chapters or sub-units of national organizations. The Mackinac (or Michigan) Chapter of the Sierra Club promotes environmental stewardship through a wide range of activities, many of which occur through members at the local level. For example, the West Michigan Group of the Mackinac Chapter is active in counties that encompass the PM watershed. Similarly, members of the Oceana Sub-chapter of the National Audubon Society, based in Ludington, are dedicated to conserving and restoring natural ecosystems for birds and other wildlife. In addition, the West Michigan Environmental Action Council, based in Grand Rapids, focuses on environmental education, preservation, and protection in western Michigan counties. Finally, the Michigan Chapter of The Nature Conservancy (TNC), based in Lansing, relies on members' volunteer efforts, financial contributions, and other donations to identify, purchase, and protect rare, threatened, and

other biologically-diverse habitats, both terrestrial and aquatic. They have identified a number of these sensitive habitats throughout Michigan, some of which are located in the PM watershed.

Table 1.7. Protection-oriented conservation organizations concerned about or having impacts on PM watershed and/or fisheries.

Pere Marquette Watershed Council
Ruby Creek Conservation and Recreation Club
Sierra Club, Mackinaw Chapter, West Michigan Group
Michigan Audubon Society, Oceana Sub-chapter
West Michigan Environmental Action Council, Grand Rapids
The Nature Conservancy, Lansing

Many other organizations are also interested in resource conservation, although their interests tend to be expressed in context of their interests in outdoor sporting activities. Members of these organizations are generally interested in outdoor activities, such as fishing and hunting, and issues that affect these recreation opportunities. We created a separate category for these organizations, since members of groups in each category may express their conservation interests through different types of value systems (Holsman 1999; Bright et al. 2000). For example, recreation-oriented conservationists may be more likely to think that natural resources should be utilized or controlled by humans (i.e., *utilitarian* or *dominionistic* attitudes), while the protection-oriented conservationists may tend to think that natural resources should be protected from human impacts (i.e., *moralistic* or *aesthetic* attitudes; see Kellert (1980) for more information on attitudes). These value systems have implications for members' attitudes, motivations, behaviors (Holsman 1999) as well as their organization's priorities, goals, and involvement with management (Bright et al. 2000). Nevertheless, we recognize that

many general conservation concerns (e.g., habitat restoration, pollution reduction, etc.) and attitudes (e.g., *naturalistic* and *ecologistic* attitudes) are applicable to members in both types of conservation groups.

This blending of interests and attitudes is represented by the Lansing-based Michigan United Conservation Clubs, one of the nine organizations we are classifying as recreation-oriented conservation organizations (Table 1.8). This umbrella organization, whose membership consists of individuals as well as other conservation organizations, helps to unify and represent a diverse set of conservation interests throughout the state. Many of these interests focus on preserving Michigan's outdoor hunting and fishing heritage, and they support educational and scientific management programs that help meet these interests. The PM watershed is one of their many interest areas, and many of their organizational and individual members are active in this area. Some of their member organizations active in the PM watershed include the Fin & Feather Club of Mason County, Oceana Sportsmen's Club, Newaygo County Sportsmen's Club, and Citizen's Sportsmen's Club. These groups' interests generally focus on hunting, fishing, and the conservation issues that affect their access to and enjoyment of these activities. Three of the groups we identified are local chapters of larger international organizations, such as the West Michigan Chapter of Trout Unlimited, the West Michigan Hacklers of the Federation of Fly Fishers, and the Westside Steelheaders (see note in Table 1.8) of the Michigan Steelhead and Salmon Fishermen's Association. Members of these organizations are interested in enhancing, protecting, promoting, and enjoying trout and salmon angling, much of which occurs in the PM River. The last organization in this category is the Pere Marquette Rod and Gun Club, an association of landowners who are

interested in hunting and fishing.

Table 1.8. Recreation-oriented conservation organizations concerned about or having impacts on PM watershed and/or fisheries.
Michigan United Conservation Clubs, Lansing
Fin & Feather Club of Mason County
Oceana Sportsmen's Club
Newaygo County Sportsmen's Club
Citizen's Sportsmen's Club
Trout Unlimited, West Michigan Chapter
Federation of Fly Fishers, West Michigan Hacklers
Michigan Steelhead and Salmon Fishermen's Association, Westside Steelheaders*
Pere Marquette Rod & Gun Club
* No longer a sub-group; chapters in western lower Michigan were re-organized following this study.

The next category of FSOs includes those organizations with an educational or information-oriented mission, part of which focuses on environmental or conservation information in the PM watershed (Table 1.9). Five of these are affiliated with Michigan State University Extension (MSUE). Extension organizations facilitate the application of knowledge and information to help people improve their quality of living (Edgerton 1987), and much of their work in Michigan focuses on agriculture and natural resource issues in rural communities. They are administratively organized into regional offices (the West Central Region includes the entire PM watershed) and county-based extension offices (the Mason, Lake, Oceana, and Newaygo County offices encompass parts of the watershed). Like other organizations with multiple administrative units, we consider each MSUE unit to be a separate FSOs, due to differences in local issues and staffing. Finally, we include West Shore Community College, located in Scottville. This college offers Associate of Science degrees in some social and natural sciences that are relevant

to local fisheries and environmental issues. They also maintain a Natural Resource Institute, through which faculty and students may engage in watershed-oriented projects.

Table 1.9. Education and information organizations concerned about or having impacts on PM watershed and/or fisheries.
MSU Extension, West Central Region office
MSU Extension, Mason County office
MSU Extension, Lake County office
MSU Extension, Oceana County office
MSU Extension, Newaygo County Extension
West Shore Community College, Natural Resources Institute

We classified five FSOs as partnership organizations, or organizations whose membership consists of multiple agencies and organizations (Table 1.10). The Great Lakes Fishery Commission (based in Ann Arbor, MI) is an international government organization through which the U.S. and Canadian federal governments coordinate and support state, provincial, and tribal fisheries management and conservation. The Great Lakes Fishery Trust is an organization created to manage the settlement of a federal court case brought against the Consumers Power and Detroit Edison Ludington Pumped Storage Plant, located at the mouth of the PM River. Members of the trust, representing state, federal, tribal, and special interest organizations, provide funding and support for enhancing, protecting, and restoring fishery resources that were lost due to pump storage plant operation. The Conservation Resource Alliance (based in Traverse City, MI, covering Mason and Lake Counties) and the Timberland Resource Conservation & Development (based near Grand Rapids, covering Oceana and Newaygo Counties) are inter-governmental organizations, through which USDA Conservation Districts, county governments, and other local government partners work together to conserve soil, water,

forests, and fish and wildlife habitat and promote local community resource-based development. Both of these organizations have expressed interest in the status of fisheries and other resources in the PM watershed. The Michigan Natural Features Inventory (MNFI), a partnership between MSUE, TNC, and the MDNR, maintains a database on Michigan's plant and animal species and communities that are endangered, threatened, or of special concern. They list 95 species and communities for the four counties encompassing the PM watershed (MNFI 2001).

Table 1.10. Partnership organizations concerned about or having impacts on PM watershed and/or fisheries.

Great Lakes Fishery Commission
Great Lakes Fishery Trust
Timberland, Resource Conservation & Development
Conservation Resource Alliance, Resource Conservation & Development
Michigan Natural Features Inventory

In our last category, we identified six other special interest organizations through which members can voluntarily explore their interests and concerns related to natural resource issues (Table 1.11); these other organizations, however, do not easily fit into the above FSO categories. The Lake County Riverside Property Owner's Association is an organization that represents the interests of those who own property along the PM River. Their interests may include issues like river access, riparian habitat, recreation, user conflicts, and the legal aspects of riparian land ownership (e.g., how they develop and use their private property adjacent to the PM; Tremp 1992). The Ludington Area Charterboat Association represents many fishing charter operations, most of which focus on Lake Michigan trout and salmon while a few operations include river fishing. The Michigan River Guides Association also represents the interests of fishing guides, angling experts

who are hired to help lead river fishing excursions. Finally, we also include the Michigan Farm Bureau in this category. The Michigan Farm Bureau (a sub-unit of the American Farm Bureau) is an agriculture-oriented organization, providing members (usually farmers) with information and support about the economic, political, environmental, and operational aspects of farming and food production. They also have a county-based network of local offices, including Mason, Oceana, and Newaygo Counties.

Table 1.11. Other special interest organizations concerned about or having impacts on PM watershed and/or fisheries.
Lake County Riverside Property Owner's Association
Ludington Area Charterboat Association
Michigan River Guides Association
Michigan Farm Bureau, Mason County
Michigan Farm Bureau, Oceana County
Michigan Farm Bureau, Newaygo County

Discussion

This study demonstrates that the FSO population in and around the PM watershed is large and diverse, and this universe of potential fisheries stakeholders presents communication challenges to resource managers. We acknowledge that this stakeholder identification process may have missed some potential FSOs, and this may have implications for managers' communication efforts. Nevertheless, the range of organization types revealed in this study illustrate that there is a wide range of interests surrounding local fisheries and watershed management efforts. We expect that the application of our four criteria to other watersheds or geographic areas would yield

similar types of stakeholder diversity and complexity; in fact, an increasingly large and complex stakeholder population would likely emerge for larger geographic areas that may encompass more natural features and resource production activities.

Once fisheries managers recognize the magnitude and diversity of their potential stakeholder population, how can they incorporate this information in their management approaches? First, they need to become familiar with these organizations to appreciate the variability between stakeholders. Organizations likely have different interests, goals, activities, and resources, and thus have different types of impacts on the fishery. Not all stakeholder organizations are equal in their importance or relevance for any given issue (Grimble and Wellard 1997; Mitchell et al. 1997). This leads to a second consideration: managers need to understand how and why stakeholders may relate to any specific management issue. Each issue will attract the interest (or be affected by the impacts) of a different set of stakeholders. Some issues will generate little involvement, while some issues will generate great controversies among stakeholders (Grimble and Wellard 1997). Left to their own devices, stakeholder organizations will engage (and disengage) in management issues as they see fit, and managers may assume a passive, or reactive, role in these stakeholder interactions.

The value of a stakeholder identification process lies in its ability to help managers assume a more *active* role in stakeholder interactions (Grimble and Wellard 1997; Mitchell et al. 1997). Once a population of potential stakeholders is identified for a given area, managers have an important database from which they can quickly and accurately distinguish those organizations that may have an interest or stake in any specific management objective, issue, and setting. For example, fishery managers

interested in a recreation opportunity marketing campaign can easily identify economic- or tourism-related organizations for possible collaboration. Having identified stakeholders and their interests, managers can look for ways to target or package their information to these groups more effectively, and they can encourage certain groups to work together on issues of common concern. The resulting patterns of communication can help managers develop approaches that are more appropriate to local conditions and interests, facilitate education about appropriate forms of resource use, and minimize the potential for conflicts that can be costly in both time and money (Grimble and Wellard 1997).

Managers must note, however, that some organizations identified by our criteria may *not necessarily* consider themselves to be fisheries stakeholders. For example, some organizations may express indifference for fisheries issues, and some may not even be aware that they are located in the PM watershed. We do not believe that this should preclude their potential involvement in fisheries management discussions, since they may still affect—and be affected by—fishing, fish habitat, or landscape hydrology. Managers, using this stakeholder identification process, can develop a more comprehensive understanding of how these groups may directly and indirectly relate to their management efforts, and they can seek appropriate forms of communication, education, and ongoing dialogue with these groups as necessary.

While developing a list of potential stakeholder organizations can be a valuable management exercise that facilitates stakeholder communication, this process provides only limited information on potential communication patterns and strategies. A list or database does not convey any information about the interactions or relationships between

organizations; in other words, it does not capture the social structure of the stakeholder community. This type of sociological information could help explain the distribution of power, influence, investment, and effectiveness among stakeholder organizations. We believe that managers would also benefit from this type of information as they determine if, why, and how to more effectively and efficiently engage stakeholders in fishery management decisions. In our next chapters, we explore the development and implications of the FSO interorganizational network for the PM watershed.

CHAPTER 2

FORMATION OF INTERORGANIZATIONAL TIES AND NETWORKS: UNDERSTANDING THE INTERACTIONS OF FISHERIES STAKEHOLDER ORGANIZATIONS

Introduction

Natural resource issues affect—and are affected by—numerous stakeholders with diverse goals. The natural resource policy arena is a dynamic forum in which stakeholders may engage (or disengage) in different types of resource issues, depending on their interests, goals, and abilities. Various patterns of stakeholder relations thereby emerge, as stakeholders find ways to learn about and influence the formation and/or application of natural resource policies. Stakeholder engagement often occurs at the organizational level, and the resulting patterns of interorganizational relations provide insight into the nature of a given resource issue or policy.

In this study, we examined the interorganizational stakeholder relations surrounding Pere Marquette (PM) River fisheries and watershed issues. The existing pattern of stakeholder relationships establishes the framework for understanding how and why organizations interact and how future interactions may be facilitated. We explored these interorganizational relations by asking: what kind of organizations enter these relations, and what kind of interactions occur? In addition, once we identified the structure of the interorganizational relations network, we explored properties of this network by asking: how and why do clusters (i.e., distinct sub-networks within the

overall network) form, and what kind of organizations occupy central positions in these clusters? Ultimately, answers to these questions will help fisheries and watershed managers develop more efficient and effective forms of communication with stakeholders in the interorganizational network.

As a first step, we established our level of analysis in studying interorganizational relations. Instead of focusing on the relations of any one particular organization, we focused on how and why relationships form within the interorganizational field or system. This system, or problem domain, includes the network of stakeholder organizations that are joined by a shared issue or problem, and it is the appropriate level of analysis for interorganizational relations (Benson 1975; Van de Ven et al. 1979; Gamm 1981; Gray 1985; Gray and Hay 1986; Wood and Gray 1991; Selin 1993; Jamal and Getz 1994). This domain, by definition, is an emergent social phenomenon that represents a "collectivity in which member organizations are identified as being interdependent with respect to some function, issue, or concern" (Gamm 1981, p. 29).

How can an interorganizational problem domain be distinguished, and therefore studied, from its greater social system? When studying organizations associated with a social problem or concept (a *nominalist* approach; see Laumann et al. 1989), identifying stakeholder organizations within a problem domain has the effect of setting domain boundaries (Gamm 1981; Gray and Hay 1986; Wasserman and Faust 1994). The network boundary-setting process, therefore, reflects current understanding of the problem and its stakeholders, but it also affects how the problem is subsequently framed and understood and, ultimately, how effectively and efficiently it may be resolved. For example, studying an incomplete or incorrect set of stakeholders will likely fail to facilitate resolution of the

problem or issue. Domain-level problems cannot be solved by any single organization; their resolution inherently requires collective action by many—if not all—domain stakeholders (Gamm 1981; Gray 1985; Jamal and Getz 1994). In this study, the domain encompassed a unique network of fisheries and watershed stakeholder organizations, a network which may not be applicable or relevant for any other type of issue domain (e.g., health care or youth services). We were interested in learning if and how this particular set of stakeholder organizations forms relationships to collectively address issues in their domain.

This analysis begins with a description of organizations and issues in the PM watershed and fisheries domain. We then review the literature about theories of interorganizational relations, and this is followed by a more targeted exploration of how these theories can be tested by looking at organizations' communication, resource contribution, and collaboration behaviors. With this information, we form numerous hypotheses about how organizational attributes may act as predictors of interorganizational tie formation, the properties of these interorganizational ties, and the structural properties of the interorganizational network that emerges as the patterns of ties are constructed. We use social network analysis methods to analyze these hypotheses. The results of this study provide insight into the formation and structure of the PM stakeholder network.

Organizations in the Pere Marquette River Watershed

The PM River is a prominent feature of the west central region of Michigan's

lower peninsula (see Prologue Figure 1). The river and its recreational salmonid fisheries are the focal point of many ecological, economic, cultural, historical, and recreational issues; therefore, a diverse and vocal stakeholder community frequently becomes involved in PM watershed and fisheries issues (USDAFS 1976; Cassuto 1994; Supinski 1994; Nelson and Smith 1998).

Many stakeholder interests are represented by organizations, which have various reasons or specific interests underlying their involvement with watershed or fisheries issues. Many such organizations are governmental agencies and units. As a public resource, the PM River is government-owned and -regulated on behalf of the public and accessible to anyone (i.e., regulated open access; Tremp 1992); therefore, state and federal government agencies are charged with conserving and managing this river and other regional public resources like forests, wildlife, trails, lakes, and resource access points (USDAFS 1976).

Governmental organizations are also active at more local scales. As in other areas of Michigan, local and regional planning is done by local units of government (i.e., counties, townships, municipalities; Public Sector Consultants 1998). These units of government have boards or offices that determine local development patterns, such as how land is zoned and developed, how and where roads are constructed, and how water is consumed and discharged (Dean and Wyckoff 1991; Decker and Steiner 1997). If these local land use planning boards do not coordinate their planning activities, the resulting patterns of land use can result in habitat loss and fragmentation, alterations to regional hydrology, and excessive rates of urbanization and pollution.

In addition to various levels of government agencies, there are many non-profit

and non-governmental organizations that represent other types of local interests that relate to fisheries and watershed management. For example, certain organizations represent the economic interests of local developers and those engaged in the tourism and hospitality industries. Many member businesses of these organizations seek to develop vacation homes, access sites, and other resource-related attractions. Education-oriented organizations may focus on spreading information to the public about land use, watershed, or other resource-related issues. Other special interest organizations represent the interests or concerns of private citizens on such fisheries-related topics as environmental preservation, resource-based recreation, private property interests, or agricultural land-use practices (see Chapter 1 for a list and more complete description of these organizations).

These organizations have diverse interests and stakes in issues related to fisheries and watershed management in and around the PM River (see also Jamal and Getz 1994). For example, the PM watershed is a mix of both public and private lands; therefore, public interests may focus on different goals for PM watershed and fisheries issues than private interests. Such public/private interest clashes are evident in the issue of trespassing, as many riparian landowners actively try to keep anglers and canoeists off their private portions of the riverbank (McCoy 2001, *pers. comm.*). In addition, the tourism-oriented development goals of economic organizations may clash with those of habitat preservation organizations. Some groups are concerned that increased resource use or the creation of additional access points to the river may lead to greater levels of human impact on now pristine sections of the river (Cassuto 1994).

Despite having goals that sometimes conflict, these organizations have some

common features. They are generally public sector or non-profit, so they are not competing with each other for profits. They may, however, have limited ability to generate revenue to meet their resource needs independently, however, and they may compete with each other for a finite set of resources like grant funding or members. Many organizations, however, especially those with a conservation focus, may recognize the advantages of forming relationships with each other to secure these scarce resources (Molnar 1978; Selin and Beason 1991). For example, grant-making foundations often reward partnerships among organizations (Provan et al. 1980), and sharing organizational member lists may provide additional information outlets.

In the PM watershed, organizations are generally small (under 20 people), so their leaders (e.g., club presidents, office managers, etc.) may have a good sense of how and with whom their organizations form relations. For the most part, these organizations have authority and discretion to voluntarily interact with other organizations as they deem appropriate, although this degree of discretion may vary for those with mandates (e.g., the Michigan Department of Natural Resources) or those associated with pre-existing interorganizational federations (e.g., Michigan United Conservation Clubs affiliates; see Fleisher 1991). These organizations share other common features; for example, given the relatively low population density of the area, it is possible that there will be some overlap of members between organizations. It is also likely that many organization members know each other through various contexts, from social to professional, and they may have a personal history of working with members of other organizations. Since most organizations have existed for many decades, there will be a long institutional history (cooperative and contentious) between many of these groups, with much of this history

focusing specifically on fisheries and watershed issues (Cassuto 1994).

Interorganizational Relations Theory

Many theories of interorganizational relations attempt to explain why organizations engage in interactions such as communicating, sharing resources, and collaborating with other organizations. Since our population included diverse types of organizations (e.g., government agencies, non-profit organizations, university-based groups, etc.), we sought information on general theories that would apply to multiple types of organizations. Furthermore, given the rarity of natural resource applications of interorganizational theory (for exceptions, see Molnar 1978; Hoban 1987; Schweer 1987; Selin and Beason 1991), most of our literature review was based on interorganizational relations in other types of public service-related problem domains.

We found any single theory of interorganizational relations to be insufficient for explaining the relationships formed between stakeholder organizations in and around the PM watershed. We focused on three theories about the formation of interorganizational relations: resource dependence, political, and institutional (see Gray and Wood 1991 for more on these and other theories). These theories complement and sometimes overlap each other, and each contributes to an understanding of why such relations develop in the PM stakeholder network. This kind of theory-blending is frequently employed by researchers (Cook 1977; Provan et al. 1980; Galaskiewicz 1985; Selin and Beason 1991; Wood and Gray 1991; Jamal and Getz 1994), as there are often many different interorganizational dynamics at many different levels that may be applicable for a given

study. These theories allowed us to develop a comprehensive theoretical foundation, which enabled us to explore how and why these interorganizational relations are manifested in the behaviors of interorganizational communication, resource contribution, and collaboration.

Resource Dependence Theory

Many organizations, especially those in the public service and non-profit arena, focus on specific services or functions and have limited ability to independently fulfill all their resource needs (Cook 1977; Molnar 1978; Galaskiewicz 1985; Schweer 1987; Beatrice 1990; Logsdon 1991; Merritt and Neugeboren 1990; Jamal and Getz 1994). Resources are anything of value that can be exchanged between organizations, such as funding, equipment, information, expertise/technical assistance, political support and legitimacy, access to policy processes, service delivery capacity, or any other tangible or intangible asset that helps organizations function (Cook 1977, Van de Ven et al. 1979; Gamm 1981; Saidel 1991). Resource dependence theory assumes that organizations engage in relationships with other organizations to directly procure resources important to organizational survival (Benson 1975; Offerman 1976; Provan et al. 1980; Gamm 1981; Van de Ven and Walker 1984; Schweer 1987; Galaskiewicz 1985; Merritt and Neugeboren 1990; Selin and Beason 1991). For interorganizational relations between state agencies and nonprofit organizations, this theory assumes that resource dependence is mutual, reciprocal, substantial, and symmetrically distributed (i.e., equally important for each group; Saidel 1991).

Given the complexity and potential turbulence within any problem domain,

resource interdependencies compel organizations to form relationships that enable them to gain more control over uncertainty in resource procurement (Benson 1975; Molnar 1978; Gamm 1981; Van de Ven and Walker 1984; Turk 1985; Galaskiewicz 1985; Harrigan and Newman 1990; Gray and Wood 1991; Logsdon 1991; Selin and Beason 1991; Selsky 1991; Wood and Gray 1991; Mizruchi and Galaskiewicz 1993; Jamal and Getz 1994; Gulati and Gargiulo 1999). Cook (1977) explains resource exchange between organizations as a result of resource scarcity and specialization in organizational function. In other words, "limitations on the availability of resources necessitate organizational interdependence...and foster specialization" (Cook 1977, p. 64); this specialization, in turn, further compels organizations to seek predictable sources of other needed scarce resources from outside organizations (Van de Ven and Walker 1984; Logsdon 1991; Selin and Beason 1991; Mizruchi and Galaskiewicz 1993). This has the effect of minimizing uncertainty in securing scarce resources and, thereby, maintaining organizational function.

This theory predicts some type of collective response or behavior among those in resource-dependent positions (Galaskiewicz 1985), and such a collective response is facilitated by other commonalities in organizational attributes. Under conditions of uncertainty in resource procurement, organizations will more likely seek out other organizations with similar backgrounds, philosophies, and values—such organizations are perceived as being more trustworthy (Molnar 1978; Galaskiewicz 1985; Selin and Beason 1991; Mulroy 1997). An organization's domain (i.e., their place in the interorganizational problem domain) includes their set of interests, goals, activities, values, and philosophies, and domain similarity between organizations is frequently

associated with the formation of interorganizational relations (Molnar 1978; Gamm 1981; Van de Ven and Walker 1984; Gray 1985; Hoban 1987; Beatrice 1990; Saidel 1991; Selin and Beason 1991; Mulroy 1997; Banaszak-Holl et al. 1998). Interorganizational relations are further facilitated if organization members have had a previous, reciprocated, cooperative professional or personal experience with members of the other organization (Hoban 1987; Wimpfheimer et al. 1990; Mizruchi and Galaskiewicz 1993; Gulati and Gargiulo 1999; see also Axelrod's (1984) theory of cooperation).

This theory explains "how and why organizations act to protect a commons, or to enhance collective interests, when their immediate self-interests and autonomy may appear to align more closely with non-collective behavior" (Gray and Wood 1991, p. 7). Resource dependence theory often assumes organizations want to preserve their perceived autonomy, independence, or identity and minimize overall dependencies on other organizations (Offerman 1976; Gamm 1981; Van de Ven and Walker 1984; Hoban 1987; Gray and Wood 1991). This desire often keeps organizations from actually merging to form a new, larger organization, and it may also affect their willingness to form any organizational relationships. Oliver (1991) investigated this assumption, however, and found that "[t]he propensity for organizations to enter into relations with one another was shown to be unrelated to the degree of commitment or loss of autonomy required by these relationships" (p. 959). This outcome may indicate that the benefits of interorganizational relations (i.e., resource mobilization, reduction of uncertainty, etc.) outweigh the mutually-bourne costs of autonomy reduction (Oliver 1991). It may also reflect the idea that organizations are inevitably dependent on each other and that the concept of autonomy is a perception that may not actually apply to interdependent

organizations (Astley and Fombrun 1987). Nevertheless, it should be noted that some perceived autonomy is necessarily lost by interdependent organizations that form relationships (Saidel 1991), since this may have implications for organizational influence and accountability.

Political Theory

According to political theory, organizations enter into relationships with other organizations to influence the political system that ultimately affects how they function (Gray 1985; Roberts and Bradley 1991). For example, "stakeholders can organize coalitions to lobby for policy changes important to the domain, they can influence public opinion, and they can initiate formal contacts with other organizations or networks" (Gray 1985, p. 931) as a way to enhance their influence or power in the domain (Beatrice 1990). As in resource dependence theory, uncertainty and common interests play a role in political theories (Roberts and Bradley 1991), as organizations will work with each other to minimize the turbulence—created by governments or other powerful decision makers—that threatens their legitimacy or ability to meet their goals (Galaskiewicz 1985). In other words, organizations may enter into relationships to preserve, improve, or otherwise control their role or function within the problem domain (Provan et al. 1980; Wood and Gray 1991; Jamal and Getz 1994).

Power and authority are two organizational attributes that are important in political theories of interorganizational relationships. Within any problem domain, power and authority are unevenly distributed among organizations (Benson 1975; Provan et al. 1980; Gamm 1981; Gray 1985; Gray and Hay 1986; Harrigan and Newman 1990). For

example, some organizations may be subservient to other organizations, some may control access to greater levels of resources upon which others depend, and some may have more resource alternatives—all of this affects their power and ability to form relationships (Benson 1975; Provan et al. 1980; Gamm 1981; Skinner and Guiltinan 1986; Harrigan and Newman 1990).

As a result of these power inequities, any interactions may be tempered by organizations' relationships to the power structure that influences how the problem domain operates. For example, some organizations may have the discretion and ability to enter into voluntary relationships; others may need to seek approval from organizations that are 'higher up' in the chain of command (Benson 1975; Gamm 1981). The distribution (and possible re-distribution) of power affects the formation of interorganizational relationships and thereby affects the resulting distribution of influence and benefits within a domain's network of stakeholders (Provan et al. 1980; Boje and Whetten 1981; Harrigan and Newman 1990; Gray and Hay 1986; Gray and Wood 1991; Lawrence et al. 1999).

Political theories of interorganizational relationships help explain what is happening with the PM stakeholder network, as the fisheries and watershed issues are inherently political in nature (i.e., how to manage and allocate limited, common public resources for the greatest interest of diverse stakeholders). The PM River and much of its surrounding lands function as a type of common property, and this presents some political issues that are addressed by this theory (see also Jamal and Getz 1994). Golich (1991) explains some features of common resources that present challenges to interorganizational relations; for example, users cannot be excluded and benefits cannot

be divided or appropriated. Nevertheless, regulation of the common resource needs to occur, and organizations must somehow access the existing power structure to ensure that they can negotiate or otherwise secure some role in the domain. Their need to protect their interests compels them to engage in the political system that controls the common resource (Golich 1991).

Institutional Theory

Institutional theorists recognize that there are institutional and other environmental constraints—often beyond organizations' control—that affect options for the type and frequency of interorganizational relations (Boje and Whetten 1981; Turk 1985; Blau and Rabrenovic 1991; Mizruchi and Galaskiewicz 1993). These theories are consistent with the assumptions of resource dependence and political theories of collaboration, yet they go further in recognizing the constraints that either enable or inhibit the formation of a relationship (Gray and Wood 1991). "[I]nstitutionalization means that a domain has become a routinized, calculable, well-integrated system, with rules of legitimate policy participation well understood and accepted by all the players" (Knoke 1990, p. 168). These institutions, or rules, establish the norms in a social system and thereby affect perceived options for interaction (Turk 1985; Galaskiewicz and Wasserman 1989; Sharfman et al. 1991; Wood and Gray 1991).

Formation of interorganizational relationships, therefore, must often be consistent with the contextual constraints of mandates, laws, traditions, public stands, constituent expectations, geographical locations, jurisdictional boundaries, and other limits that affect organizations' perceived options (Benson 1975; Boje and Whetten 1981; Hoban 1987;

Beatrice 1990; Wimpfheimer et al. 1990; Blau and Rabrenovic 1991; Gray and Wood 1991; Selin and Beason 1991; Mizruchi and Galaskiewicz 1993; Selin 1993; Mulroy 1997). In a circular sense, even the structure of the relationships within the interorganizational network poses institutional and environmental constraints on an organization's perceived options for forming relationships (Selsky 1991; Gulati 1995; Gulati and Gargiulo 1999). Furthermore, organizational interactions are facilitated by similarity or proclivity of organizations' institutional constraints—like geographical locations, institutional mandates, and institutional purposes/products—as well as by mutual awareness of other organizations' goals, services, resources, expertise, and reputations (Van de Ven et al. 1979; Boje and Whetten 1981; Gamm 1981; Galaskiewicz 1985; Gray 1985; Hoban 1987; Selin and Beason 1991; Selsky 1991; Mizruchi and Galaskiewicz 1993).

Institutional mandates present a type of constraint that is applicable to this study and warrants additional consideration. Many of our stakeholder organizations are government agencies, and many of these are mandated—through law or policy—to interact with other organizations (Schweer 1987; Merritt and Neugeboren 1990). Mandates can be a powerful institutional force in creating interorganizational relations, yet mandated "structure without facilitative conditions is insufficient to promote collaboration" (Gray 1985, p. 929) or other types of relationships. Although much of the preceding discussion has focused on the voluntary (as opposed to mandated) formation of interorganizational relations, many of the same concepts apply to the formation of *effective* mandated relations (Gray 1985). For example, mandates for interorganizational relations should recognize and be built upon the interdependencies, mutual resource

needs, shared political interests, and other facilitating conditions that the interacting organizations have in common.

Institutional theorists further recognize that organizations will structurally adjust themselves with institutional or environmental forces, such as mandates, as a way to enhance their legitimacy (Offerman 1976; Turk 1985; Galaskiewicz and Wasserman 1989; Gray and Wood 1991; Sharfman et al. 1991). For example, by conforming to others' expectations, mimicking the interactions or behaviors of other similar organizations, or otherwise aligning with institutional forces, organizations are more likely to be accepted as valid partners, service providers, or customers within their social system (Galaskiewicz and Wasserman 1989; Logsdon 1991; Sharfman et al. 1991; Gulati and Gargiulo 1999). By establishing interorganizational relationships, organizations are able to obtain endorsements, secure political support, enhance their public image, and otherwise identify or align with cultural symbols or power figures—all of which enhance their perceived legitimacy (Galaskiewicz 1985; Beatrice 1990; Gray and Wood 1991).

Summary of Theories

Resource dependence, political, and institutional theories of interorganizational relations lend insight into the formation of interactions among PM stakeholder organizations. In the PM watershed stakeholder network, governmental and non-profit organizations operate under conditions of uncertainty, and they each specialize in some function important to the operation of the PM fisheries and watershed problem domain. They need to secure resources, such as funding, expertise, information, facilities, and political support, from other organizations in order to maintain their function, and they

are likely to form relationships with others that have organizational domain similarity. Much of the resource sharing is done for political reasons—to generate support for organizations' positions or efforts regarding common fishery or watershed issues—given the inevitable uncertainty of the natural and political environment. Resource sharing, however, must occur under constraining institutional factors such as mandates, missions, geographical proclivity, and public opinion. The resulting dynamic interactions between organizations will enable them to operate, adapt to new issues that emerge within the domain, and influence the collective social responses that help shape the issues and future of the domain.

Organizational Behaviors as Indicators of Interorganizational Relations

We determined the nature of PM stakeholder interorganizational relations by studying three specific behaviors that indicate the presence of an interorganizational relationship: leadership communication, resource contribution, and joint program collaboration (Molnar 1978; Gamm 1981; Gray and Wood 1991; Lawrence et al. 1999). The following sections outline why we looked at each type of tie, how we think each tie may be exhibited between organizations in the PM river watershed, and specific hypotheses linking interorganizational relations theory with observations in the PM watershed.

Before proceeding, however, we should address why we aggregated the three types of ties into one network of interorganizational relations, rather than looking at the separate networks for each of the three tie types. We are primarily interested in

understanding the *overall* patterns and properties of the interorganizational relations field, among *all* the organizations in the potential stakeholder population. A network based on only one type of tie would give us only a partial picture of the overall network of interorganizational relationships (Laumann et al. 1989). Furthermore, theories on interorganizational relations frequently look at a combination of communication, contribution, and/or collaboration ties, and the predictors of these types of interorganizational relations frequently overlap. In other words, the organizational properties that predict interorganizational communication behavior are similar to those that predict interorganizational resource contribution and collaboration. Nevertheless, Knoke (1990) found that different network structures can emerge for different types of ties; in comparing communication and resource exchange networks, he found that ". . . these were quite distinct structural relations" (p. 168; see also Cook 1977; Van de Ven et al. 1979; Wasserman and Faust 1994). In a follow-up study, we can break down our analysis according to tie types, developing separate networks based on communication, contribution, and collaboration ties. We could then learn more about how these networks compare to each other in terms of tie formation and network patterns.

Communication Between Organizational Leaders

Communication between organizational leaders is one indicator of interorganizational relations, and it is often a precursor for other relations like resource contributions or joint program collaboration. We examined communication at the leadership level because organizational leaders generally have ultimate decision-making authority; ability to commit resources; knowledge of mandates, goals, responsibilities,

constraints, and opportunities; and some ability to motivate and direct staff activities. They may also have a history of working with other organizations, familiarity with other organizations' background, and knowledge of their and others' roles in the problem domain. Other organizational staff or members may communicate and establish relationships with those in other organizations without necessarily going through their leader, but, in general, the leader (especially in a small organization) may at least have general knowledge about their kind and extent of interorganizational relationships.

Organizational leaders in the PM River Watershed—and elsewhere—may engage in communication for many reasons related to interorganizational relations theory. For example, they may talk about ways they can meet common goals or how they can work with each other for mutual benefit. They may engage in strategic planning activities, as part of mandates or missions, that require communication. Leaders may serve as organizational representatives or serve on other organizations' boards or committees, and they may commit their support to an issue in efforts to increase their legitimacy or mobilize power for some common advantage. Communication between interdependent organizations is likely to be professional and cordial (Galaskiewicz 1985); however, in cases of conflict, leaders may represent and negotiate on behalf of their organization.

In the PM watershed, communication patterns may be influenced by institutional and environmental constraints, such as county borders, proximity, traditions, and mandates. Common interests may also underlie communication, and many interests in this domain may relate to fisheries and watershed issues. Those concerned with conservation may recognize the strong need to communicate—assuming these leaders are aware of the interconnected and interdependent nature of fisheries and watershed

conservation issues. Furthermore, we expect to see mutual communication ties between leaders, since leadership communication is inherently a two-way process about which both sides should be aware.

Contribution of Resources Between Organizations

Given the above explanations of interorganizational relations theory (specifically resource dependence theory), it is clear that resource contribution behaviors between organizations indicate interorganizational relations. In the PM problem domain, public sector and non-profit organizations specialize in certain functions and have limited resources; therefore, they will need to form relationships to secure other resources to maintain their existence and achieve their goals. By pooling or sharing resources, organizations may be able to meet their resource needs, but they may also enhance their legitimacy, increase support for their positions, leverage political power, and otherwise influence the distribution of benefits and power in the domain.

Among PM stakeholder organizations, resource contribution may be a frequent activity, between all types of organizations. Resource sending may occur more often than leadership communication or collaboration, since sending resources does not necessarily require that leaders communicate or organizations collaborate. Many different kinds of resources may be needed (e.g., money, information, equipment, support, legitimacy, etc.), and organizations may have many methods and reasons for seeking and providing resources. For example, many organizations will have mandates, missions, or purposes that focus on providing resources (e.g., Extension organizations, Chambers of Commerce, etc.). According to the theory, we expect to see a high degree of reciprocated resource

sharing—even for different kinds of resources—since there are many types of resources, resource needs are mutual, and many resources can be provided easily and inexpensively.

PM stakeholder organizations may be more likely to send resources—especially high investment ones—when they share interests, concerns, goals, or other features of their organizational domain. For example, common interest in natural resources may provide a strong motivator for resource sharing, due to the interdependent and integrative nature of conservation issues. Organizations with such a common interest may more willingly share resources, since they may feel this will help them generate support for their (sometimes controversial or unpopular) environmental goals and positions. Nevertheless, resource sharing is a common interorganizational activity, and it will more frequently occur collaboratively or casually (than in a tense or confrontational way).

In this research, we asked organizations to identify other organizations to which they sent resources. With information on their perceived provision of resources, we may get a sense of how helpful an organization thinks it may be to another organization or how much they are trying to invest in a relationship with the other organization. Data on resource sending may also reflect the number of requests that an organization receives for sending resources. Resource *sending* behavior, however, may not exactly be mirrored in resource *receiving* behaviors (the latter were not included in this study). Since reports of resource sending and receiving can be influenced by the perceptions of the research participant, future research should ask about both types of resource exchanging behaviors to assess the validity or accuracy of actual resource distribution patterns within the network.

Interorganizational Collaboration

Collaboration is perhaps the most commonly studied form of interorganizational relations. Given the overwhelming complexity and turbulence of many social issues, collaboration enables organizations to overcome barriers to opportunities or resources and achieve goals collectively that could not be achieved individually (Gray 1985; Beatrice 1990; Gray and Wood 1991; Wood and Gray 1991; Lawrence et al. 1999). In a comprehensive study of interorganizational collaboration, Wood and Gray offer the following oft-cited definition: "[c]ollaboration occurs when a group of autonomous stakeholders of a problem domain engage in an interactive process, using shared rules, norms, and structures, to act on issues related to that domain" (1991, p. 146; see also Gray 1985). In order to establish and maintain this kind of interorganizational relationship, organization members must think that the benefits of collaboration outweigh the costs; in other words, members have to perceive that they have gained something or improved their state of affairs (Gray 1985; Wimpfheimer et al. 1990; Gray and Wood 1991; Selin and Beason 1991; Wood and Gray 1991).

Consistent with resource dependence theory, the formation of collaborative relationships is facilitated by perceptions of high stakes and high interdependencies regarding a common issue (Gray 1985; Logsdon 1991; Selin and Beason 1991; Wood and Gray 1991; Jamal and Getz 1994). Collaboration is more likely when they perceive some shared purposes, goals, or interests, as well as some common current and future risks (Gray 1985; Galaskiewicz 1985; Beatrice 1990; Wimpfheimer et al. 1990; Gray and Wood 1991; Logsdon 1991; Lawrence et al. 1999). Recognizing their shared views and dependencies, organizations will be motivated to mobilize their organizational resources

toward the common problem (Wimpfheimer et al. 1990; Saidel 1991). Their specific interests in the issue, however, need not be the same (Gray and Wood 1991; Lawrence et al. 1999). Any collaborations that develop must serve an organization's own needs and interests, yet these are often consistent with the collective interests of multiple organizations (Wood and Gray 1991).

Political and institutional theories of collaboration, specifically regarding collective action and coalition formation, also recognize the importance of organizational domain similarity (Gray 1985; Galaskiewicz 1985; Beatrice 1990; Roberts and Bradley 1991; Gray and Wood 1991; Lawrence et al. 1999). Collaboration based on political theory is motivated by a shared purpose to achieve social or political change (Roberts and Bradley 1991; Gray and Wood 1991). It can also be motivated by an organization's need to protect their interests in common resources (e.g., the PM River) that may be depleted or confiscated by others (Golich 1991; Gray and Wood 1991). Collaboration emerges as stakeholders come to understand a problem domain (its structures and processes, limits and possibilities), appreciate their interdependence, and negotiate a collective response (Gray 1985; Gray and Wood 1991; Lawrence et al. 1999).

The formation of interorganizational collaborations is a function of both organizational and personal factors. Organizational factors include available resources, personnel and organizational structures, purposes and philosophies, and future goals. Personal factors include staff skills, abilities, and contacts; interpersonal histories, relationships, and personalities; and future plans and expectations (Van de Ven et al. 1979; Hoban 1987; Beatrice 1990; Wimpfheimer et al. 1990; Selsky 1991). The relative importance of each set of factors, however, is debatable; Galaskiewicz (1985) believes

that the importance of personal factors may sometimes be overestimated, since collaboration seems to be more consistently dependent upon organizational factors, regardless of variations in personal factors.

While leadership communication or resource provision are often pre-requisites for collaboration to occur, they do not necessarily result in collaboration; therefore, this indicator of interorganizational relations may occur least often. Formation of collaborative relationships requires recognition and removal of institutional barriers, leadership commitment, investment of resources, and possibly some degree of joint decision-making (i.e., losses in perceived autonomy). Working together on joint programs may be more cooperative or casual, as opposed to tense or confrontational, if a working relationship is to be developed and maintained (Galaskiewicz 1985). We expect to see a high degree of mutuality, since collaborating on a joint program is inherently a two-way process about which both sides should be aware.

The literature suggests that collaboration formation requires a greater degree of domain similarity than communication or resource sharing. In the PM stakeholder network, organizations may think they can achieve more and increase the likelihood of success by committing to working jointly with others. This may be especially true with conservation-oriented organizations, since conservation approaches require integrative ecosystem-level planning and coordination. We may therefore see more cases of collaboration among conservation-oriented organizations, possibly due to the greater domain similarity and the integrative nature of conservation issues.

Hypotheses on Interorganizational Tie Formation

Based on the above theories on interorganizational relations and descriptions of potential communication, resource contribution, and collaboration between organizations in the PM stakeholder population, we have developed the following hypotheses to explain the formation of interorganizational relationship. Specifically, we predict that an organization may be associated with a tie (i.e., either they indicate a tie *or* another organization indicates a tie with them) based on the following attributes:

H1: Generalist organizations (i.e., interested in multiple types of issues) will be more likely to form interorganizational relations, since having more interests can lead to more and diverse types of relations.

H2: Organizations with a natural resource orientation will be more likely to form interorganizational relations, due to the integrative nature of natural resource issues.

H3: State and federal government agencies will be more likely to form interorganizational relations, likely having mandates and missions to serve the public this way.

In addition to the above organizational attributes that may explain the presence or absence of a tie, we believe there are other attributes that—when shared by two organizations (i.e., a dyad)—help predict the presence of a strong tie between them. We refer to these types of dyadic ties as 'strong ties,' since organizational respondents must indicate that they are reciprocated (i.e., two organizations each identify a tie with each other), positive (i.e., cooperative and/or casual as opposed to tense and/or confrontational), *and* important (i.e., the interaction is worthwhile and should be maintained). We look specifically at these ties because these may be the types of ties that are the most effective or productive within the problem domain. These are stricter tie criteria than those used in the first three hypotheses, and they may therefore only be

predicted by a stricter, or more restrictive, set of organizational attributes.

H4: Similarity of organizational domain (as measured by purpose, philosophy, and having at least two common interests) will be positively associated with strong interorganizational relations.

H5: Similar high levels of involvement will be positively associated with strong interorganizational relations.

H6: Similarity of geographic attributes (measured by county) will be positively associated with strong interorganizational relations.

In addition, we can better understand the nature of interorganizational relations by looking at the relative proportions of each type of tie within the complete set of relations. We expect there will be more resource sending ties than strong leader communication or strong collaboration ties, since there are many different ways in which organizations could exchange resources, many types of resources can easily be sent, and many different staff members could provide resources. Leadership communication ties will occur more often than collaboration ties, but it will not occur as often as mutual resource provision. There will be fewer strong program collaboration ties than communication or resource sending ties, as collaboration requires the greatest levels of investment and it is not likely without the existence of the other two types of ties.

H7: Within the complete set of interorganizational relations, there will be more resource contributions ties than leadership communication ties, and there will be more leadership communication ties than collaboration ties.

We expect most interorganizational relations to be positive experiences for organizations (indicated as being cooperative or casual), since professionals and volunteers that engage in these ties likely behave in a polite, respectful manner. Nevertheless, since fisheries and watershed issues are political in nature, we can expect that conflicts will arise when parties are not satisfied with the existing allocation of

resources, power, or benefits within the network. In attempting to change such unsatisfactory allocations, organizational leaders, representing the interests of their groups, may engage in potentially contentious interactions with other groups' leaders. On the other hand, negative interactions may lease likely between groups that have already invested in collaborative relationships. By looking at which types of ties are more likely to be negative experiences (indicated as being tense or confrontational) for organizations, we can better understand how to anticipate and possibly minimize the extent of interorganizational conflicts.

H8: Negative ties will occur most frequently in leadership communication ties, less frequently in resource contribution ties, and even less frequently in collaboration ties.

Clustering and Centrality in Interorganizational Networks

So far we have looked at the preconditions for tie, or relationship, formation between organizations. By aggregating information on these ties, we can examine how their patterns collectively create an interorganizational network. Why is this important? As Knoke (1990, p. 9) explains, "[a] complete explanation for some social phenomena requires knowledge about the relationships among system actors." An organization's position in the overall network structure reflects their role in the problem domain; for example, an organization's position relative to other organizations may indicate the kind and extent of information or other resources they can easily access (Knoke 1990), and it can reflect their ability to mobilize political support or other forms of domain influence (Galaskiewicz 1985). We will look at two network properties, clustering and centrality,

that emerge among organizations in the PM watershed network to understand how and why certain patterns and positions emerge in the network.

Properties and Hypotheses of Network Clusters

Clustering is a network property that emerges when network ties form identifiable sub-networks of ties (Wasserman and Faust 1994; Banaszak-Holl et al. 1998). The sub-networks are known as clusters, and their formation may be explained by theories of structural equivalence or cohesion (Frank 1996). According to structural equivalence, clusters emerge when a set of nodes displays similar patterns of strong or frequent interactions—as well as similar patterns of weak or infrequent interactions—with other organizations (Lincoln 1982; Knoke 1990). These clusters of organizations that behave similarly are likely to emerge among organizations with similar organizational domains, as predicted by resource dependence and political theories. For example, cluster formation has been associated with similar functional areas or activities (Gamm 1981; Mizruchi and Galaskiewicz 1993; Banaszak-Holl et al. 1998).

Clustering based on cohesion, or the tendency to form bonds, occurs when organizations form micro-systems of dense interactions with each other (Frank 1996). Higher densities or concentrations of ties among sets of nodes (i.e., a higher ratio of existing ties:possible ties) indicate the presence of cohesive subgroups. Organizations within a cohesive subgroup may be from similar or different organizational domains, thereby enabling organizations to complement or fulfill their resource needs through repeated interaction with other kinds of groups in their cluster. They may display other common attributes, however, such as ideological affinity (Knoke 1990); historical

interactions; proclivity of geographical features such as counties, jurisdictions, and proximity (Mizruchi and Galaskiewicz 1993); or other institutional similarities (Frank 1996). The distribution of various attributes or behaviors among members of cohesive subgroups helps describe the formation and function of clusters in the problem domain.

Identification of cohesive subgroups may also help us understand how organizations perceive, affect, and otherwise relate to the problem and each other. While similarity in some organizational attributes may help explain tie—and therefore cohesive subgroup—formation, the structure of the resulting network clusters in turn affects the behavior of cluster members (Frank 1996). Cohesive subgroup affiliation exerts powerful influences on cluster members, as Knoke (1990) explains:

> "Members of a cohesive group or clique (i.e., cluster) are linked directly to one another by many intense mutual ties across which influence communications are transmitted. They are structurally oriented toward their internal reference groups for clues to appropriate thoughts and deeds" (p. 12).

Cohesive subgroups, therefore, also have the effect of reinforcing and normalizing certain attitudes and behaviors among cluster members (Frank 1996; Banaszak-Holl et al. 1998).

Since clusters based on cohesive subgroups demonstrate a greater tendency to form (and reinforce) relationships with each other, cluster identification can be an informative analytical exercise. In the PM fisheries and watershed domain, cohesive subgroups are expected to form among groups with similar organizational domains or geographical status. First, we expect to see cohesive subgroups among groups with organizational domain similarity, since, according to interorganizational relations theories, interactions or ties are more likely to occur between organizations with similar interests, goals, philosophies, and other features of their organizational domain. Second,

we expect to see institutional constraints affect cohesive subgroup formation through geographical and jurisdictional features of the problem domain. Since most local-level planning and work activities are performed at the county level, organizations may be used to working with intra-county partners, thereby forming county-based cohesive subgroups.

H9: For all types of ties, clusters of cohesive subgroups will emerge among groups with similar organizational domains and/or counties.

Properties and Hypotheses of Organizational Centrality

Centrality is the degree to which an organization forms ties with other organizations in their cluster (Lincoln 1982). Those having more ties will have greater access to other nodes in their cluster or network and will, therefore, tend to have a more central position; those with fewer ties will tend to have a peripheral or less central position. Centrality is a structural property of interorganizational networks that has often been associated with an organization's power or influence (real, perceived, or reputed) relative to other organizations in the cluster or network (Benson 1975; Cook 1977; Boje and Whetten 1981; Schweer 1987; Mizruchi and Galaskiewicz 1993). For example, "[c]entrality prominence in a communication network is synonymous with influence" (Knoke 1990, p. 13), as central organizations may have greater access to information and other resources, serve as mediators in the flow of resources, and be in favorable bargaining positions by having more alternatives and partners. Factors other than centrality, however, may influence an organization's power or influence (Cook 1977; Boje and Whetten 1981), and we should not necessarily assume a simple cause-effect relationship between network centrality and power. Nevertheless, although we are not examining influence or power *per se*, we may expect that our central organizations may,

in some ways, be more influential in the stakeholder relationship network.

Centrality of a node, or organization, is generally measured in three ways (Freeman 1979; Wasserman and Faust 1994). First, centrality can be a function of degree, or the number of other nodes that are connected to a given node (see also Lincoln 1982). Nodes with highest degrees have the highest potential of directly interacting and serving as major channels or focal points of interaction (see also Knoke 1990). Other ways to define centrality fall into two categories, based on betweenness and closeness (Freeman 1979). Centrality based on betweenness focuses on a node's presence on various chains of ties, and this is appropriate when one is interested in a node's ability to control resource flow. Centrality based on closeness focuses on the distance from a node to all other nodes, and this is appropriate when examining how one can avoid the potential control of others or how efficiently one can interact with all other nodes. In deciding how to define centrality based on one or more of these methods, one must consider the context of the intended application (Freeman 1979; Wasserman and Faust 1994). We were most concerned with direct interorganizational relations (as opposed to the control of information or communication efficiency); therefore, we defined centrality based on an organization's degree or number of ties.

Organizations in central positions tend to display certain properties, primarily related to their range of concerns or interests in their policy domain. For example, organizations with a wider, more diverse range of interests tend to be more engaged in domain activities, have more ties, and therefore be located in prominent positions of their cluster or network (Offerman 1976; Galaskiewicz 1985; Knoke 1990). "[T]he broader an organization's issue concerns, the greater the number of events in which it is actively

engaged" (Knoke 1990, p. 168). Similarly, some studies (Mizruchi and Galaskiewicz 1993; Banaszak-Holl et al. 1998) report that integrative organizations are more likely to be central, and that highly specialized organizations are more likely to be positioned at the periphery of the network. These patterns apply to communication as well as resource exchange networks (Knoke 1990). In addition to having many interests and an increased likelihood of being influential, central organizations are more likely to have a coordinating role in the network, the ability to mobilize resources (Benson 1975; Provan et al. 1980; Mizruchi and Galaskiewicz 1993), larger staffs or membership (Gamm 1981; McPherson 1983; Blau and Rabrenovic 1991; Banaszak-Holl et al. 1998), and an increased likelihood of becoming engaged in controversies (Knoke 1990).

Within the PM stakeholder network, central organizations are expected to display many of these properties. Since these are organizations that have, in general, more ties to other organizations than would otherwise occur, these organizations may have missions or strong interests that compel greater involvement in watershed/fisheries issues or local planning; have a wider, or more generalist, range of interests; and have a more permanent presence with regular staff to devote to these issues (Knoke 1990). These organizations may have more resources (e.g., expertise, interests, information, advice, funding, facilities, etc.) to devote to building and maintaining all types of ties with other organizations. Alternatively, these organizations may also have resource needs that they can meet by interacting with other organizations; therefore, consistent with resource dependence theory, these organizations may hold roles as seekers and/or providers of resources. Whether senders or receivers of resources, these organizations have attained a position that may reflect a higher level of influence in the problem domain. Once they

have assumed a central role, they may perceive themselves—or have others perceive them—as having more influence or importance in PM fisheries and watershed issues. They may, therefore, have more effective engagement in the political or policy processes that affect regional issues, how the domain operates, and how they may operate as an organization within that domain.

H10: Organizations with a central role in their cluster will have a natural resource or local government purpose; be non-voluntary; have high involvement; and/or be generalist in scope.

Analytical Approach

Data Collection and Variable Definition

Our study population consisted of the 101 fisheries stakeholder organizations (FSOs) in the PM River watershed identified in Chapter 1. To meet our objectives, we surveyed each FSO about their interactions with other FSOs in the watershed regarding fisheries management. Since we were seeking organizational-level data (as opposed to individual-level data), we identified a person in each organization to respond to the survey on behalf of their organization. This person needed to be familiar with their organization's leadership communications, resource contributions, and collaborations with other FSOs in the watershed. The organizational representative who answered the survey was often someone in a leadership position, a public relations position, or a program specialist (see Van de Ven et al. 1979 for more on this data collection process).

The survey, refined through a pre-testing process with survey design experts and novices, was administered as a mail questionnaire in the summer and fall of 2000. In the

first section of the survey, we collected information on the following organizational variables: organization size, membership type (voluntary or non-voluntary), duration of existence, organizational purpose and philosophy, level of involvement with local natural resource issues, level of satisfaction with current fisheries management, and their concern about nine fisheries-related issues. These issue concerns were aggregated to determine if an organization had a specialist scope (i.e., concerned about only one type of issue) or a generalist scope (i.e., concerned about multiple types of issues). Other variables—purpose, philosophy, and concerns—were aggregated to define domain, a variable that captures an organization's role or niche in the network.

In addition to survey-based data collection, we collected information on other organizational attributes from other sources. For example, we identified their category (e.g., state government, conservation special interest, etc.), county, and location relative to watershed boundaries by reviewing organizational documents and maps. Data on these organizational attributes served as independent variables (Table 2.1) that may help explain the formation of ties and network properties.

In the second section of the survey, we listed all other FSOs identified for the watershed (see Chapter 1), and we asked the respondent to identify those with which their organization has interacted regarding a fisheries-related issue in 1998 and 1999. We limited these interactions to these years in order to assess recent stakeholder network structure and increase the accuracy of respondent recall. We also provided spaces for organizations to identify other organizations not already listed on the survey. As they identified organizations they have interacted with, we sought additional information on variables concerning the nature and extent of their interactions. Specifically, we collected

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dich

Table 2.1. Organizational attributes serving as independent variables, with dichotomous coding.	
size	number of staff and/or members: - 1 to 20 members (yes or no) - 21 to 100 members (yes or no) - 101 or more members (yes or no)
memb	membership status: - staff (yes or no) - volunteers (yes or no)
age	duration of existence: - 0 to 10 years (yes or no) - 11 to 50 years (yes or no) - 51 or more years (yes or no)
purpose	self-described purpose or reason for existing - natural resource conservation/management (yes or no) - natural resource recreation/tourism (yes or no) - natural resource protection/preservation (yes or no) - education and information (yes or no) - property owner representation (yes or no) - private business representation (yes or no) - local government planning (yes or no) - local/regional economic development (yes or no) - agricultural interests (yes or no) - other (yes or no)
philos	philosophy about natural resource management: - protect from human impacts (yes or no) - develop for economic activity (yes or no) - multiple social and environmental benefits (yes or no) - other (yes or no)
involve	involvement in local fisheries/watershed issues: - not (yes or no) - somewhat (yes or no) - very (yes or no)
satis	satisfaction with current fisheries management: - not (yes or no) - somewhat (yes or no) - very (yes or no)

Table 2.1 (cont'd).	
concern	topics or issues of concern: - fishing access (yes or no) - fishing regulations (yes or no) - enforcement of regulations (yes or no) - status of fish populations (yes or no) - resource use conflicts (yes or no) - fish stocking (yes or no) - habitat quality (yes or no) - recreational experiences (yes or no) - sea lamprey control (yes or no) - no concerns about the fishery or watershed (yes or no)
scope	identification of interest scope: - generalist (yes or no) - specialist (yes or no)
category	category or type of organization: - federal government (yes or no) - state government (yes or no) - county government (yes or no) - township government (yes or no) - city government (yes or no) - local economic development (yes or no) - environmental/conservation special interest (yes or no) - recreation/sportsmen's special interest (yes or no) - education/information interests (yes or no) - other (e.g., agriculture, property owner) (yes or no)
sdomain	two groups with the same purpose, philosophy, and concerns (yes or no)
county	county where organization is located - Mason (yes or no) - Lake (yes or no) - Oceana (yes or no) - Newaygo (yes or no) - other (yes or no)
proxim	proximity to the watershed: - inside (yes or no) - outside (yes or no)

data on communication, resource contribution, and collaboration ties between organizations (based on Knoke and Rogers 1979). We defined each type of tie as follows:

- communication: "Our leaders talked about goals or plans."
- resource contribution: "We sent them information, advice, or other resources."
- collaboration: "We worked together on joint programs."

In addition to determining the existence of these kinds of network ties, we used the mail survey to seek other information on the nature of these ties. Such additional information is important because properties of ties can convey other information about the nature of interorganizational relationships. We explored these properties by asking about the frequency of interactions, the tone or mood surrounding these interactions, and the importance they place on maintaining the relations. By combining data on reciprocated, positive, and important ties, we could define the strong ties used in H4, H5, and H6. Along with other data on the presence or absence of a tie, these served as our dependent variables (Table 2.2). While this contextual information may not capture all variables that could describe the nature of interactions, we could get a sense of why and how interactions arise and identify important contextual variables for follow-up research. A complete replication of the questionnaire (adjusted for page size) can be found in Appendix B.

Network analysis methods were developed to study an entire population, not a representative sample of that population; therefore, a higher response rate will enable a more reliable and accurate analysis of the network (Wasserman and Faust 1994). To maximize our response rate, we initially mailed a notice of the upcoming survey (Appendix C) then distributed the survey (cover letter in Appendix D), sent postcard

Table 2.2. Interaction data serving as dependent variables, with dichotomous coding.	
chooser	an organization that indicated a tie with another organization (identified by a number)
chosen	an organization with which a tie was indicated by another organization (identified by a number)
strongti	a reciprocated, positive, and important tie (yes or no)
freq	frequency of interaction: - occasional (yes or no) - frequent (yes or no)
type	type of interactions: - leadership communication tie (yes or no) - resource contribution tie (yes or no) - joint program collaboration tie (yes or no)
tone	tone of interactions: - cooperative interaction (yes or no) - casual interaction (yes or no) - tense interaction (yes or no) - confrontational interaction (yes or no)
import	importance of maintaining a given tie: - not (yes or no) - somewhat (yes or no) - very (yes or no)

reminders to non-respondents (Appendix E), mailed second survey mailings (cover letter in Appendix F), and followed the mailings with phone interviews to obtain the above information until we achieved the highest possible response rate.

Modeling Framework

The development of our analytical model is rooted in theories about the relationship between organizational attributes and interorganizational network structure. The relationship between social actors (e.g., organizations) and their place in system

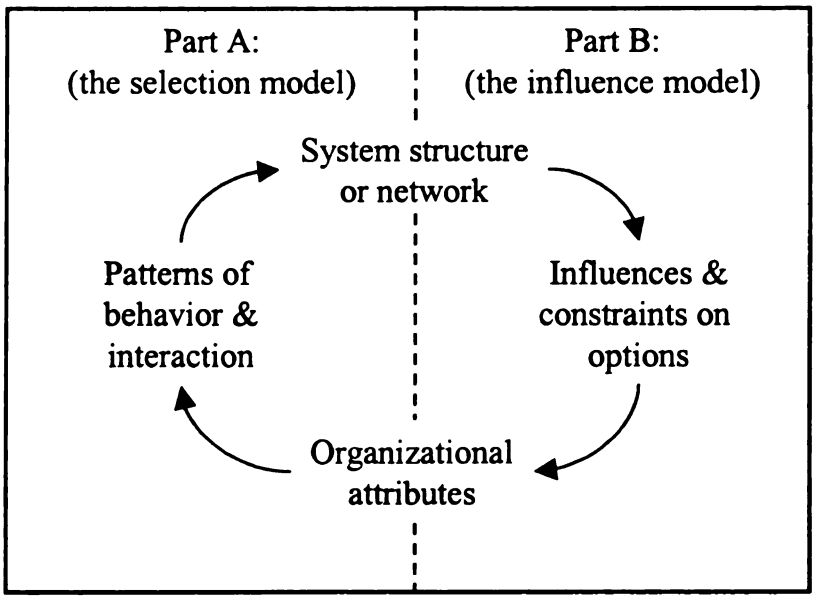

Figure 2.1. Theoretical relationships between organizational attributes and interorganizational network structure, and the mechanisms by which they influence each other.

structure can be characterized by a circular model, in which organizational attributes and network structure affect—and are affected by—each other (Figure 2.1). Network structure influences an organization's access to resources (e.g., information, funding, technology, etc.) and imposes other constraints on their identity and behavior; these constraints thereby affect or define an organization's attributes (Lazega and van Duijn 1997; Frank and Fahrbach 1999). This does not, however, lock in an organization to a certain role or position in the network structure. An organization may engage in behaviors that influence or change overall network structure. Generally, these behaviors are facilitated by similarities in organizations' attributes, which drive interactions among organizations that may thereby change network structure (Homans 1950; Leenders 1995; Lazega and van Duijn 1997; Frank and Fahrbach 1999). This structure again influences organizational attributes, and the cycle continues. In reality, these processes are thought

to occur simultaneously and iteratively.

This conceptual model has led to two types of analytical models for social network analysis (Leenders 1995; Frank 1998; Frank and Fahrbach 1999). The first type focuses on how organizational attributes affect the patterns of relationships in network structure (Part A of Figure 2.1), and it is known as the *selection* model. The second type, known as the *influence* model, focuses on how network structure affects organizational attributes (Part B of Figure 2.1). Each type of modeling approach has its own mathematical framework for capturing the relevant relationships (Frank 1998; Frank and Fahrbach 1999). The choice of either model is based on the theories and case studies of the intended application.

We chose to use the selection model, since questions of interorganizational tie formation are frequently the subjects of interest in natural resource management. Resource managers interested in promoting holistic approaches to watershed and ecosystem management appreciate the importance of interorganizational relations like communication, resource contribution, or collaboration. They need to know how and why such interorganizational ties can be facilitated, which may help managers develop more efficient and effective forms of stakeholder involvement. This, in turn, can increase the likelihood of achieving management goals. Our model will help us examine how attributes affect tie formation and, therefore, stakeholder network structure, but we do not completely disregard the effects of the network on organizations. Institutional theories of interorganizational relations include network structure, such as clustering patterns, as a type of constraint that affects organizational choices for interactions. Therefore, while our model is based on the mathematical approach of the selection model, some of our

hypotheses recognize certain structural factors that influence organizations' options for interaction.

Our modeling framework has implications for our identification of dependent and independent variables. In the selection model, the organizational attributes listed above are the independent variables that are used to explain stakeholder relationships and network structure. It is possible, however, to switch these variables if one is interested in using the influence model. For example, organizational attributes—especially variables like involvement and satisfaction with fisheries management—could easily serve as the dependent variables that are explained by the patterns of ties observed in the network structure. Future studies of the PM problem domain, perhaps with the objective of understanding the characteristics of a particular organization, may utilize the influence modeling framework.

Network Analysis Process

The first step of the interorganizational network analysis was to construct sociograms, or two-dimensional maps, of the network. These maps enable one to visualize the spatial relationships between nodes (i.e., organizations) and various types of ties (i.e., relationships) that exist between them (Wasserman and Faust 1994; Frank 1996, 1998). In doing this, it indicates the presence of clusters, or concentrations of ties between nodes, as well as those organizations that hold central positions in their clusters. One can also link data on organizational attributes[1] to the nodes in the resulting

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[1] Organizational identity can also be linked to each node, but we do not report identity in order to protect survey respondents' privacy.

sociogram, which allows one to examine the distribution of various attributes in the network and their possible roles in facilitating ties. This information can help verify hypotheses for forthcoming statistical analyses, as well as indicate other possible explanations for tie formation and network structure. We produced these sociograms with KliqueFinder© software (Frank 1995, 1996), a clustering algorithm that iteratively scans databases for information on ties to produce a visual map of non-overlapping cohesive subgroups (see Frank 1996, 1998). Figure 2.2 represents one of the many sociograms utilized at this stage of the analysis, indicating the relative network position of organizations and the distribution of strong ties.

The second step involves using statistical tools to analyze the occurrence of relationships between organizations, given variations in 1) the attributes of organizations indicating a tie (i.e., the chooser); 2) the attributes of organizations with which they indicate a tie (i.e., the chosen); and 3) the attributes of dyads, or pairs of organizations. Data were collected at the individual (organizational) level of analysis, yet combining these data allow us to analyze relationships at the dyadic (between two organizations) level of analysis. Therefore, we needed to utilize a multilevel model that combines individual- and dyadic-level data within a common framework. The p_2-like model, developed by Lazega and van Duijn (1997) and applied by Frank (*in prep.*), provides a multilevel, cross-nested model for analyzing how organizational characteristics (independent variables) may explain the presence or absence of a tie (the dependent variable). As a cross-nested model, it nests pairs of organizations within the chooser and chosen organizations, thereby capturing the dyadic dependencies (with random effects for chooser and chosen organizations) that underlie sets of relationships, then models the

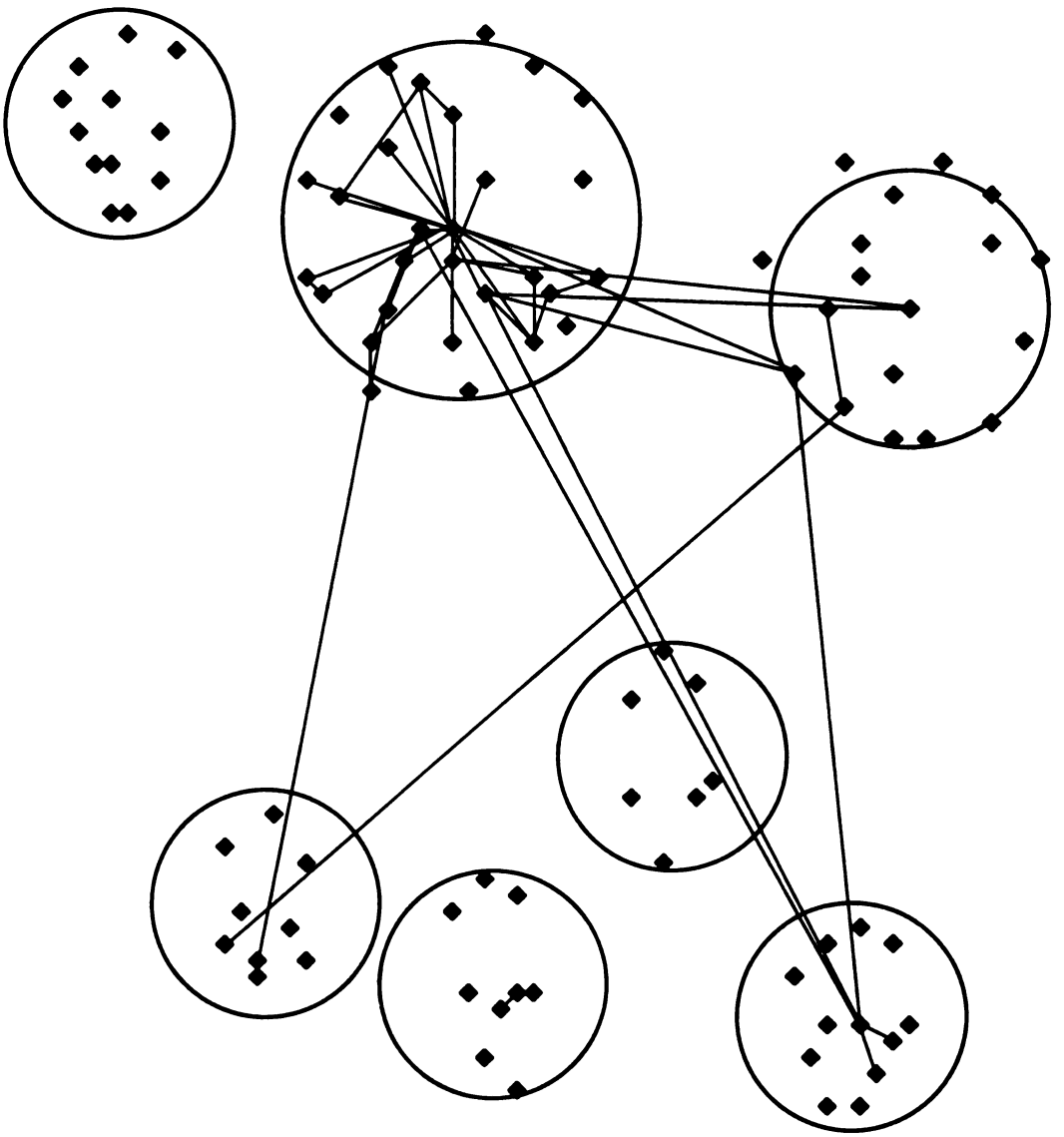

Figure 2.2. Selected sociogram representing the approximate PM stakeholder network structure. Diamonds represent organizations (excluding the outliers), lines represent strong ties, and circles represent clusters.

random effects as functions of organizational characteristics (Frank et al. 2000).

This analytical approach begins with a logistic regression model for predicting ties (Menard 1995), but it is expanded to account for the differential effects of chooser and chosen organizations as well as reciprocity effects[2] (Lazega and van Duijn 1997). Logistic regression is used to assess how well independent variables can explain or predict a dichotomous response (e.g., whether or not a tie occurs; Menard 1995). Since interorganizational relationships may depend on a set of varying characteristics of the chooser, chosen, and/or dyad, logistic regression is insufficient for accurately predicting dyadic ties. It is useful, however, for preliminary identification of potentially important independent variables that should be incorporated into the p_2-like model (Wasserman and Pattison 1996). We used SAS© statistical software (SAS Institute 1999) to run logistic regression models on tie formation, which enabled us to perform preliminary hypotheses tests and to explore other possible explanations for tie formation. The outcomes of these models provided the basis for further exploring tie formation patterns in the p_2-like model. For example, preliminary analyses indicated that both organizations having high levels of involvement (H5) was so strongly associated with strong tie formation (this practically defines it) that it would have diminished our ability to model other variables. We excluded this variable from the p_2-like model.

The p_2-like model was applied to the analysis of both regular ties (H1, H2, and H3) and strong ties (H4, H5, and H6); both are represented by "Tie" in the model below.

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[2] Reciprocity effects were not modeled in this analysis because they would have washed out the effects of our variables defined by chooser and chosen attribute similarity.

Mathematically, whether organization *i'* formed a relationship with organization *i* is a function of the tendency of *i'* to be a chooser ($\alpha_{i'}$) and *i* to be chosen (β_i) (Frank et al. 2000):

$$\textit{level 1 (dyadic)}:$$

$$\log\left(\frac{P[Tie_{ii'}=1]}{1-P[Tie_{ii'}]}\right) = \alpha_{i'} + \beta_i \quad . \tag{1}$$

The measure of a tie between *i* and *i'* was dichotomized (with 1 indicating the presence of a tie); therefore, equation (1) was estimated via logistic regression. We then included various combinations of organizational attributes (covariates for same county, same domain, and same scope are represented below) in the dyadic level of the model to assess their relative importance in explaining or predicting a relationship:

$$\textit{level 1 (dyadic)}:$$

$$\log\left(\frac{P[Tie_{ii'}=1]}{1-P[Tie_{ii'}]}\right) = \alpha_{i'} + \beta_i + \tag{2}$$

$$\delta_1(\textit{same county})_{ii'} +$$

$$\delta_2(\textit{same domain})_{ii'} +$$

$$\delta_3(\textit{same scope})_{ii'} \quad .$$

In addition, an organization's tendencies to be the chooser ($\alpha_{i'}$) and the chosen (β_i), based on their attributes (being a generalist is represented in the equations below), were modeled at the individual organizational level:

$$
\begin{aligned}
&\textit{level 2a (chooser)}: \\
&\alpha_{i'} = \gamma_{00} + \gamma_{01}\, \textit{generalist}_{i'} + u_{0i'} \\
&\textit{level 2b (chosen)}: \\
&\beta_{i} = \gamma_{10} + \gamma_{11}\, \textit{generalist}_{i} + v_{0i}
\end{aligned}
\qquad (3)
$$

where $u_{0i'}$ and v_{0i} represents random effects of the chooser and chosen, respectively. Equation 3 enabled us to evaluate the effects of the chooser and the chosen, in addition to the effects of the pair of organizations constituting a dyad in equation 2. We used HGLM© software (Byrk et al. 2001) with cross-nested effects to estimate the models (Frank et al. 2000).

Our observations of interorganizational relations are not independent (i.e., an organization can be involved in many interactions), which violates the standard assumption of independence. As a result, the standard errors from ordinary logistic regression routines—and, therefore, t-ratios and p-values—are incorrect. The p_2-like models account for these dependencies through $u_{0i'}$ and v_{0i}, but significance testing is still not well understood for these models (see Lazega and van Duijn 1997; Wasserman and Pattison 1996). At the very least, these models provide valuable descriptive information in terms of regression coefficients and odds ratios, which are different ways to interpret the relative importance of tie formation predictors (i.e., a higher coefficient or odds ratio indicates a stronger predictor; Menard 1995). We can make these comparisons because the predictors, or independent variables, were each coded to be dichotomous (i.e., 0 or 1, indicating an organization does not or does have an attribute, respectively); therefore, a coefficient can be interpreted as the change in the dependent variable when an attribute is

present (Menard 1995). The t-ratios, however, can also serve as rough guides to statistical significance. When the t-ratio is greater than 3, concerns about the model accommodations for dependencies would likely not alter an inference. On the low end, when the t-ratio is less than 1.5, a coefficient is not likely to be statistically significant using any modeling framework that minimally accounts for dependencies in the dyads.

As a final step in this analysis, we calculated variance components for the chooser and chosen organizations. We determined unconditional (i.e., unmodeled) chooser and chosen variances with HGLM©, which enabled us to estimate a baseline for evaluating the variance explained by the model. By comparing the unconditional with conditional (i.e., modeled) variances for chooser and chosen, we could determine the percent of variation attributed to chooser and chosen organizations in the model.

Results

Description of Responses

We received responses from 90% of the organizations in the PM stakeholder population (i.e., 91 out of 101 organizations). Out of the ten organizations that did not respond, six were township governments and four were other types of organizations. Their lack of response was likely due to communication difficulties or organizational indifference to the survey subject matter. For the most part, these ten organizations were not suspected to have significant roles in the PM fisheries and watershed domain; for example, the other townships that responded did not generally exhibit numerous interactions. We were not concerned that these non-responses affected our results or

conclusions.

Out of the 91 organizations that responded, 60 were chooser organizations that reported having interorganizational relations with at least one other organization; on average, 18.1 ties were reported (standard deviation 15.3) by a chooser. Eight of these organizations each indicated at least one 'other' group (not initially identified in Chapter 1 or listed on the survey) with which they formed interorganizational relationships, resulting in 11 additional organizations. These new organizations, and any available attribute information on them, were included as chosen organizations in the analysis. These additional organizations increased the final population size in the analysis to 112, out of which 109 were chosen by at least one chooser organization; on average, an organization was chosen 10.0 times (standard deviation 6.7) by choosers.

Between these organizations, chooser organizations reported having 1088 interorganizational relations with chosen organizations. Some of the relations indicated by a chooser consisted of more than one type of tie with a particular chosen organization. When each of the three types of ties are counted separately, there were 1594 ties (657 communication ties, 505 resource contribution ties, and 432 collaboration ties) indicated by chooser organizations. A complete set of descriptive statistics on the properties of ties and organizations can be found in Appendix G.

Tie Formation Patterns

Preliminary analyses indicated that certain attributes were more likely to be associated with tie formation. Each independent variable, taken individually for choosers and chosens and in combination when they were similar at the dyadic level, was

examined to assess its relative importance in determining tie formation patterns. Only those attributes (for chooser, chosen, and dyadic levels) that appeared to explain ties in the sociograms and logistic regressions were analyzed with the p_2-like model.

Based on the preliminary analyses, the tendency to be associated with a regular tie (i.e., not a strong tie), either as the chooser or chosen organization, was suspected to be associated with the following attributes at the chooser, chosen, and dyadic similarity level: location inside the watershed, interest in multiple issues (generalist), satisfaction with PM fisheries (as opposed to neutral/undecided), dissatisfaction with PM fisheries (as opposed to neutral/undecided), small size (under 20 members), old (over 100 years), and new (less than 20 years). Since categories for satisfaction, age, and size were represented with sets of dichotomous variables, coefficients could be interpreted relative to one another. The p_2-like model calculated the coefficients and odds ratios, which we used to approximate the relative importance of each attribute in explaining tie formation; we generally considered odds ratios above 1.50 (i.e., a 50% *increase* in the odds of having a tie, given a certain attribute; Menard 1995) and t-ratios near 3 or greater to indicate noteworthy attribute effects. By comparing coefficients (Table 2.3), we concluded that the odds of a tie occurring are four times greater when the chooser is located in the watershed, a generalist, satisfied, or unsatisfied. The odds of a tie occurring were 83% greater when the chooser is new, but the t-ratio is indicated this is insignificant. The odds of a tie occurring were at least twice as great when pairs of organizations are both in the same domain, both inside the watershed, and both old. Among chosen organizations, being satisfied displayed the most association with tie formation (odds ratio 1.498 and t-ratio of 1.713), but this is not as strong as the effects of those chooser or dyadic attributes.

Table 2.3. Effects of chooser, chosen, and dyadic attributes on tie formation.				
Independent Variable	Coeff.	Approx. Std. Err.	T-Ratio	Odds Ratio
Chooser Attribute				
located inside the watershed*	1.557	0.451	3.451	4.745
generalist (multiple interests)*	1.735	0.489	3.552	5.669
satisfied with PM fisheries*	1.760	0.492	3.578	5.812
unsatisfied with PM fisheries*	1.651	0.642	2.571	5.212
small (less than 20 members)	0.373	0.422	0.882	1.452
old (over 100 years old)	-0.267	0.463	-0.577	0.766
new (less than 10 years old)	0.606	0.881	0.688	1.833
Chosen Attribute				
located inside the watershed	0.140	0.208	0.674	1.150
generalist (interested in multiple issues)	0.138	0.244	0.565	1.148
satisfied with PM fisheries	0.404	0.236	1.713	1.498
unsatisfied with PM fisheries	0.089	0.306	0.290	1.093
small (less than 20 members)	0.041	0.196	0.209	1.042
old (over 100 years old)	-0.582	0.225	-2.577	0.559
new (less than 10 years old)	-0.056	0.411	-0.137	0.946
Dyadic Similarity Attributes				
both in the same domain*	0.778	0.197	3.957	2.177
both inside the watershed*	0.934	0.158	5.928	2.545
both generalists	0.268	0.163	1.645	1.307
both satisfied with PM fisheries	-0.088	0.164	-0.535	0.916
both unsatisfied with PM fisheries	-0.452	0.309	-1.462	0.636
both small	0.230	0.156	1.474	1.259
both old*	0.877	0.163	5.373	2.404
both new	-1.229	0.729	-1.685	0.293

* those attributes most strongly associated with tie formation

Both being new organizations actually decreased the odds of tie formation by 71%, but the t-ratio indicates this may not be significant.

We used this initial model to calculate the conditional variance components, which were compared with the unconditional variances for chooser and chosen. The unconditional variances were 4.806 for the chooser (u) and 0.716 for the chosen (v), which indicated that choosers vary six times more than chosens in tendencies to engage in ties (Table 2.4). The conditional variances for this model were 3.138 and 0.628 for chooser and chosen, respectively. The attributes included in the above model, therefore, explained approximately 35% of the variation for choosers and 12% of the variation for chosens. There was much more variation attributed to characteristics of the chooser organizations; therefore, our models tended to emphasize the effects of choosers. We did not re-calculate the variance components for each of the following models, since they were not expected to vary drastically for each set of modeled attributes.

Table 2.4. Variance components for the chooser and chosen organizations.

	Unconditional	Unconditional as Percentages	Conditional (Modeled)	% Explained
Chooser	4.806	0.870	3.138	0.347
Chosen	0.716	0.130	0.628	0.123

In the above p_2-like model results, domain similarity between organizations was found to be an important dyadic predictor of tie formation, yet we had information from our preliminary analyses that indicated that some types of domains were more important predictors than others. We repeated the above analysis, replacing domain similarity with

Table 2.5. Effects of chooser, chosen, and dyadic attributes on tie formation, with domain similarity replaced by each domain type.

Independent Variable	Coeff.	Approx. Std. Err.	T-Ratio	Odds Ratio
Chooser Attribute				
located inside the watershed*	1.517	0.520	2.915	4.559
generalist (multiple interests)*	1.959	0.565	3.466	7.092
satisfied with PM fisheries*	2.011	0.568	3.539	7.471
unsatisfied with PM fisheries*	1.814	0.745	2.435	6.135
small (less than 20 members)	0.335	0.488	0.686	1.398
old (over 100 years old)	-0.391	0.537	-0.729	0.676
new (less than 10 years old)	0.562	1.013	0.555	1.754
Chosen Attribute				
located inside the watershed	-0.132	0.252	-0.521	0.876
generalist (interested in multiple issues)	0.170	0.295	0.576	1.185
satisfied with PM fisheries	0.485	0.288	1.684	1.624
unsatisfied with PM fisheries	0.047	0.376	0.124	1.048
small (less than 20 members)	-0.021	0.239	-0.089	0.979
old (over 50 years old)	-0.686	0.273	-2.517	0.504
new (less than 10 years old)	-0.166	0.504	-0.330	0.847
Dyadic Similarity Attributes				
both natural resource agencies	0.313	0.197	1.589	1.368
both other government agencies*	0.581	0.210	2.770	1.788
both local government offices*	0.603	0.242	2.492	1.828
both education organizations*	4.413	0.775	5.349	82.517
both economic organizations*	2.214	0.547	4.049	9.152
both agriculture organizations*	3.722	0.563	6.609	41.347
both environmental organizations*	1.621	0.889	1.824	5.058
both outdoor recreation organizations*	1.459	0.362	4.025	4.302
both from the same county*	2.856	0.137	20.871	17.392

Table 2.5 (cont'd).				
both inside the watershed	-0.414	0.190	-2.184	0.661
both generalists	0.306	0.179	1.710	1.358
both satisfied with PM fisheries	-0.064	0.179	-0.356	0.938
both unsatisfied with PM fisheries	-0.378	0.346	-1.092	0.685
both small	0.276	0.171	1.612	1.318
both old*	0.810	0.180	4.503	2.248
both new	-1.144	0.773	-1.479	0.319

* those attributes most strongly associated with tie formation

each of the eight domain types at the dyadic level: natural resource management agencies, other government agencies, local government offices, education organizations, economic organizations, agriculture organizations, environmental organizations, and outdoor recreation organizations (Table 2.5). We also added the dyadic variable representing similar counties. In this analysis, each of the specific domain categories, except for natural resource agencies, produced an odds ratio of at least 1.5, although significance based on t-ratios may be questionable for dyadic relationships in the following domains: other government, local government, and environmental organizations. Two dyadic-level domains, education and agriculture organizations, had very high odds ratios (82.517 and 41.347, respectively), indicating that the organizations in these domains may be extremely well tied to each other. Being from the same county made the odds of a tie occurring at least 17 times greater, and both being old made the odds to form ties twice as great. Being both inside the watershed decreased in importance from the first model, and being both new still decreased the odds of having a tie. The

relative importance of other chooser and chosen independent variables from Table 2.3 (p. 94) did not change considerably, although the odds associated with a satisfied chosen organization tie increased to 62% (but significance based on the t-ratio of 1.684 is still inconclusive).

These results generally support our first three hypotheses, but this support is not consistent among attributes of choosers, chosens, and dyads. Generalist organizations were associated with the formation of interorganizational relations (H1), but this was strongest when the chooser was a generalist. Being a generalist was not found to be as important for both organizations in a dyadic relationship, and it was even less important for chosen organizations. Organizations with a natural resources-related orientation (H2) included natural resource management agencies, environmental organizations, and outdoor recreation organizations; the latter two groups, at the dyadic level, tended to form interorganizational relations within their group. State and federal government agencies (H3) included natural resource management agencies and other government agencies, the latter of which also formed interorganizational relations within their group. These were not, however, the only important predictors of tie formation. Among choosers, tie formation was also associated with being inside the watershed, satisfied with PM fisheries, and unsatisfied with the fisheries. Among chosens, however, ties were only very weakly associated with being satisfied with PM fisheries. At the dyadic level, being in the same domain (for most domain types), both old in age, and in the same county were also found to be important predictors of tie formation.

Strong ties (i.e., reciprocated between chooser and chosen, positive, and important) were more strictly defined than the regular ties explored above, and they may

only be predicted by a more stringent set of independent variables. Based on preliminary analyses, the strong ties were suspected to be associated with the following attributes at the dyadic similarity level: both in the same county, both in the same domain, both generalists, and both satisfied with PM fisheries (Table 2.6). Being in the same county and same domain were associated with more than a seven- and four-fold increase in the odds, respectively, of forming strong ties. Having lower odds ratios and inconclusive t-ratios, however, the importance of being both generalists and both satisfied with PM fisheries was questionable.

Table 2.6. Effects of dyadic attributes on strong tie formation.

Independent Variable	Coeff.	Approx. Std. Err.	T-Ratio	Odds Ratio
Dyadic Similarity Attributes				
both in the same county*	1.971	0.189	10.444	7.178
both in the same domain*	1.411	0.264	5.343	4.100
both generalists	0.433	0.242	1.791	1.542
both satisfied with PM fisheries	0.474	0.241	1.966	1.606

* those attributes most strongly associated with strong tie formation

Again, domain similarity can be broken down into domain types, and we modeled the relative importance of each domain in predicting the formation of strong ties. We ran the strong tie model with each of the eight domain types at the dyadic level (Table 2.7). The importance of being in the same county, both generalists, and both satisfied with PM fisheries was indicated in this analysis, and the odds ratios and t-ratios of the latter two variables increased. Not each domain type, however, was found to be important. Strong

Table 2.7. Effects of dyadic attributes on strong tie formation, with domain similarity replaced by each domain type.

Independent Variable	Coeff.	Approx. Std. Err.	T-Ratio	Odds Ratio
Dyadic Similarity Attributes				
both natural resource agencies*	0.818	0.280	2.925	2.266
both other government agencies*	1.214	0.290	4.179	3.367
both local government offices	0.046	0.490	0.094	1.047
both education organizations*	3.374	0.897	3.762	29.195
both economic organizations	-7.217	47.238	-0.153	0.001
both agriculture organizations*	4.486	0.678	6.618	88.766
both environmental organizations*	3.160	0.956	3.304	23.571
both outdoor recreation organizations	-0.368	0.797	-0.461	0.692
both in the same county*	1.949	0.191	10.201	7.022
both generalists*	0.837	0.240	3.481	2.309
both satisfied with PM fisheries*	0.610	0.243	2.514	1.840

* those attributes most strongly associated with tie formation

ties could be explained by a pair of organizations each being in the following domains: natural resources management, other government agencies, education organizations, agriculture organizations, and environmental organizations; the latter three of which had extreme increases in the odds of having ties. Strong ties were not predicted if both organizations were in the local government, economic, or outdoor recreation domains.

The preliminary analyses on strong ties also indicated that some chooser effects may be important predictors of strong ties, in addition to the dyadic similarity attributes explored in Tables 2.6. and 2.7. Specifically, strong ties were expected if the chooser was

Table 2.8. Effects of chooser and dyadic attributes on strong tie formation, with domain similarity replaced by each domain type.

Independent Variable	Coeff.	Approx. Std. Err.	T-Ratio	Odds Ratio
Chooser Attribute				
natural resource management agency*	2.065	0.360	5.733	7.885
environmental organization*	2.718	0.667	4.075	15.150
generalist*	1.529	0.356	4.294	4.614
satisfied with PM fisheries	0.660	0.350	1.885	1.935
Dyadic Similarity Attributes				
both natural resource agencies	0.298	0.298	1.001	1.347
both other government agencies*	1.181	0.291	4.059	3.258
both local government offices	0.472	0.504	0.937	1.603
both education organizations*	3.727	0.927	4.020	41.554
both economic organizations	-6.814	44.506	-0.153	0.001
both agriculture organizations*	4.795	0.703	7.080	120.904
both environmental organizations*	2.771	0.922	3.006	15.975
both outdoor recreation organizations	-0.144	0.802	-0.179	0.866
both in the same county*	2.075	0.197	10.553	7.965
both generalists	0.388	0.264	1.469	1.474
both satisfied with PM fisheries	0.337	0.261	1.288	1.401

* those attributes most strongly associated with tie formation

a natural resource management agency, an environmental organization, a generalist, or satisfied with PM fisheries, so these attributes were added to the strong tie model (Table 2.8). The first three of these chooser attributes added to the model were found to be important predictors. Among each domain type, however, both being natural resource

management agencies was no longer found to be as important in predicting strong ties; this may indicate that any importance associated with this domain at the dyadic level is actually a function of these agencies engaging in ties.[3] Again, the education, agriculture, and environmental organization domains were found to be extremely important in predicting tie formation. Being in the same county remained as a strong predictor, but the importance of both being generalists or satisfied with PM fisheries decreased when these other chooser independent variables were added—this may also indicate that the importance of these variables is actually more of a chooser effect.

These results generally support H4 and H6. Being in the same domain (H4) was important at the dyadic level (Table 2.6), although the importance of each type of domain similarity varied in subsequent analyses (Tables 2.7 and 2.8). While natural resource management domain similarity was important in Table 2.7, both being other government agencies, education organizations, agriculture organizations, and environmental organizations were consistently important dyadic predictors of strong tie formation. Being in the same county (H6) consistently increased the odds of a tie between organizations at least seven times.

We found other independent variables to be important predictors of strong ties. At the chooser level, these are: being a natural resource management agency, an environmental organization, and a generalist (Table 2.8). At the dyadic level, however, the importance of being both generalists and both satisfied with PM fisheries was inconsistent and inconclusive.

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[3] This was not consistently found to be the case, however, in the preliminary analyses of chooser and chosen effects for regular (i.e., not strong) ties.

Other Observations on Tie and Network Properties

We can learn about other tie and network properties by observing certain trends and patterns from the survey results and the sociograms. Some of these observations reinforce the results of the p_2-like model; others provide supplemental information that helps explain other network dynamics. For example, in H7, we hypothesized that within the complete set of interorganizational relations, there will be more resource contribution ties than leadership communication ties, and there will be more leadership communication ties than collaboration ties. This was not the case, as leadership communication (657 ties) occurred more often than resource contribution (515 ties). As expected, however, collaboration occurred least often (432 ties).

We also hypothesized about the occurrence of negative ties. As expected, most interorganizational relations were positive (indicated as being cooperative or casual) experiences for organizations, with 88.8% of relations being described as cooperative and/or casual. When negative ties occur (5.8% were described as being tense or confrontational), we hypothesized that they will occur most frequently in leadership communication ties, less frequently in resource contribution ties, and even less frequently in collaboration ties (H8). This was the case, with 40 negative reports of leadership communication, 33 negative reports of resource contribution, and 28 negative reports of collaboration.

Appendix G provides other information on tie properties that may help explain network dynamics. For example, 77.4 % of ties were described as occasional (i.e., once a month or less) and 22.6% were frequent (i.e., more than once a month) (Table A.13). Furthermore, 68.9% of ties were perceived to be very important, 25.1% were somewhat

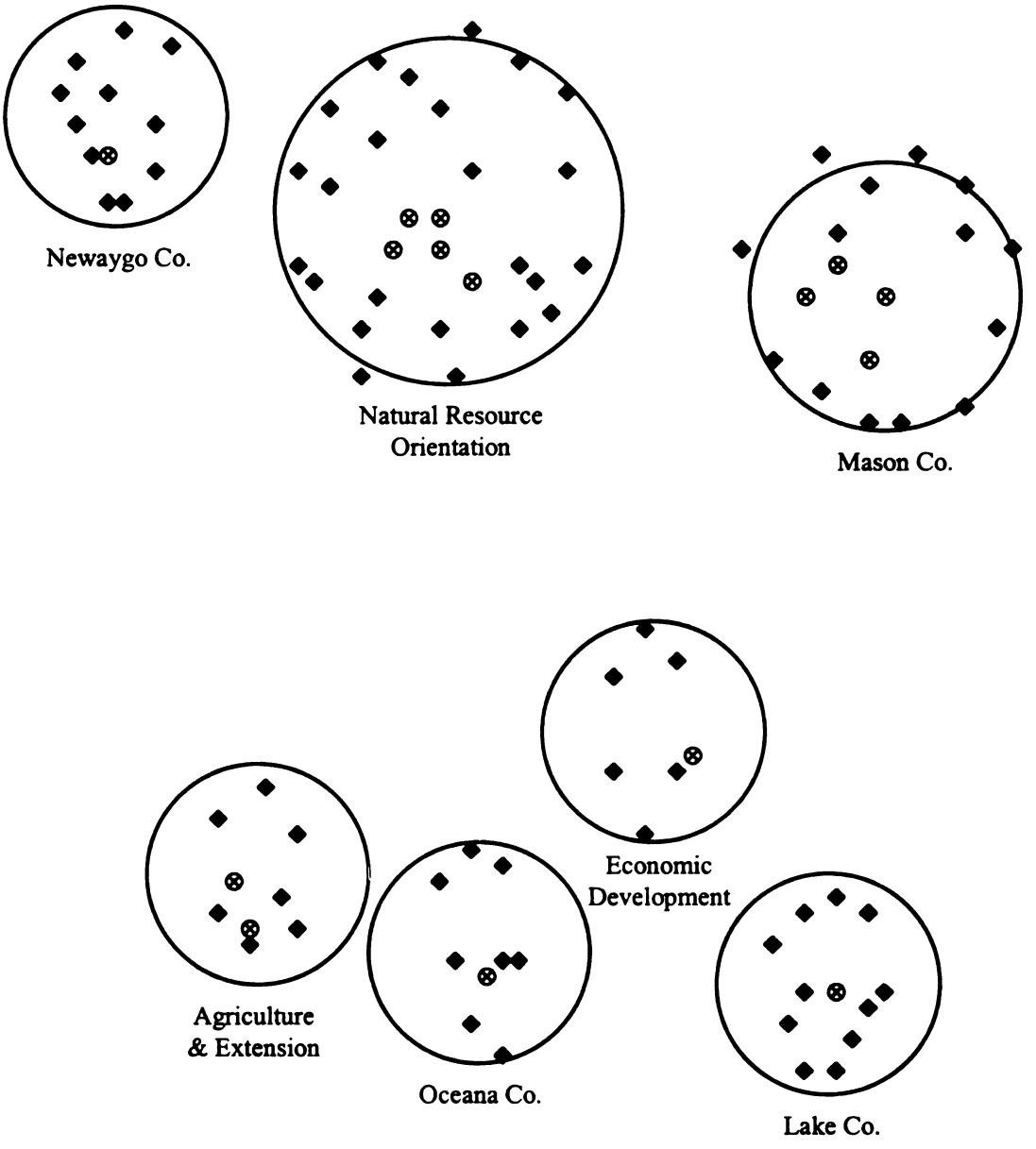

Figure 2.3. Clusters identified in the PM fisheries stakeholder network and central organizations (represented by ⊗) within each cluster (outlier organizations and lines representing ties are omitted for clarity).

important, and only 1.2% of ties were described as not important (Table A.17).

The sociograms helped illustrate the structure of the PM fisheries and watershed network, and they provided other information on network properties such as clustering and centrality. In H9, we hypothesized that cluster formation will emerge among groups with similar organizational domains and/or counties. As illustrated in Figure 2.3, this was the case for the seven clusters in the network. Four cohesive subgroups were based on county similarities, and three were primarily based on domain similarities in natural resource , agriculture/extension, and economic development orientations. These findings complement the results from the p_2-like model, which found tie formation patterns to be strongly influenced by county similarity and domain similarity between organizations.

The sociograms also enabled us to determine which organizations held a central position in their cluster. Central organizations were—quite literally—the organizations located near the center of a cluster, yet they also had to serve as the focal point of most interorganizational relationships in the cluster to be considered central. In H10, we hypothesized that organizations with a central role in their cluster will have a natural resource or local government purpose; be non-voluntary; have high involvement; and/or be generalist in scope. Each of the clusters had at least one central organization (Figure 2.3), and there were 15 such organizations that met our criteria. As expected, 11 were non-voluntary, 10 had a natural resource or local government planning purpose, and 8 were generalists; however, only 6 indicated having high involvement. Although beyond the scope of our hypotheses, we noted that 14 believed in the "multiple social and environmental benefits" philosophy of natural resource management, 11 indicated having a concern about habitat, 9 were more than 51 years old, and 8 were satisfied with PM

fisheries. Many of these attributes agree with the findings of the p_2-like model, such as being a generalist, old, and being satisfied with PM fisheries. In addition, purpose, philosophy, and concern attributes, which were important for centrality, were combined to create the domain variable, which was important in the p_2-like model.

Summary and Conclusions

Collectively, these results point to several organizational attributes that can predict organizational relations (Table 2.9). At the dyadic level, the most important predictors were being from the same county and the same organizational domain (with certain domains being more important predictors). Having a similar age of more than 51 years was also associated with interorganizational relations. Having the same generalist interest scope was also suggested as a predictor, although much less consistently. These results are consistent with interorganizational relations theories. All three theories

Table 2.9. Important predictors of interorganizational relations at the dyadic and chooser levels.

Dyadic level	Chooser level
same county*	generalist
same organizational domain*	satisfied with PM fisheries
(especially certain domains)	unsatisfied with PM fisheries
both more than 51 years old	inside the watershed
	natural resource and environmental club domains

* those attributes most strongly associated with tie formation

explored here emphasized the importance of organizational domain and interest similarity, and the institutional theory would predict that similarities in county and long duration of existence would be important.

At the chooser level, important predictive variables include the effects of being a generalist, satisfied with PM fisheries, unsatisfied with PM fisheries, being inside the watershed, and from certain domains (Table 2.9). We would expect organizations that are generalists and/or satisfied with PM fisheries to indicate the presence of interorganizational relations, as they may recognize the value of such relationships in maintaining and enhancing organizational function. Interestingly, dissatisfaction with PM fisheries was also found to be an important predictor, perhaps due to some organizations' desire to promote their goals or positions on a specific issue, improve their role in the network, or otherwise garner support for making desired changes in the management framework. The watershed boundary is a conceptual constraint that frames many PM-related issues, and we would expect that organizations located inside the watershed may have a greater interest in forming or recognizing relationships with others. They may need resources from organizations outside the watershed, or they may need to establish, elevate, or protect their interests with local and distant political decision makers. The only chooser effect to suggest any importance in predicting tie formation was satisfaction with PM fisheries, although the significance of this effect was highly questionable. Any importance, however, may indicate that organizations tend to indicate having ties with other organizations that may be perceived as being positive or supportive.

The relative importance of various domains was found to vary between analyses,

although natural resource orientations (management agencies and environmental clubs), state and federal government agencies, educational organizations, and agriculture organizations were the domains most consistently found to be important predictors of strong ties at the chooser and/or dyadic levels. Given the very nature of the problem domain—fisheries and watershed management issues—we would expect natural resource-oriented organizations to be well-linked with each other. The ecosystem- and landscape-level issues in this domain require holistic, integrative approaches to management, and this requires sustained interactions between those who manage the resource. Why, however, would other domains like agriculture exhibit (sometimes much) greater odds of tie formation? As this variable, domain, at the dyadic level only applies to ties between organizations in the same domain, we can interpret this as being an indicator of how well-connected a given domain is. Natural resource agencies and other government offices had relatively lower odds of forming ties (strong and regular) with each other, but this may indicate that they also form more ties with organizations in *other* domains. If this is the case for natural resource agencies (as indicated by the chooser-level effects in Table 2.8), then this is also very consistent with holistic, integrative ecosystem management efforts. Other domains with greater tendencies to interact may be relatively more insular; for example, education and agriculture domains demonstrated high tendency to form strong ties, indicating they maintain interactions with each other as part of their routine operations. Domains such as local government, economic development, and outdoor recreation were not consistently shown to be significant predictors of strong ties, although they were important in predicting regular ties. This suggests that organizations in these domains may demonstrate more independence from

each other (and possibly more interactions with other types of organizations) in their routine operations.

Certain conclusions can be drawn from these analyses. First, the importance of each organizational attribute varies according to whether it is applied to the chooser, the chosen, or the chooser-chosen dyad. Satisfaction with PM fisheries was the only attribute that may be important at each level, which may indicate a general trend that these organizations have stronger incentive to engage and invest in domain-level issues and relationships. Other attributes were important as chooser level-effects, which may reflect the wider range of variance among attributes that cause one to seek or recognize interorganizational relationships. Those attributes important at the dyadic similarity level indicate the strong tendency of organizations to form relationships with other organizations that hold similar attributes.

Second, the overall interorganizational network patterns that emerged for the PM fisheries and watershed problem domain are generally consistent with interorganizational relations theory. Most hypotheses on tie formation patterns were generally supported by our data, and these ties collectively produced interorganizational networks that also agreed with our hypotheses. For example, our observations on clustering and centrality patterns generally agreed with the concepts represented in our hypotheses on tie formation. Cohesive subgroups formed around counties and domains, and central organizations displayed characteristics (e.g., generalist, satisfied, non-voluntary, long existence, concerned about habitat and natural resources and/or local planning) that would support the idea that they are influential network actors.

These conclusions have important implications for PM fisheries and watershed

managers and others who would seek to facilitate interorganizational relations in the problem domain. In trying to conserve, protect, allocate, and sustainably use these resources, managers should note what kind of stakeholder organizations enter relationships, why they enter these, and what kind of relations emerge between organizations. In addition, they should note that in this network—although most ties occurred occasionally—interactions were overwhelmingly perceived to be positive experiences and very important to maintain; this gives managers a solid base from which to facilitate future interorganizational relationships. The breadth and depth of fisheries and watershed management implications will be further explored in Chapter 3, which integrates these findings with various perspectives on stakeholder involvement in natural resource management.

CHAPTER 3

INTEGRATING FISHERIES STAKEHOLDER ORGANIZATIONS INTO A COMPREHENSIVE WATERSHED PLANNING PROCESS: IMPLICATIONS OF INTERORGANIZATIONAL NETWORK DEVELOPMENT AND STRUCTURE

Introduction

Throughout North America, aquatic resource managers are increasingly embracing two important concepts: that watersheds define appropriate management units (Alexander et al. 1995; Rhoads et al. 1999; Taylor et al. 1999; Wesche and Isaak 1999) and that stakeholders can serve as both management constituents and participants (Decker and Krueger 1993; Grimble et al. 1995; Margerum 1999; Rhoads et al. 1999; Beierle and Konisky 2000; Gregory 2000; Lundqvist 2000). These concepts are transforming fisheries and other aquatic resources management from what could formerly be described as a linear, top-down, piecemeal approach to fish and habitat manipulation to a more dynamic, inclusive, holistic approach that views fish communities in the context of ecological and social landscape processes (Taylor et al. 1997). Many management agencies are developing or implementing management systems that incorporate these concepts, and some form of "watershed-based stakeholder participation" is now frequently emphasized in aquatic resource management approaches (Alexander et al. 1995; Rhoads et al. 1999).

Integrating these concepts in fisheries management, however, presents managers with a wide range of challenges. Not only do they need to expand their definition of what

management is (e.g., considering land along with water, considering stakeholders as potential partners)—they also need to find new ways to plan, implement, and monitor day-to-day management activities that integrate watershed and stakeholder concepts. Adopting watershed-based management boundaries can be a straightforward process, as watersheds can be identified with geological and hydrological information (Alexander et al. 1995; Wesche and Isaak 1999). Watershed boundaries can be superimposed on existing management units (often based on political boundaries or jurisdictions), thereby revealing where new management units should be geographically bounded or what political units must become integrated with watershed processes.

Adopting new management concepts and roles for stakeholders, however, is less straightforward. Managers may struggle with questions like: who are our watershed stakeholders? How do they affect management, and how does management affect them? What is—or could be—their role in management? How do we integrate them effectively and efficiently? There are no obvious answers to these questions, as the stakeholder population, their relation to management, and management issues are unique for every watershed or management unit. Furthermore, the existing relationships among some fisheries stakeholders may be rooted in their interests surrounding other types of issues (e.g., education, economic development, etc.)[4]; therefore, their involvement in fisheries may affect their relationships surrounding other types of issues. Fisheries managers, therefore, need a framework or process that can help guide them through these difficult

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[4] Theories of social capital, or the potential to access resources through social relationships, have also been applied to explain tie formation among stakeholders. See Woolcock (1998) and Gittel & Vidal (1998) for more information on social capital theory.

stakeholder integration questions, which will ultimately enable them to increase the likelihood of achieving holistic watershed-based management.

The need for stakeholder engagement in fisheries management has been recognized for the Pere Marquette (PM) River watershed in Michigan. As described in Chapters I and II, this watershed is host to over 101 stakeholder organizations, many of which hold strong opinions about PM watershed management—opinions steeped in a long history of commitment to the river (Cassuto 1994). Many groups have worked together on issues that they perceive as affecting their use of the river, although "[r]elations between the citizens' groups and government agencies can get fractious, and alliances among the groups themselves shift with the changing issues" (Cassuto 1994, p. 61) regarding the PM River and its resources. Nevertheless, these stakeholders can be important participants in PM management, and this points to the need for a stakeholder integration framework. Dave Washburg, a long-time recreationist on the PM, observed, "'[e]verybody's going to have to work together...and I hope they can mark out a pretty good blueprint of how to do it by using the PM'" (Cassuto 1994, p. 110).

In this chapter, we consider how the existing network of stakeholder relationships surrounding the PM watershed can be better utilized—or even transformed—to facilitate stakeholder integration in management. Networks provide great insight into studies of stakeholder interactions, since "organizations participate in a network because they have a critical *stake* in the issue, can make an important contribution in resolving it, or both" (Chisholm 1996, p. 221, emphasis added). Stakeholder organizations often engage in PM management issues, although this may be done in a reactionary, ad hoc, contentious, and costly manner (Cassuto 1994). Nevertheless, there *is* a network of relationships among

fisheries-oriented PM stakeholders (see Chapter 2), which managers could utilize to enhance stakeholder communication and participation. Although members of this network may overlap with members of other issue-based networks, the potential PM fisheries-based stakeholder network is a distinct population that affects (or is affected by) fisheries management; thus, they are the focus of this study. We review concepts about interorganizational network form and function, followed by a look at how features of the PM stakeholder network may have implications for fisheries management processes. Since every watershed—and its issues and stakeholders—is unique, managers need a framework for determining what kind of stakeholder involvement is appropriate and how it can be achieved. We offer recommendations for such a framework and examine how it may be applied to PM watershed issues and stakeholders. Finally, we consider the strengths and weaknesses of using such a framework, so that application of this approach and future research can continue to improve integration of the stakeholder network in management.

Interorganizational Networks and Fisheries Stakeholder Integration

Importance of a Network Approach

Scholars of organizational sociology (Gray 1985; Lawless and Moore 1989; Hanf and O'Toole 1992; Chisholm 1996; Agranoff and McGuire 1999; Hillier 2000) have increasingly recognized that complex social metaproblems (e.g., crime reduction, health care delivery, educational reform, environmental quality, etc.) cannot be solved by any single organization. These social problems are multi-faceted, turbulent, and complex,

and multiple stakeholder organizations each relate to different components of these problems. Organizational functions are affected by the context of the metaproblem, yet they can in turn affect only a fraction or subset of the overall problem, depending on their set of strengths, specialties, responsibilities, and expertise (Hanf and O'Toole 1992). Recognizing these limitations, many organizations engage in formal (i.e., deliberately planned) and informal issue networks with other organizations as a way to share information and other resources, collectively define problems and solutions, and coordinate activities (Agranoff and McGuire 1999; Hillier 2000; see also Chapter 2). This network approach enables them to tackle the issue from different fronts, reducing the occurrence of overlapping or counterproductive efforts (Lawless and Moore 1989; Hanf and O'Toole 1992). Given the prevalence of multi-faceted social metaproblems, an issue network orientation is starting to dominate theories of public organizational administration, replacing the hierarchical and bureaucratic orientations of traditional organizational analyses (Agranoff and McGuire 1999; Hillier 2000).

Natural resource agencies, organizations that address the fisheries management issues in question, are highly subject to the types of problems that call for network-based solutions. They are responsible for protecting, conserving, and allocating fisheries and other natural resources across the landscape, yet they generally recognize that they cannot do this in isolation from other resource management agencies, resource users (recreational and commercial), private land managers, and other types of direct and indirect stakeholders (Edgerton 1987; Hanf and O'Toole 1992; Hanna 1999; Margerum 1999; Hillier 2000). Managers have often tried to identify, consider, and incorporate the interests and behaviors of stakeholder groups; at the same time, many of these groups

have become increasingly active in seeking access to management decisions and processes (Beierle and Konisky 2000; Gregory 2000). "However, what generally appears to be missing is an overall structure for organizing the dialogue with diverse stakeholders..." (Gregory 2000, p. 35); therefore, in addition to discerning the technical aspects of ecosystem function, management agencies need to have personnel that are skilled in communicating, coordinating activities, resolving conflicts, understanding expectations, and otherwise facilitating joint efforts among a diverse and interacting set of stakeholders (Rowley 1997; Agranoff and McGuire 1999; Beierle and Konisky 2000). By recognizing stakeholders' diversity and interactions in the context of their network structure, managers can more efficiently and effectively integrate these groups and enhance their likelihood of achieving management goals.

Many agencies are responsible for fisheries and other ecosystem resources in and around the PM River (Cassuto 1994), and we are interested in how the PM stakeholder network affects their ability to meet their management goals. The network implications and recommendations in this study, therefore, are equally applicable to multiple management agencies with PM responsibilities: the Michigan Department of Natural Resources, the U.S. Forest Service, the U.S. Fish and Wildlife Service, and the Little River Band of Odawa Indians.[5] Any of these agencies—alone or in combination—can serve as a facilitator or coordinator of stakeholder network activities. Each needs to understand their role in the network, others' roles in the network, and the potential for joint problem resolution via network coordination and mobilization (Chisholm 1996;

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[5] For the remainder of this study, the term "management agency" will be applicable to any of these organizations (unless otherwise noted).

Rowley 1997; Agranoff and McGuire 1999; Hillier 2000).

Network Characteristics and Organizational Function

Social network analysis enables one to examine organizations' interdependence and determine 1) how relationships form and 2) how the pattern of these relationships collectively influence their behavior (Lawless and Moore 1989; Hanf and O'Toole 1992; Chisholm 1996; Rowley 1997; Hillier 2000; Scott and Lane 2000). A review of issue-based network characteristics, and how organizations function in these network-based management settings, will help facilitate our assessment of management implications of the PM stakeholder network.

In contrast to top-down authoritative structures, interorganizational networks display a horizontal structure with virtually no official hierarchy between organizations (Lawless and Moore 1989; Hanf and O'Toole 1992; Chisholm 1996; Agranoff and McGuire 1999; Hillier 2000). Although interdependent, the organizations are loosely linked and retain their purpose and responsibilities, perceived autonomy, and decision-making independence, thereby allowing them to voluntarily engage (and disengage) in the network (Chisholm 1996; Agranoff and McGuire 1999). Organizations enter the network by forming relationships that they perceive will meet their needs for information, resources, or influence (see Chapter 2); therefore, networks are dynamic. Network engagement can be motivated by a desire to maintain vested interests as well as by dissatisfaction with the status quo (Hillier 2000). As a result, the configuration of the network at any given time reflects organizations' perceptions of the issue and their role in addressing it. A central organization can be influential or powerful in the network, but

they generally cannot directly control the activities of other network members. The distribution of tasks and activities among network members is allocated through market-like transactions (i.e., the interactions determine how tasks are assigned and coordinated) as opposed to being centrally controlled (Lawless and Moore 1989).

As the number of interactions between organizations increase, communication among network members becomes more efficient (Rowley 1997). It becomes easier to share ideas, information, and expectations, and organizations may be more likely to reach consensus about common values and norms (Galaskiewicz 1985; Scott and Lane 2000). Well-connected networks members (i.e., those having a 'bonding' role in the network; Gittel and Vidal 1998), often forming sub-networks or clusters, can more easily monitor each others' actions, and they are therefore harder to manipulate or coerce. In addition, it is easier for well-connected organizations or clusters to form coalitions or alliances in response to new issues, and they may collectively exert more influence than other less-connected sectors (Rowley 1997; Hillier 2000; Scott and Lane 2000). For well-connected organizations, networks provide a forum in which "existing interorganizational networks provided a latent structure that could be used for coalition building" (Galaskiewicz 1985, p. 294; Chisholm 1996). In contrast, where fewer ties exist between organizations or clusters, organizations become isolated, segregated, or marginalized, thereby decreasing their flow of communication, ability to reach consensus, and collective influence in social and political decisions (Rowley 1997; Hillier 2000; Scott and Lane 2000). Some organizations may have relationships that span between clusters or reach these isolated, marginal groups, and these organizations (i.e., those having a 'bridging' role in the network; Gittel and Vidal 1998) can be instrumental in accessing diverse resources as

well as expanding and mobilizing network-wide activity (Hillier 2000). Woolcock (1998) emphasized the need for both bonding and bridging organizations in sustaining and strengthening network-based activities.

Once organizations are engaged in the issue network, coherent goals, visions, and decisions may emerge through processes of formal and informal dialogue, debate, and bargaining among network members (Lawless and Moore 1989; Hanf and O'Toole 1992; Chisholm 1996; Hillier 2000). Broad access to information and disclosure of costs and benefits help develop the perceptions, expectations, trust, and visions that underlie organizations' goals and activities (Lawless and Moore 1989). This collective goal-setting process requires some level of agreement in interests, policies, and obligations among network members, and this multi-organizational perspective is important for network-level goal attainment (Lawless and Moore 1989). Such agreement promotes collective action on a higher-level problem (i.e., the metaproblem; Chisholm 1996)—action that is also compatible with organizational-level goal attainment. This agreement, however, is harder to achieve in interorganizational conflict situations; therefore, conflict identification and mediation will help organizations find ways to complement, not compete with, each other (Hillier 2000).

Since organizational engagement in the network may or may not occur spontaneously, a central organization—or closely allied set of central organizations—may be strategically situated to initiate, encourage, and maintain (although not necessarily force) interactions and flows of resources between organizations (Lawless and Moore 1989; Chisholm 1996). Central organizations are more likely to have more alternatives and sources of information and resources, which often translates into greater perceived

prominence, power, and status (Rowley 1997; Scott and Lane 2000; see also Chapter 2). When this ability to influence is combined with trust between organizations, a central organization can facilitate or coordinate interactions between groups that would otherwise remain separate from each other or isolated from the network (Rowley 1997; Agranoff and McGuire 1999). Network coordinators can identify, assemble, and mobilize stakeholder organizations (Hanf and O'Toole 1992; Agranoff and McGuire 1999); facilitate the exchange of information, ideas, and resources; be a source of long-term continuity, compromise, and conflict mediation; facilitate ongoing dialogue on network goals and vision (Hanf and O'Toole 1992; Chisholm 1996); and otherwise "promote integration by acting as the link needed to bring member agencies together, and get them committed to the overall system" (Lawless and Moore 1989, p. 1176). Network coordinators can also articulate, record, and monitor organizations' commitments, thereby facilitating communication and progress towards achieving network goals (Hanf and O'Toole 1992). In the PM stakeholder network, a management agency could fulfil this role of facilitator or coordinator, given their responsibilities and strong interests in the problem domain. Although stakeholders' trust of agency managers may vary from issue to issue, stakeholders will likely recognize that these agencies are influential network leaders, having the expertise, resources, and obligations to address many domain issues.

Management Implications of the Pere Marquette Stakeholder Network

The PM River watershed, having multiple stakeholders and various fisheries management issues (see Chapters 1 and 2; Cassuto 1994), provides an ideal setting for

studying how interorganizational stakeholder networks relate to fisheries management processes. In Chapter 2, we used social network analysis tools to better understand the formation of interactions among the 101 PM fisheries stakeholder organizations identified in Chapter 1. We studied: 1) the formation of interactions between two organizations based on the properties of those organizations, 2) the tendency of a single organization to report or recognize their interactions with others, 3) the properties of the overall network relationships, and 4) the network properties that emerged when data on organizations and interactions were aggregated. Results of this network analysis enabled us to understand more about what kind of organizations form relationships as well as characterize the network of stakeholder interactions, which in turn enable us to compare the PM network with the general network properties explored above. In the following sections, we list the findings in each of these areas and explore their implications for management processes.

Interactions Between Two Organizations

The network analysis results indicated that, surrounding PM watershed issues, interorganizational relations are likely to form between two organizations that share certain attributes:

- *Being from the same county.* The PM watershed contains parts of four counties: Mason, Lake, Oceana, and Newaygo. These political boundaries influence organizations to interact with others according to political jurisdictions and geographical proximity. This may indicate that county governments are influential coordinators of sub-networks, or it may reflect a perceived need to conform to any formal or informal local government planning processes.

- *Being from the same organizational domain.* Organizational domain refers to a group's role or orientation in the network, and it is reflected in their purpose, philosophy, and interests. Organizations in the education, agriculture, and environmental club domains were most likely to form strong ties (i.e.,

reciprocated, positive, and important) with each other, although organizations in all eight domains (the above three plus natural resource agencies, other government agencies, local government offices, economic development groups, and sportsmens' clubs) demonstrated a tendency to simply have ties associated with each other. The emergence of ties between similar kinds of groups may reflect a higher degree of familiarity, trust, and reliability that facilitates working toward common goals.

- *Both more than 51 years old.* As organizations exist for a longer period of time, they become better established among network members. They develop a more permanent presence in the area, and they may be perceived as having more influence, credibility, or experience based on a longer history of involvement. Members of these organizations may be more familiar and comfortable with each other and with the issues, and they may perceive each other as being reliable, stable partners.

These observed predictors of interactions between two organizations have certain implications for management agencies. Knowing that organizations have a tendency to interact with others in the same county, managers interested in widening communication beyond political boundaries could design cross-county programs or initiatives. If, on the other hand, managers wanted to target information within a certain county, they could assume that groups in any given county are generally well-connected and that information may spread easily among them. Similar implications result from organizations being in the same domains; cross-domain communication efforts would need to be deliberately designed to overcome the divergent orientations that characterize different domains, but intra-domain communication could be easily achieved by targeting a few key organizations in the domain. Knowing that older organizations tend to interact with each other, managers could help broaden their range of interactions by identifying newer groups and facilitating the transfer of experience-based knowledge, institutional memory, and traditional goals. Conversely, newer organizations may have innovative ideas and insights that could be informative to the traditional administrative culture of some older

organizations.

Organizations That Report Having Interactions

Different properties emerged when describing those organizations (as opposed to pairs of organizations) that are more likely to report or recognize having an interaction with another organization. Those organizations consistently displayed certain attributes:

- *Being a generalist.* Some organizations were interested in only one type of issue (i.e., 'specialists' interested in either ecological, recreational, or user behavior issues), while others were interested in more than one type of issue (i.e., 'generalists'). When an organization is a generalists, they have a wider range of concerns or goals that may compel them to seek a wider range of interactions.

- *Being satisfied with PM fisheries.* When an organization is pleased with the state of PM fisheries management, they tend to be involved in more interactions. We studied satisfaction as a cause of interactions, but it is also possible that interactions cause satisfaction with management. Nevertheless, if an organization is pleased with management, they may have more enthusiasm or perceive more stability and rewards in forming and maintaining interactions with other organizations. This was also the only attribute associated (although very weakly) with organizations that were selected as partners in interorganizational relations.

- *Being unsatisfied with PM fisheries.* As an interesting contrast to the preceding attribute, those organizations that are not pleased with fisheries management may try to engage in a process of changing management goals or processes. They may form contentious interactions with organizations that support the status quo, or they may form other relationships to gain support for their positions on how they think management should be conducted.

- *Being located inside the watershed.* Those organizations located inside the watershed, as opposed to elsewhere in Michigan, have the most direct experience with PM watershed issues. They have the most immediate access to the river, and they may perceive a greater sense of urgency to engage in issues that could affect their lifestyle. They may, therefore, have more incentive to work with other organizations that could help them achieve their goals.

- *Being from a natural resource agency or environmental club.* Organizations in these two domains demonstrated a greater likelihood of reporting ties with other organizations—both within and outside their own domain. Given the nature of the topics (i.e., fisheries and watershed issues) that helped define our stakeholder

> population, we would expect to see groups concerned with resource conservation, protection, and management be highly involved in the network. Their high involvement with numerous types of organizations may reflect an understanding that ecosystem management requires input from diverse stakeholders.

Knowing what kind of organizations tend to report or recognize interactions—in cases where interactions are not necessarily based on attribute similarity—enables managers to identify these other active network participants. Since these organizations tend to be generalists, managers can assume that active organizations are interested in, receptive to, and communicative about many topics. Managers who wish to broaden network activity to include specialists can assess their specific concerns and facilitate greater levels of issue-based interaction, dialogue, or goal-setting. Active organizations also tend to be satisfied *as well as* unsatisfied with PM fisheries (as opposed to undecided or neutral), indicating that active organizations are motivated by some care or concern about the fisheries, whether or not they want to maintain or change current management systems. Managers, therefore, can focus on enhancing the exchange of ideas and concerns among active members in attempts to resolve conflicts or facilitate debate, or they can try to expand the network by reaching the undecided or neutral sectors of the network. In addition, knowing that active groups are located inside the watershed can lead managers to further utilize this well-connected and potentially influential sector to set watershed-level goals, and it may lead managers to look for opportunities to extend interactions to organizations in other parts of the state. Furthermore, since active organizations tend to be natural resource agencies or environmental clubs, managers can utilize their interactions to spread information throughout the network, and they can seek other ways to target different domains. For example, under the guidance of skilled

communication professionals, they could customize messages to better mesh with other groups' frames of reference (e.g., highlight agriculture or economic issues related to fisheries) or identify any common interests they may have with other organizations, thereby facilitating cross-domain interactions.

Types of Interorganizational Relations

Data on the properties of interactions between organizations revealed information about the kind of relationships that occur. Interactions among stakeholders surrounding the PM had the following properties (see also Appendix G):

- *Type of interactions:* Most interactions occurred in the form of leadership communication (reported in 41% of the interactions). Resource contribution interactions (e.g., providing information, expertise, facilities, etc.) occurred less often (32%), and joint program collaborations occurred least often (27%).

- *Tone of interactions:* The majority of interactions were positive (i.e., cooperative or casual) in tone (reported in 89% of the interactions); negative interactions (i.e., tense or confrontational) were only reported in 6% of the interactions.

- *Occurrence of negative interactions:* When negative interactions did occur, they occurred most often in leadership communication, less often in resource contributions, and least often in collaborations.

- *Frequency of interactions:* Most interactions (77%) occurred once a month or less; 23% of interactions occurred more than once a month.

- *Importance of interactions:* Most interactions (69%) were perceived as being very important to maintain, 25% were thought to be somewhat important, and only 1% were reported as being not important.

Since leadership communication was the most frequently reported tie, this may indicate that leaders are familiar with each other and that communication, generally positive but occasionally negative in tone, is a common leadership function. Managers

could target their communication efforts toward organizational leaders as a way to both influence organizational behavior and spread information among other leaders. Resource contribution and collaboration were reported less often, indicating that these may be perceived as being less necessary or important, or that there may be institutional, financial, or other barriers that limit a group's perceived options for providing resources or working with other groups. We think the first explanation is less likely, as most network members reported that their interactions were positive experiences and very important to maintain. This indicates that managers and network members have a foundation of conceptual agreement about the value of interacting with others. Managers, therefore, may not necessarily have to try to convince stakeholders of this value, yet the fewer occurrences of collaboration—and the lower frequency of interactions in general—may indicate that some organizations lack resources or information on how to operationalize or implement collaborative activities. If this is the case, managers may need to help identify and lift perceived barriers to interactions by providing supportive information or resources or by demonstrating how to build collaborative partnerships and integrate them with regular organizational functions. Managers should try to learn more about the specific contributions and collaborations that now occur between organizations, looking for ways to expand these efforts and to communicate about the processes of implementing these interactions.

Emergent Network Properties

Data on the interactions between organizations, when aggregated, describe a

network. The interorganizational stakeholder network surrounding the PM displayed the following properties:

- *Cluster formation:* Maps of interaction patterns revealed seven sub-networks, or clusters with higher concentrations of interactions, that formed among the PM stakeholder organizations (see Figure 2.3 in Chapter 2). Four of these were based on county attributes, and three were based on common organizational domains (natural resource, agriculture, and economic development orientations).

- *Central organizations:* Within each cluster, certain organizations were involved in more interactions than other organizations. These central organizations tended to be concerned about habitat, have paid staff, be more than 51 years old, be generalists, be satisfied with PM fisheries, and have a planning function in their cluster (either natural resources or local government). These characteristics describe the more well-established—and possibly more influential—network actors.

The emergence of clusters, or cohesive subgroups, indicates that certain members of the overall network are well-connected with each other. Managers may expect these cluster members to communicate more easily, thereby having a greater likelihood of developing common values and goals, a greater ability to form alliances, and a reduced susceptibility to pressures from outside their cluster. Whether these clusters emerged out of ad hoc interactions or more deliberate coordination attempts, cluster members are potentially very influential as a more coherent or unified set of network members. Managers should look for ways to build relationships, identify areas of common interest or compromise, and otherwise work with these clusters—they should not try to split or regulate cluster function. For example, while managers' attempts at watershed-based approaches may compel them to remove county-based communication barriers (i.e., political constructs that artificially divide ecosystems), managers should not try to prevent or override intra-county communication, as this would risk resistance from county-based affiliations and possibly lead to other unintended consequences (see Portes 2000).

Instead, managers should encourage organizations in different counties to expand their relationships across county borders while not abandoning their county-based affiliations. Furthermore, by maintaining and utilizing county-based communication, managers could also benefit from coordinated land use and environmental planning at the more local (i.e., city and township) level.

Clusters are not the only influential network component—network influence may also be demonstrated by central organizations. Configuration of the PM network indicated that a certain number of central organizations exist[6] (at least one per cluster), and these organizations display characteristics (see above) of being well-established. Managers can look to organizations that, by reputation or demonstrated ability, are widely-regarded as important, well-established network members. They can work with these organizations to collectively coordinate and facilitate cluster and network activities, or they can target important management information to central organizations so they can help spread information and ideas throughout their respective clusters. Central organizations also often served as cluster spanners or bridging organizations; therefore, they can also help spread information to other clusters (and possibly to isolated organizations, where such ties exist). Given the perceived power attributed to central organizations, managers should try to minimize the potential for conflict with other central organizations. Conflicts could diminish the ability of network members to communicate effectively or reach any level of consensus, thereby reducing the likelihood of activity coordination or collective goal setting.

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[6] In the interest of protecting the study participants' privacy, we cannot reveal the identity of these organizations.

Overview of Management Process Implications

To summarize these management implications in the briefest sense: stakeholder network information enables managers to be more active (as opposed to passive) in their attempts to foster relationships between resource-dependent sectors of society. In turn, such action could help managers encourage the collective goal-setting and action that will enable more sustainable forms of resource use, allocation, and conservation. In the PM watershed-based network, we were able to identify well-connected network stakeholders, disconnected network stakeholders, influential centralized organizations, and channels for distributing information within and between clusters. Such information is instrumental in developing effective and efficient stakeholder communication strategies, as managers can better target and package information to help them achieve stakeholder coordination, conflict mediation, and goal-setting.

The implications of the stakeholder network can be further understood in context of the overall natural resource management process. Taylor et al.'s (1995) "eight steps of management" outlines a general—yet adaptive—sequence of stages that can be utilized in fisheries management: 1) setting the goal; 2) analyzing the resource in the context of the goal; 3) diagnosing problems and identifying potentials; 4) prescribing a management plan (includes objectives, techniques, and courses of action); 5) organizing to carry out the plan (e.g., staff, equipment, budgets, and other resource needs); 6) implementing the plan; 7) evaluating the plan's outcomes; and 8) maintaining the successful components of the plan. Several of these steps could utilize network-based information. For example, in goal setting, managers need to understand to what extent their short- and long-term goal(s) reflect watershed stakeholders' interests and desires. It is possible that goals are

influenced by the most vocal sectors of the network, whether or not any degree of stakeholder consensus has been achieved. While complete consensus is unlikely, managers should be aware if and how their management goals relate to network-wide interests. If necessary, they can try to expand the goal-setting discussions between stakeholders and to other sectors of the network. In steps two, three, and four, managers need to consider the various ways that different sectors of the stakeholder network affect their ability to achieve short- and long-term management goals. Stakeholders' roles in these steps will vary according to the nature of the management issues; therefore, managers need to treat stakeholders' roles as one of many resource-related considerations. In step five, organizing to carry out the plan, managers can truly capitalize on the communication and coordination potential of the stakeholder network. Managers can use network information to build and facilitate interorganizational partnerships that both expand the scope of management activities and bring in new management resources (e.g., funding, equipment, etc.). They can also identify ways in which other organizations can help communicate about the plan, and they can look for ways in which management activities can complement and enhance other groups' activities. Finally, in steps six, seven, and eight, managers can again use the stakeholder network to communicate about management successes and failures, as they send and seek information via network channels about stakeholders' perceptions, expectations, and evolving management interests. In sum, the stakeholder network has great potential to inform many stages of the resource management process.

Many of these management implications can be further understood by looking at an example: the Fraser River Estuary Management Program (FREMP). This program is

a cooperative, multi-agency, integrated resource management approach that was developed in response to complex environmental problems and diverse user demands in an urban estuary (Hanna 1999). In evaluating the success of this program, estuary stakeholders were surveyed about their views on environmental quality, program impact, and the overall structure of the FREMP. Hanna (1999) found that those who were included in the program—well-connected government and industry respondents who shared resources and coordinated efforts—held more similar, consistent, and positive views about the program and the state of the estuary. Those who were most removed from the program (i.e., isolated or marginalized network members, usually nongovernmental environmental organizations) were more likely to hold dissimilar, inconsistent, and critical views and expectations of the program and the state of the estuary (Hanna 1999). This lack of stakeholder integration was thought to weaken the program's potential for collective goal-setting, planning, and successful implementation. Although this study was not framed in a network context, its results concur with theories about network structure and the behavior of stakeholder organizations. We suggest that a network-based approach to FREMP could help identify other important stakeholders as well as facilitate the communication and coordination that are necessary for effective interorganizational management approaches.

Framework for Issue-based Stakeholder Involvement

To this point, we have considered how features of the PM stakeholder network relate to general management goals and processes. Does this mean that managers should

involve all network members in all management issues? No. Although managers should use the wider stakeholder network as a source of social context and communication, they do not necessarily have to utilize the entire network to address every specific management issue. "The manager must constantly bear in mind the lineup of potential collaborators, although the actual number engaged may be small" (Agranoff and McGuire 1999, p. 22), depending on who affects this issue and vice versa. Furthermore, even when managers utilize the entire network in a general management approach, they would still need to deal with emerging issues and problems that may not be well-addressed by current members network or existing management objectives and procedures. Managers need to anticipate and respond to these specific issues and topics, which almost inevitably involve some set of stakeholders' interests, perceptions, and expectations. For each management issue, large or small, the network (or sub-network) that managers attempt to mobilize must reflect the diversity and complexity of the problem it needs to address and the methods used to address it (Chisholm 1996; Agranoff and McGuire 1999). Managers can better deal with these specific issues if they understand how the stakeholder network—and various subsets of it—affect how issues may be framed, understood, and resolved.

The dynamic nature of stakeholder networks, explored earlier, implies that networks are flexible, adaptive, and responsive to emerging issues (Lawless and Moore 1989; Chisholm 1996; Agranoff and McGuire 1999); therefore, managers can engage different sets of network members on an "as needed" basis. To do this well, however, they may need some type of method for identifying *which* network members should be involved as well as *how* they should be involved. Fortunately for managers and stakeholders, social scientists have developed processes for exploring the social impacts

of environmental issues and actions. As defined by Burdge et al. (1994, p. 78), "a social impact assessment is an analysis of past and present impingements upon social conditions and processes and a projection of likely future consequences of proposed interventions in social interactions and relationships between and among people." Social impact assessments (SIA) were developed to understand how a proposed action on the bio-physical environment (i.e., the "intervention") will affect social communities and relationships (Burdge et al. 1994). While it can be difficult to predict such consequences with complete accuracy (see Portes (2000) for more on unintended consequences of social action), the basic SIA concepts and methods can be adapted to help understand how specific management issues affect past, present, and future stakeholders. The last few phrases in the Burdge definition—about how events may affect the "...social interactions and relationships between and among people"—highlight the applicability to studying the network of stakeholders, their relationships to each other, and their relationships to the issue in question.

The SIA process occurs in multiple stages, which are described in great detail by the Interorganizational Committee on Guidelines and Principles for Social Impact Assessment (1994, p. 111-119). Briefly, once an environmental action or alteration is proposed, project planners and social impact analysts would: 1) identify potentially affected publics and their concerns, 2) identify proposed actions and alternatives, 3) describe the human environment in the area of influence, 4) identify probable impacts, 5) investigate the effects of impacts (along with the public's responses and cumulative impacts), 6) recommend changes to the proposed action (and prepare a mitigation plan), and 7) develop a monitoring plan. Steps one and four are based on "scoping," an

investigative process through which relevant information is determined by in-depth exploratory studies on various aspects of this issue (e.g., who is affected? what are the impacts?; Burdge and Robertson 1994).

How can this project-based social impact assessment process be adapted into an issue-based process for engaging network stakeholders? Initially, managers should verify that a network-based approach is appropriate. For example, managers need to recognize that the specific issue or problem may be so complex or widespread (i.e., a complex social metaproblem, as opposed to a simple issue with negligible social impacts) that they cannot resolve it independently. In addition, managers need to confirm their roles or responsibilities related to taking leadership on the issue, take stock of the resources (e.g., time, effort, funding) they can devote to network coordination, and assess the degree to which stakeholders trust them and each other. Once the appropriateness of a network-based approach has been confirmed for a given issue, we recommend the following process, generally based on the above SIA process, for identifying and involving concerned stakeholders:

Step 1: Define the issue and any related issues. While it may seem that an issue is obvious, it is important to ensure that the issue has been examined from all sides and from all perspectives. Short-, medium-, and long-term aspects of the issue should be considered through a thorough scoping process, as should any tangential or indirect aspects. Any relevant social and ecological indicators (e.g., measurable components that reflect the status of the issue) and stakeholders' values (e.g., preservation, utilization, etc.) should be identified. For example, an issue such as streambank stabilization (i.e., the reduction of erosion through the use of vegetation and physical buttresses) may seem like

a straightforward problem with a clear solution, but closer inspection may reveal that the issue—and its proposed solutions—involves more complex issues related to long term habitat quality (e.g., native plant use, spawning site materials, flow regimes), private property (e.g., landowner training, incentives, perceived violation of property rights), logistics (e.g., access to erosion sites, road and bridge construction, project funding), angler behavior (e.g., walking down steep slopes, disturbing vegetation), and so on (Alexander et al. 1995). As an issue (and related issues) becomes better identified through scoping, managers can increase the likelihood that they will comprehensively address it.

Step 2: Identify the stakeholders that relate to the issue(s). Based on the findings of the issue definition stage, managers can identify those network members (and possibly new stakeholders not previously included in the network) that affect, or are affected by, the issue(s). Through interviews, focus groups, or other information-gathering processes, managers can utilize network channels to work with stakeholders in verifying their understanding of the issue from the first step. Continuing the above example, managers interested in stabilizing riverbanks should clearly consult with other riparian public land managers and property owners, but they should also consult with anglers, scientists, construction site managers, vegetation suppliers, and so forth. Specifically, managers should determine how stakeholders view the issue in question, and they should ask stakeholders to identify other possible stakeholders that may have been overlooked. Having a common understanding of the issue and a (possibly) complete set of stakeholders, managers and stakeholders can proceed with actually addressing the issue.

Step 3: Determine if, how, and to what extent the issue(s) affects and is affected by stakeholders. Managers may not be aware of the full range of ways in which the issue affects the social and ecological surroundings of different stakeholders and vice versa. Alternatively, stakeholders may perceive that the issue will result in certain impacts that may or may not actually occur, or they may not be aware of how they affect the issue. Utilizing another scoping process, this step allows managers and stakeholders to jointly investigate and communicate about their relationships, perceptions, expectations, and knowledge concerning an issue. This can be facilitated by utilizing network communication channels, and it can increase the likelihood of reaching wider consensus about the nature of the issue and its resolution. Again, this step may reveal other issue aspects (e.g., indicators or values) and stakeholders that were previously overlooked, thus enabling managers to fortify their network-based approach to issue resolution. For example, managers may realize that they have overlooked farmland erosion issues in lower stretches of the river. They can then proceed with a wider understanding of agriculture practices and stakeholders that need to be incorporated.

Step 4: Develop and implement solutions or collective problem-solving approaches. This step again utilizes the coordination potential of the stakeholder network. Once an issue-based network (or sub-network) of relevant stakeholders has been mobilized, they can engage in the dialogue and debate through which collective solutions, compromises, or partnerships may emerge. Any necessary tasks or responsibilities related to the issue can be negotiated among network members (avoiding any redundant or counterproductive efforts), and managers can proceed with coordinating, implementing, or otherwise facilitating action on these joint approaches to

the issue. Revisiting our example, managers can help build linkages between riparian landowners' associations, farmers, and Extension agents that will help spread information about private riverbank management techniques; they can also work with other managers and private foundations to fund bank restoration projects.

Step 5: Conduct follow-up evaluation and monitoring of the issue and the network. Once issue-related activities have been implemented, managers can oversee any necessary evaluation and monitoring to determine the extent to which issue-related goals have been achieved and how network members may have been affected. Managers and stakeholders can utilize network communication channels to spread and collect information about their roles and outcomes—including information about how issue-based activities may have, in turn, affected the configuration of ties within the greater stakeholder network. By compiling and analyzing this information, managers can inform the wider network about trends in issue resolution as well as identify emerging issues, some of which may need to be addressed by revisiting step one and mobilizing other sectors of the network. In this sense, network-based management and communication strategies are iterative, evolving processes in which different sectors of the network are mobilized at different times. In our example, managers could track the progress of streambank stabilization projects, communicating to funders, anglers, and the wider stakeholder network about the evolving status of this issue. If the stabilization projects were successful, for instance, the ties between managers and funders may be strengthened or expanded, thereby facilitating the funding of other projects. On the other hand, if bank stabilization was not achieved, managers may need to consider if and how this outcome may hurt relationships between network members (which could hinder future network

mobilization efforts). Either way, managers need to maintain relationships with the active sub-network and other members of the network in order to facilitate the adaptability and success of future network-based activities.

Conclusions

We have attempted to demonstrate the powerful communication and coordination potential that is embedded within stakeholder networks. While our specific findings on the PM network led us to explore the management process implications tailored to that watershed, we believe that any stakeholder network surrounding complex resource management issues can be identified and incorporated into both general and issue-based management approaches. Management agencies and other groups that seek to better understand stakeholders in context of their network structure need to invest in securing and maintaining this kind of information, but doing so provides a strong foundation for more effective stakeholder integration. The greatest strength of this network approach may lie in its ability to adapt to different management scenarios and issues. A list of potential stakeholders can be easily modified as the nature of management issues evolves, and managers' understanding of the interrelationships between stakeholders (and their relationship to the issues) can be updated as needed. This flexible approach to stakeholder communication and coordination enables managers to develop innovative and relevant management systems in response to society's changing resource interests.

This stakeholder network approach is not immune to weaknesses, however. First, despite all efforts at identifying and integrating stakeholders, some—especially

individuals not affiliated with an organization—will inevitably be left out of management discussions. For example, in this study, canoeists are ever-present users of the PM river, yet they are not represented in the network at the organizational level (except indirectly, through recreation-promoting organizations). Nevertheless, the network could be adapted to include individuals, if managers feel they can be easily identified. Second, managers cannot assume that all identified stakeholders will express care or concern about how they affect management or how management affects them. Even if managers think a group *should* become involved in management, members of the group may remain indifferent despite managers' efforts to inform and integrate them. When this is the case, managers may need to be creative in finding ways to compensate for the group's decision to opt out of the network. Third, managers cannot assume that those who are engaged in the network will easily or harmoniously reach any degree of consensus. Network members may persist in holding opposing views or positions, and managers may not be able to facilitate resolution or compromise. "Simply forming a network does not ensure a high degree of cooperation among member agencies" (Lawless and Moore 1989, p. 1177). To fully realize the potential of the network, network members must have some degree of commitment to collective problem solving.

Clearly, there are costs and benefits associated with network-based communication and coordination strategies. Such strategies can be costly in terms of managers' time and effort, which are required to develop a foundation of shared values and trust among diverse network members (Lawless and Moore 1989; Agranoff and McGuire 1999; Rhoads et al. 1999). Time and personnel are generally in short supply among management agencies, and managers may be tempted to resort to traditional

modes of bureaucratic, top-down systems that appear easier and less costly in the short run. These are not the only limiting factors, however. Since network coordination can be largely dependent on the administrative and leadership support of the "lead" network agencies, the overall utilization of the network may be vulnerable to each agency's technology needs, legal constraints, institutional resources, political power, and other real and perceived constraints on management options (Agranoff and McGuire 1999). Furthermore, networks-based approaches present risks related to accountability. Network members can be held accountable for their limited role in network-based strategies and approaches, but none—even a coordinating management agency—are fully accountable for *everything* since responsibility is dispersed throughout the network.

Despite the potential risks and real costs, the benefits of successful network-based approaches offer tremendous opportunities for redefining the relationships between managers, stakeholders, and the issues about which they are concerned. Success is achieved if organizations perceive that they have gained more via the network than they would have otherwise by working separately (Agranoff and McGuire 1999). We believe that successful network utilization—even if pursued through long-term adaptation of network members and approaches—will enable managers to achieve more management goals than they otherwise would have. Knowledge of the stakeholder network will improve their ability to understand, appreciate, and integrate the social dimensions of resource management. Having obligations to uphold the public trust and develop sustainable resource management systems, managers may reap long-term benefits by exploring and utilizing the possibilities inherent in stakeholder networks.

EPILOGUE

Introduction

Each of the preceding chapters served as a semi-autonomous contribution, looking at different stages of the stakeholder identification and integration process. As a whole, the chapters provide natural resource managers with guidelines for identifying fisheries stakeholder organizations, understanding how and why they interact with each other regarding fisheries management issues, and exploring how they can become better integrated with watershed-based management efforts. Lessons learned about stakeholders surrounding the Pere Marquette (PM) River watershed may be directly helpful to that watershed-specific set of resource managers, but these lessons can also provide—for any management setting—an analytical framework for other stakeholder network studies as well as a foundation for resource managers' current and future communication strategies. To develop these future studies and strategies most effectively, however, we need to examine the sources of error that may limit the applicability of this overall study. Here we review the uncertainties surrounding this network-based approach and recommend future research that can help minimize these uncertainties and further build on this research.

Potential Sources of Error

The quality of any analysis is strongly affected by the accuracy and reliability of

the data collected. As a representative of an organization answered the survey, they may have done so in a way that introduced error in the data collection process. For example, the answers from any one organizational representative may have differed from the answers that another representative of the same organization would have provided, due to differences in their personal knowledge, relationships, and perceptions. Therefore, it was very important that an appropriate (i.e., knowledgeable of organizational relations) representative be identified to answer the survey.

Even if the most appropriate person answered the survey on behalf of their organization, they may still have misinterpreted or misunderstood the survey instructions. This may have led them to answer the questions with other guidelines or subject matter in mind, which may, for example, cause them to report their ties with other groups based on non-fisheries issues. In addition, they may have misperceived or misrepresented their actual frequency, type, or tone of involvement with other groups. They may have also failed to answer some questions completely, thereby providing no data about certain aspects of their group or their ties with other groups.

Still other sources of error were introduced when we compiled the responses from many different organizations. Each respondent may have held differing perceptions about what they think is a PM-related issue, what is a fishery issue, and what constitutes an interaction with another group. These inconsistent perceptions can lead to error, even if the respondents answered accurately based on their perceptions. For example, one group may have indicated on the survey that providing a referral to another group about a canoeing question from the public was an "interaction" about a "fishery issue," while another group may not have indicated the same event on the survey. These types of

inconsistencies between respondents can lead to inaccurate conclusions about the overall nature and extent of interactions.

While some of these errors were due to the input of survey respondents, some errors may also have been rooted in survey design flaws. This survey was very long and detailed (see Appendix B), compared to many other surveys, and it required a great deal of time and attention from the respondent. A more concise survey would not have required such stamina to complete, thereby decreasing the likelihood of errors. Further, some instructions may have been unclear, and some of the questions may have been worded in ways that limit their ability to provide helpful information. For example, by only asking about three types of interorganizational ties, we may have missed other types of interactions that are important for fisheries management communication strategies.

Other sources of error were also possible. For instance, if we did not define our stakeholder population correctly in the first phase of the research, our survey may not have gone to actual fisheries stakeholder organizations. We may have omitted some groups that were stakeholders, and we may have included some that were not. In addition, data collection occurred over a four month period; therefore, those who answered quickly could not have included information about ties in subsequent weeks that were reported by later-answering organizations. Finally, we may have erred in data coding, entry, modeling, or interpretation.

These types of errors could be minimized in future studies, but we believe any survey-based data collection and analysis process is subject to such limitations. Despite these potential sources of error in this study, we did not find strong evidence of major errors and we are reasonably confident that such errors did not significantly affect our

results or conclusions. For example, we only know of 11 additional organizations that were not produced by our initial stakeholder identification process, and each additional group was not suspected to be highly involved (each was indicated only once). In addition, the types and nature of survey answers were reasonably consistent across organizations, as we did not receive outlandish feedback or other evidence of significant aberrations. Survey pre-testing, therefore, may have helped minimize any misunderstandings or misinterpretations. We received a very high response rate, diminishing our concerns about non-response bias, and most respondents completed most questions. Many responses could also be replicated or verified with other data sources (which largely agreed with the responses), and we were able to double-check data coding and entry. Our overall analysis, while not immune to errors, appears to have produced reasonable results.

Areas for Future Study

First, we believe this study could be strengthened by supplementing this quantitative analysis with qualitative analysis. This quantitative analysis can provide statistical results on tendencies to form ties, but it may not necessarily capture all the underlying dynamics that led to these results. Qualitative analysis can provide rich descriptive information, but it may not reveal the extent or prevalence of a certain outcome like tie formation. Therefore, we believe that both quantitative and qualitative analyses, in combination, provide the most information about system dynamics. For example, if we were to follow this study with in-depth interviews or focus groups of

organizational members, we could obtain much more information on the specific issues, concerns, motivations, and goals that led to tie formation between groups. In addition, we could utilize the wealth of information that has been developed about stakeholder activities in and around the PM River watershed, such as watershed-based meeting records, transcripts of in-depth interviews, fisheries management documents, and personal observations. By comparing this information to the results of this study, we could achieve a deeper level of understanding about the dynamics of stakeholder relationships with each other and to the fisheries issues.

Other aspects of this study could be modified in ways that provide additional information about the PM stakeholder network. In this study, we applied the selection model to study how organizational attributes lead to tie formation, but we could also have applied the influence model to see how network structure influences organizational attributes and behaviors (see Gulati 1995; Gulati and Gargiulo 1999). In addition, instead of taking a "snapshot" of all relationships occurring in a given time frame, we could have conducted longitudinal data analysis to study how the PM network changes, look for cause-and-effect relationships, or look at other network trends over time (see Perrucci and Lewis 1989; Selsky 1991; Gulati 1995; Gulati and Gargiulo 1999). Even more ambitiously, we could combine the influence, selection, and longitudinal models, along with qualitative analyses, for the most comprehensive assessment of network structure, dynamics, and evolution.

Still other future research could also expand the scope of this study. For example, our population of network members could be modified in ways that provide additional information on network dynamics. If we were to change the configuration of the network

population (e.g., adding for-profit businesses or deleting some set of stakeholders from this research) and compare it to this study, we could see if and how changes in the population of stakeholders affects our results. This would allow us to see how different stakeholder identification criteria may affect our understanding of the network. We could also identify a population of stakeholders based on another watershed entirely, replicating this study in another setting. Comparing these results would enable us to see if and how well our results may apply to other settings, and we could see if any generalizable trends emerge.

As opposed to expanding this study outward, we could also look inward at the dynamics *within* organizations. Instead of having one respondent answer on behalf of their organization, we could select some set of groups with known relations and study the *intra*organizational networks among organizational members. We could examine if their personal ties extend to other organizations, and examine how the characteristics of organizational members affect this tendency. This would help us understand if and how individual people or dynamics within organizations may affect or better explain the patterns observed for interorganizational networks (see Lincoln 1982; Selsky 1991); for example, we could study the networks within a natural resource agency—where collaboration is essential—to better understand how and why ties are formed and facilitated in that setting. We could also examine other components of this study in more depth, for example, by comparing the sub-networks formed around different types of ties (Van de Ven et al. 1979), resources exchanged, communication media, or collaboration strategies.

Furthermore, this study could also serve as a preliminary stage in further research

about other phases of interorganizational relations processes. This study primarily looked at network structure and formation—not necessarily network function, processes, content, or outcomes. Therefore, it excludes some factors that could be important for network-based management. For example, we could examine if and how stakeholder characteristics and relationships affect tie maintenance and dissolution, as well as decision-making processes among network members. We also need to remember that a fisheries-based network is but one of many issue-based networks, and there may be ways in which this network overlaps or relates to other networks in the region (e.g., economic development, public health, etc.). The processes through which these networks affect each other may provide additional insight into their roles and functions of networks in the greater social system.

For any setting or social issue in which relationships, interactions, or collaboration are important, network analysis provides a powerful tool for analyzing and explaining who is interacting, as well as how, why, and when they are interacting. This information enables managers in network settings to be more deliberate and proactive in developing interaction strategies, which has great potential to make management more effective and efficient. The potential applications of network analyses—in natural resources and other management settings—is substantial, and the statistical approaches for analyzing networks are becoming more refined and powerful. We hope to encourage and expand the application of network analysis in natural resource sociology and policy, since sustaining ecosystem function and productivity demands integration and collaboration among resource stakeholders.

APPENDIX A

APPENDIX A

Complete List of Fisheries Stakeholder Organizations

Fisheries Stakeholder Organizations in, concerned about, or having impacts on the Pere Marquette River watershed and fisheries.

Federal Government:
US Fish and Wildlife Service, Ludington Biological Station US Forest Service, Baldwin Ranger Station USDA Farm Service Agency, Mason-Oceana County Office USDA Farm Service Agency, Osceola-Lake County Office USDA Farm Service Agency, Newaygo County Office Natural Resource Conservation Service, Mason-Lake Conservation District Natural Resource Conservation Service, Oceana Conservation District Natural Resource Conservation Service, Newaygo Conservation District Little River Band of Ottawa Indians
State Government:
MDNR Fisheries Division, Cadillac Field Office MDNR Forest Management Division, Cadillac Field Office MDNR Wildlife Division, Baldwin Field Office MDNR Parks & Recreation Bureau, Cadillac Field Office MDNR Law Enforcement Division, District 6, Cadillac MDNR Law Enforcement Division, District 9, Grand Rapids MDNR Natural Rivers Program, Lansing MDEQ Land & Water Management Division, Cadillac MDEQ Land & Water Management Division, Grand Rapids MDA, Region 3 Office, Grand Rapids MDOT, Cadillac Transportation Service Center MDOT, Muskegon Transportation Service Center
County Government:
Mason County Drain Commissioner Mason County Road Commissioner Lake County Road and Drain Commissioner Oceana County Drain Commissioner Oceana County Road Commissioner Newaygo County Drain Commissioner Newaygo County Road Commissioner

Township Government:	
Pere Marquette Township	Pleasant Plains Township
Amber Township	Yates Township
Custer Township	Chase Township
Branch Township	Crystal Township
Sweetwater Township	Colfax Township
Peacock Township	Troy Township
Webber Township	Lilley Township
Cherry Valley Township	Home Township
Pinora Township	Barton Township
Summit Township	Leavitt Township
Riverton Township	Beaver Township
Eden Township	Merrill Township
Logan Township	Monroe Township
Lake Township	Norwich Township
City Government:	
City of Ludington City	
City of Scottville	
Village of Baldwin	
Inter-governmental Organizations:	
Great Lakes Fishery Commission	
Great Lakes Fishery Trust	
Timberland, Resource Conservation & Development	
Conservation Resource Alliance, Resource Conservation & Development	
Local & Regional Economic Development Organizations:	
Ludington Chamber of Commerce and Convention & Visitors Bureau	
Scottville Chamber of Commerce	
Mason County Economic Development Corporation	
Lake County Enterprise Community Board	
Lake County Chamber of Commerce and Tourist Center	
Oceana County Economic Development Corporation	
Oceana County Tourism Bureau	
Newaygo County Tourist Council	
West Michigan Shoreline Regional Development Commission	
West Michigan Tourist Association	

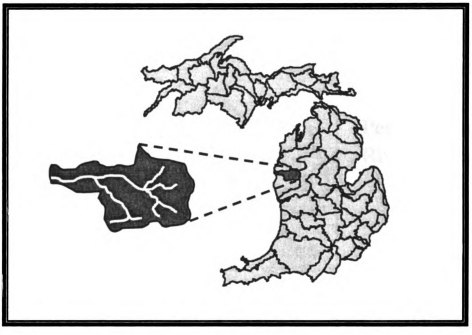
Protection-oriented Conservation Organizations:
Pere Marquette Watershed Council Ruby Creek Conservation and Recreation Club Sierra Club, Mackinaw Chapter, West Michigan Group Michigan Audubon Society, Oceana Sub-chapter West Michigan Environmental Action Council, Grand Rapids The Nature Conservancy, Lansing
Recreation-oriented Conservation Organizations:
Michigan United Conservation Clubs, Lansing staff Fin & Feather Club of Mason County Oceana Sportsmen's Club Newaygo County Sportsmen's Club Citizen's Sportsmen's Club Trout Unlimited, West Michigan Chapter Federation of Fly Fishers, West Michigan Hacklers Michigan Steelhead and Salmon Fishermen's Association, Westside Steelheaders Pere Marquette Rod & Gun Club
Other Special Interest:
Lake County Riverside Property Owner's Association Ludington Area Charterboat Association Michigan River Guides Association Michigan Farm Bureau, Mason County Michigan Farm Bureau, Oceana County Michigan Farm Bureau, Newaygo County
Education and Information:
MSU Extension, West Central Region office MSU Extension, Mason County office MSU Extension, Lake County office MSU Extension, Oceana County office MSU Extension, Newaygo County Extension MSUE Natural Features Inventory, Lansing West Shore Community College

APPENDIX B

APPENDIX B

Replication of the Survey Instrument

Organizational Linkages In and Around the Pere Marquette River Watershed



Michigan State University
Department of Fisheries & Wildlife

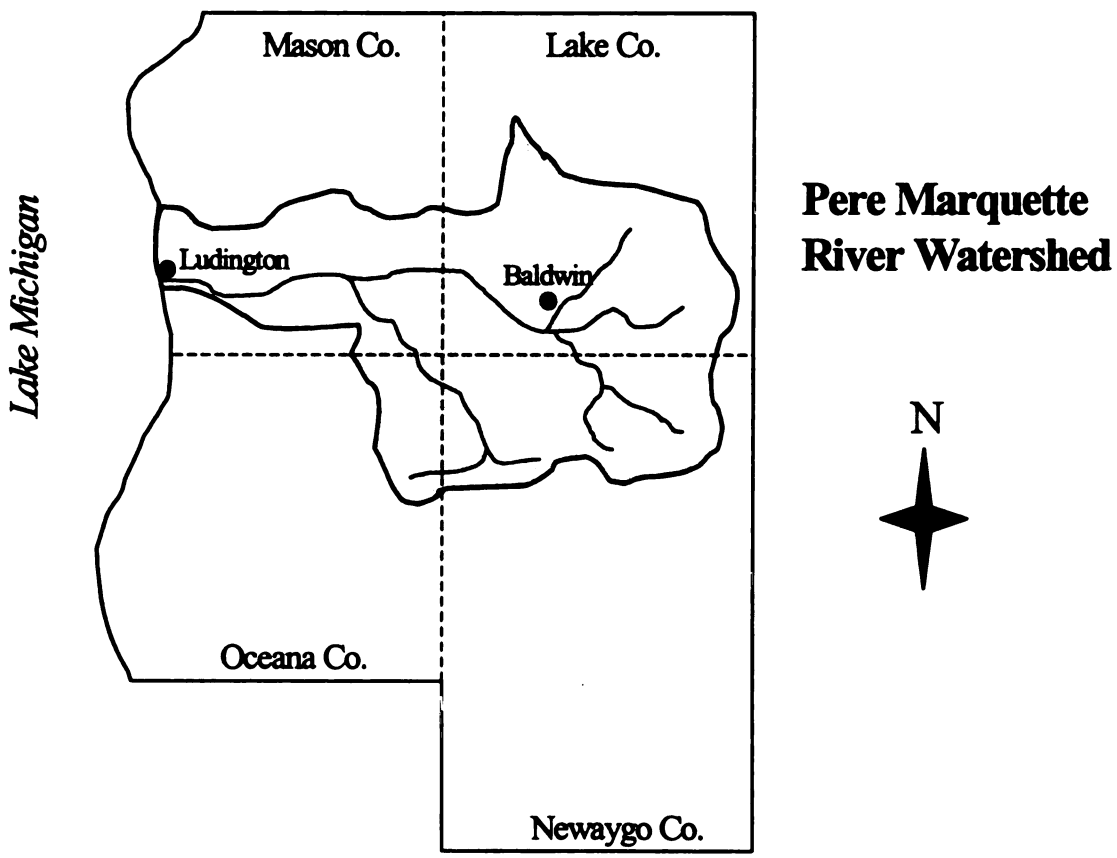
July 2000

Part I

For this survey, natural resources include fisheries, forests, water, air, land, wildlife, and other environmental features that humans use and enjoy.

Please answer the following questions on behalf of your local organization. If your organization has a statewide or national affiliation, please answer this survey only on behalf of your local chapter or office.

Many of the questions refer to the Pere Marquette River watershed. Please refer to the following watershed map:



1. Approximately what year was your local organization, chapter, or office established?
   _____

2. Approximately how many people currently belong to your local organization, chapter, or office? _____
   (*We would like to know how many people work there, attend meetings, or otherwise identify with your local group.*)

   2a. How many are paid staff? _____ **2b.** How many are volunteers? _____

3. Which phrase best describes your organization's primary purpose?
   (*If you select more than one, please circle one of them as the primary purpose.*)

   ☐ Natural resource conservation and/or management
   ☐ Natural resource recreation and/or tourism
   ☐ Natural resource protection and/or preservation
   ☐ Education and information
   ☐ Representation of property owners
   ☐ Representation of private businesses
   ☐ Local government planning
   ☐ Other (*please specify*):
   _____

4. Which statement best reflects your organization's primary philosophy regarding natural resources? (*Check one.*)

   ☐ "Natural resources should be protected from any further human impacts."
   ☐ "Natural resources should be developed to maximize regional economic activity."
   ☐ "Natural resources should be managed to produce multiple types of social and environmental benefits."
   ☐ Other (*please specify*):
   _____

   _____

5. To what degree is your organization involved in natural resource issues in the Pere Marquette River watershed? (*Check one.*)

   ☐ Not involved → (*Please go to* **6.**)
   ☐ Somewhat involved → (*Please go to* **5a.**)
   ☐ Very involved → (*Please go to* **5a.**)

5a. Approximately how many years has your organization been involved with these issues in the Pere Marquette River watershed? _____ years

6. Fisheries management addresses the production and harvesting of fish and the conservation of aquatic resources and habitats. Is your organization satisfied with fisheries management in the Pere Marquette River watershed? (*Check one.*)

☐ Yes
☐ No → (*Please go to* **6a.**)
☐ Undecided or neutral → (*Please go to* **6a.**)

6a. Please explain your local organization's concerns with fisheries management in the Pere Marquette River watershed:

_____

_____

_____

_____

_____

_____

7. In the Pere Marquette River watershed, what kinds of fisheries issues is your organization most interested in? (*Check all that apply.*)

☐ Fishing access
☐ Regulations
☐ Enforcement
☐ Status of fish populations
☐ Conflicts with other river users
☐ Stocking
☐ Habitat quality
☐ Recreational experiences
☐ Sea lamprey control
☐ None
☐ Others (*please specify*): _____

_____

Part II

We would like to learn about your organization's interactions with other organizations in the Pere Marquette River watershed. Please note:

- **We're only interested in those interactions that have occurred regarding a fisheries-related issue.**
- **We're only interested in those interactions that have occurred since January 1999.**

DIRECTIONS: For each organization, local chapter, or office listed on the following pages, please answer the set of questions that follows. Please feel free to consult with other members of your organization in answering these questions. If you answer "Never" to Question A, please move on to the next organization listed. *While this section appears long, it actually goes quickly for most organizations.*

Acronyms and Abbreviations:

Assoc.	=	Association
Cent.	=	Central
Cons.	=	Conservation
Dept.	=	Department
Dist.	=	District
Div.	=	Division
L.	=	Lake
MDEQ	=	Michigan Department of Environmental Quality
MDNR	=	Michigan Department of Natural Resources
Mgt.	=	Management
MSU	=	Michigan State University
Nat.	=	Natural
Serv.	=	Service
Trans.	=	Transportation
US	=	United States
USDA	=	United States Department of Agriculture

Questions A. – D. (→) refer to interactions: • about fisheries issues • since January 1999	**A.** How often did your group interact with this group? (*Check one.*) Never (skip questions B–D) Occasionally (once a mo. or less) Frequently (more than once a mo.)	**B.** What kinds of interaction did your group have with this group? (*Check all that apply.*) Our leaders talked about goals or plans We sent them info., advice, or resources We worked on joint programs	**C.** How would you describe the interactions between your groups? (*Check all that apply.*) Cooperative Casual Tense Confrontational	**D.** How important is it that your groups maintain interaction? (*Check one.*) Not important Somewhat important Very important
1. US Fish and Wildlife Service, Ludington Biological Station	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
2. US Forest Service, Baldwin Ranger Station	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
3. USDA Farm Service Agency, Mason County	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
4. USDA Farm Service Agency, Lake County	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
5. USDA Farm Service Agency, Oceana County	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
6. USDA Farm Service Agency, Newaygo County	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
7. Nat. Resource Conservation Serv., Mason-Lake Conservation District	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
8. Nat. Resource Conservation Serv., Oceana Conservation District	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
9. Nat. Resource Conservation Serv., Newaygo Conservation District	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐

Questions A. – D. (→) refer to interactions:
- about fisheries issues
- since January 1999

	A. How often did your group interact with this group? (*Check one.*)			**B.** What kinds of interaction did your group have with this group? (*Check all that apply.*)			**C.** How would you describe the interactions between your groups? (*Check all that apply.*)				**D.** How important is it that your groups maintain interaction? (*Check one.*)		
	Never (skip questions B–D)	Occasionally (once a mo. or less)	Frequently (more than once a mo.)	Our leaders talked about goals or plans	We sent them info., advice, or resources	We worked on joint programs	Cooperative	Casual	Tense	Confrontational	Not important	Somewhat important	Very important
10. Great Lakes Fishery Commission (Ann Arbor)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11. Great Lakes Fishery Trust (Lansing)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12. Little River Band of Ottawa Indians	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13. MDNR Fisheries Division, Cent. L. Michigan Management Unit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14. MDNR Forest Management Div., Cadillac Forest Management Unit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15. MDNR Wildlife Division, Northwestern Management Unit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
16. MDNR Parks & Recreation Div., Cadillac Field Office	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17. MDNR Law Enforcement Div., District 6 Office (Cadillac)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18. MDNR Law Enforcement Div., District 9 Office (Grand Rapids)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

19. MDNR Natural Features Inventory (Lansing)	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
20. MDNR Natural Rivers Program (Lansing)	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
21. MDEQ Land & Water Mgt. Div., Cadillac District Office	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
22. MDEQ Land & Water Mgt. Div., Grand Rapids Field Office	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
23. Michigan Dept. of Agriculture, Region 3 Office (Grand Rapids)	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
24. Michigan Dept. of Transportation, Cadillac Trans. Service Center	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
25. Michigan Dept. of Transportation, Muskegon Trans. Service Center	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
26. Michigan Assoc. of Conservation Dist., Mason-Lake Cons. Dist.	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
27. Michigan Assoc. of Conservation Dist., Oceana Cons. Dist.	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
28. Michigan Assoc. of Conservation Dist., Newaygo Cons. District	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
29. Michigan Farm Bureau, Mason County	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
30. Michigan Farm Bureau, Oceana County	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐

Questions A. – D. (→) refer to interactions: • about fisheries issues • since January 1999	**A.** How often did your group interact with this group? (*Check one.*) Never (skip questions B–D) Occasionally (once a mo. or less) Frequently (more than once a mo.)	**B.** What kinds of interaction did your group have with this group? (*Check all that apply.*) Our leaders talked about goals or plans We sent them info., advice, or resources We worked on joint programs	**C.** How would you describe the interactions between your groups? (*Check all that apply.*) Cooperative Casual Tense Confrontational	**D.** How important is it that your groups maintain interaction? (*Check one.*) Not important Somewhat important Very important
31. Michigan Farm Bureau, Newaygo County	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
32. Mason County Drain Commissioner	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
33. Mason County Road Commissioner	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
34. Lake County Drain Commissioner	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
35. Lake County Road Commissioner	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
36. Oceana County Drain Commissioner	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
37. Oceana County Road Commissioner	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
38. Newaygo County Drain Commissioner	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
39. Newaygo County Road Commissioner	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐

40. Pere Marquette Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
41. Amber Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
42. Custer Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
43. Branch Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
44. Sweetwater Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
45. Peacock Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
46. Webber Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
47. Cherry Valley Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
48. Pinora Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
49. Summit Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
50. Riverton Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
51. Eden Township government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐

Questions A. – D. (→) refer to interactions:
- about fisheries issues
- since January 1999

	A. How often did your group interact with this group? (*Check one.*)			**B.** What kinds of interaction did your group have with this group? (*Check all that apply.*)			**C.** How would you describe the interactions between your groups? (*Check all that apply.*)				**D.** How important is it that your groups maintain interaction? (*Check one.*)		
	Never (this question 2-D)	Occasionally (once a mo. or less)	Frequently (more than once a mo.)	Our leaders talked about goals or plans	We sent them info, advice, or resources	We worked on joint programs	Cooperative	Casual	Tense	Confrontational	Not important	Somewhat important	Very important
52. Logan Township government	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
53. Lake Township government	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
54. Pleasant Plains Township government	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
55. Yates Township government	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
56. Chase Township government	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
57. Crystal Township government	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
58. Colfax Township government	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
59. Troy Township government	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
60. Lilley Township government	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

61. Home Township government	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
62. Barton Township government	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
63. Leavitt Township government	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
64. Beaver Township government	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
65. Merrill Township government	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
66. Monroe Township government	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
67. Norwich Township government	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
68. Ludington City government	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
69. Ludington Chamber of Commerce	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
70. Ludington Area Convention & Visitors Bureau	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
71. Scottville City government	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		
72. Scottville Chamber of Commerce	☐	☐	☐		☐	☐	☐		☐	☐	☐	☐		☐	☐	☐		

Questions A. – D. (→) refer to interactions: • about fisheries issues • since January 1999	**A.** How often did your group interact with this group? (*Check one.*) Never (skip questions B–D) Occasionally (once a mo. or less) Frequently (more than once a mo.)	**B.** What kinds of interaction did your group have with this group? (*Check all that apply.*) Our leaders talked about goals or plans We sent them info., advice, or resources We worked on joint programs	**C.** How would you describe the interactions between your groups? (*Check all that apply.*) Cooperative Casual Tense Confrontational	**D.** How important is it that your groups maintain interaction? (*Check one.*) Not important Somewhat important Very important
73. Baldwin Village government	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
74. Mason County Economic Development Corporation	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
75. Lake County Enterprise Community Board	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
76. Lake County Chamber of Commerce & Tourist Center	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
77. Oceana County Economic Development Corporation	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
78. Oceana County Tourism Bureau	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
79. Newaygo County Tourist Council	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
80. W. Michigan Shoreline Regional Development Commission	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
81. West Michigan Tourist Assoc.	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐

82. Timberlands Resource Cons. & Development	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
83. Pere Marquette Watershed Council, Inc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
84. Sierra Club, Mackinaw Chapter, West Michigan Group	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
85. Michigan Audubon Society, Oceana Sub-Chapter	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
86. West Michigan Environmental Action Council (Grand Rapids)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
87. Conservation Resource Alliance (Lansing staff)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
88. The Nature Conservancy (Lansing staff)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
89. Ruby Creek Conservation and Recreation Club	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
90. Trout Unlimited, W. Michigan Chapter	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
91. Federation of Fly Fishers, West Michigan Hacklers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
92. Michigan Steelheaders, Westside Steelheaders	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
93. Michigan United Conservation Clubs (Lansing staff)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Questions A. – D. (→) refer to interactions:
- about fisheries issues
- since January 1999

	A. How often did your group interact with this group? (*Check one.*)			B. What kinds of interaction did your group have with this group? (*Check all that apply.*)			C. How would you describe the interactions between your groups? (*Check all that apply.*)				D. How important is it that your groups maintain interaction? (*Check one.*)		
	Never (skip questions B–D)	Occasionally (once a mo. or less)	Frequently (more than once a mo.)	Our leaders talked about goals or plans	We sent them info., advice, or resources	We worked on joint programs	Cooperative	Casual	Tense	Confrontational	Not important	Somewhat important	Very important
94. Fin & Feather Club of Mason County	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
95. Oceana Sportsmen's Club	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
96. Newaygo County Sportsmen's Club	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
97. Citizen's Sportsmen's Club	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
98. Pere Marquette Rod & Gun Club	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
99. Lake County Riverside Property Owners Association	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
100. Ludington Area Charterboat Association	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
101. Michigan River Guides Association	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
102. MSU Extension, West Central Region office	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

103. MSU Extension, Mason County Extension	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
104. MSU Extension, Lake County Extension	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
105. MSU Extension, Oceana County Extension	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
106. MSU Extension, Newaygo County Extension	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
107. West Shore Community College, Biological Sciences/Aquaculture	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
108. Other (*please specify*):	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
109. Other:	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
110. Other:	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
111. Other:	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
112. Other:	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
113. Other:	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐
114. Other:	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐

QUESTION: When we report the results of this survey, it may be helpful to identify your organization. It will not be necessary, at any point, to reveal the name of the person answering the survey. If necessary, will you allow us to associate your answers with the name of your organization? (*Check one.*)

☐ **Yes, if necessary, the researchers may associate the name of our organization with our survey answers.**

☐ **No, the researchers may not associate the name of our organization with our survey answers.**

☐ **← Check here if you would like to receive a summary of survey results.**

OPTIONAL: Please use the space below (and to the right) to tell us if you have any other thoughts about your organization's recent fisheries-related interactions with other organizations in the Pere Marquette River watershed:

Thank you for your cooperation! Your time and effort will help promote more effective and efficient communication about natural resource issues.

Please return the survey in the stamped envelope (enclosed). Please address your questions, comments, and this survey to:

Kristine Lynch
Michigan State University
Dept. of Fisheries and Wildlife
13 Natural Resources Bldg.
E. Lansing, MI 48824-1222
phone (517) 353-6697; fax (517) 432-1699; dawsonkr@msu.edu

APPENDIX C

APPENDIX C

Upcoming Survey Notice Letter

Date

Address

Dear [name]:

Fisheries and fish habitat are directly and indirectly affected by the many ways people use land and water resources. Different organizations make various decisions about how to use and manage land and water, and fisheries managers need to understand how each organization's decisions and activities may relate to fishery management goals.

We are conducting a survey to understand if and how stakeholder organizations interact in making decisions that could possibly affect fish and their habitats in the Pere Marquette River watershed. Your local organization, chapter, or office may have some kind of role or interest in how this watershed's fisheries and aquatic ecosystems are used, conserved, or managed. In the next few days, your organization will be receiving a questionnaire in the mail that will help us explore interactions among various kinds of stakeholder organizations. Your organization was selected due to its location in the Pere Marquette River watershed and/or its potential interest in fisheries and aquatic ecosystem issues in this watershed.

We would greatly appreciate your input in this study, as it will help provide a complete and accurate assessment of interactions between potential natural resource stakeholders. With this information, we can better understand how to enhance communications among all kinds of fisheries stakeholders in and around the Pere Marquette River watershed.

Thank you in advance for your participation in this study! If you have any questions before receiving the questionnaire, please feel free to contact us.

Sincerely,

William W. Taylor
Professor and Acting Dean

Kristine D. Lynch
Graduate Research Assistant
(517) 353-6697; dawsonkr@msu.edu

APPENDIX D

APPENDIX D

Cover Letter for First Survey Mailing

date

address

Dear [name]:

We are interested in learning about your organization and how it communicates or interacts with other organizations about fisheries issues in the Pere Marquette River watershed. This information will help us find ways to increase the ease and strength of interorganizational communication. Our goal is to promote better fisheries management by finding ways to bring more stakeholders into fisheries management discussions. Please note:

- While the questionnaire appears to be lengthy, the questions can be answered fairly quickly. For most organizations, the questions will take about 20-30 minutes to complete.

- If necessary, please feel free to consult with other members of your organization in answering these questions.

- If you believe that this questionnaire does not apply to your organization, please just complete Part I of the questionnaire and return it in the enclosed envelope with a statement that Part II does not apply to your organization.

- When you have completed the survey, please mail it back in the enclosed stamped envelope.

Your help is critical in enabling us to understand how to structure watershed-based communication networks. Your participation is voluntary, and you indicate your willingness to participate by completing and returning this questionnaire. Your responses will be kept confidential and your name will not be associated with the results. In some cases, it may be helpful for us to associate the name of an organization with their responses, but we will only use this information with your permission. On the survey, *you can choose whether or not we can associate your answers with the name of your organization.* If you have any questions about participating as a research subject, please call David E. Wright, Chair of the Institutional Review Board, at (517) 355-2180.

Thank you for your cooperation! Your input can help promote better communication among stakeholder organizations, which can lead to better fisheries management. If you have any questions about this study, feel free to contact us.

Sincerely,

William W. Taylor
Professor and Acting Dean

Kristine D. Lynch
Graduate Research Assistant
(517) 353-6697; dawsonkr@msu.edu

enc.

APPENDIX E

APPENDIX E

Reminder Postcard for First Survey Mailing

July 14, 2000

A week ago I sent you a questionnaire seeking information about your organization and its interactions with other organizations in the Pere Marquette River watershed. If you have already completed and returned this survey, please accept my sincere thanks! If not, please do so today. Feel free to consult with others in your organization to answer the questions.

Your participation will help provide a complete assessment of how organizations interact. With your input, we can find ways to enable better and stronger communication among organizations in and around the Pere Marquette watershed.

If you did not receive this questionnaire, or it got misplaced, please contact me (517-353-6697) and I will mail you another copy.

Sincerely,

Kristine Lynch, Project Director

APPENDIX F

APPENDIX F

Cover Letter for Second Survey Mailing

date

address

Dear [name]:

A few weeks ago, we sent you a questionnaire about organizational linkages in and around the Pere Marquette River watershed. As of today, we have yet to received your completed questionnaire. In case you misplaced the questionnaire, we are enclosing another copy for you.

Your participation is very important to us, because it will enable us to have the *most complete* and *accurate* assessment of how groups communicate about fisheries issues in the Pere Marquette River watershed. Our goal is to understand how organizations in this watershed interact, as this can help facilitate more effective communication about fisheries management.

If you believe that this questionnaire does not apply to your organization, please just complete pages 2, 3, and 16 and return it in the enclosed stamped envelope. *This information is still very important for our overall assessment of how organizations interact.* Please note:

- While the questionnaire appears to be lengthy, the questions can be answered fairly quickly. For most organizations, the questions take less than 30 minutes to complete.
- Feel free to consult with other members of your organization in answering these questions.
- When you have completed the survey, please mail it back in the enclosed stamped envelope.

Please also note that your participation is voluntary, and you indicate your willingness to participate by completing and returning this questionnaire. Your responses will be kept confidential and your name will not be associated with your results. In some cases, it may be helpful for us to associate the name of an organization with their responses, but we will only use this information with your permission. On the survey, *you can choose whether or not we can associate your answers with the name of your organization.* If you have any questions about participating as a research subject, please call David E. Wright, Chair of the Institutional Review Board, at (517) 355-2180.

If you have any questions about this study, or if you would prefer to discuss or phone in your responses, please feel free to contact us. We can also arrange to phone you at your convenience.

We sincerely appreciate your cooperation! Your input will help promote better communication among stakeholder organizations, which can ultimately lead to better fisheries management.

Sincerely,

William W. Taylor
Professor and Acting Dean

Kristine D. Lynch
Graduate Research Assistant
(517) 353-6697; dawsonkr@msu.edu

enc.

APPENDIX G

APPENDIX G

Descriptive Statistics for Organizations and Ties

The following tables list organizational attributes as described by survey respondents and other organizational information. The total population of 112 includes the 101 organizations identified in Chapter 1 and the 11 organizations that were added as "other" organizations by respondents. A response of "no information" indicates that the respondent did not answer the question. N = the number of organizations with a given attribute. Percent (%) = the proportion of the population having a given attribute (percent may not equal 100 due to rounding).

Table A.1. Categories of Organizations (the broad organizational classification type).

Response	N	%
federal government	14	12.5
state government	12	10.7
county government	9	8.0
township government	28	25.0
city government	3	2.7
local economic development	10	8.9
preservation-oriented conservation special interest	9	8.0
recreation-oriented conservation special interest	10	8.9
educational or informational interests	9	8.0
other interests (e.g., agriculture, property owners, etc.)	8	7.1
Total	112	99.8

Table A.2. Proximity of Organizations (the organization's location relative to watershed boundaries).

Response	N	%
inside the watershed	55	49.1
outside the watershed	57	50.9
Total	112	100.0

Table A.3. County of Organizations (the county in which the organization is located).		
Response	N	%
Mason Co.	24	21.4
Lake Co.	21	18.8
Oceana Co.	15	13.4
Newaygo Co.	18	16.1
other county	34	30.4
Total	112	100.1

Table A.4. Age of Organizations (how many years the organization has existed).		
Response	N	%
0-10 years	6	5.4
11-50 years	24	21.4
51 or more years	69	61.6
no information	13	11.6
Total	112	100.0

Table A.5. Size of Organizations (the number of employees, members, or others associated with the organization).		
Response	N	%
1-20 members (small)	46	41.1
21-100 members	23	20.5
101 or more members (large)	15	13.4
no information	28	25.0
Total	112	100.0

Table A.6. Membership Type of Organizations (whether membership is mostly voluntary or non-voluntary).		
Response	N	%
non-voluntary (paid staff)	65	58.0
voluntary	32	28.6
even split	2	1.8
no information	13	11.6
Total	112	100.0

Table A.7. Involvement of Organizations (the degree to which an organization is engaged in natural resource issues in the PM watershed).		
Response	N	%
not involved	36	32.1
somewhat involved	38	33.9
very involved	18	16.1
no information	20	17.9
Total	112	100.0

Table A.8. Philosophy of Organizations (how the organization views the relationship between people and natural resources).		
Response	N	%
natural resources should be protected from human impacts	5	4.5
natural resources should be developed for economic activity	0	0.0
natural resources should provide social & ecological benefits	73	65.2
other	5	4.5
no information	29	25.9
Total	112	100.1

Table A.9. Purpose of Organizations (the organization's reason for existing and bringing people together).

Response	N	%
natural resource management	21	18.8
natural resource recreation and/or tourism	11	9.8
natural resource protection and/or preservation	6	5.4
education and information source	7	6.3
property owner representation	2	1.8
private business representation	3	2.7
local government planning	40	35.7
local or regional economic development	7	6.3
agriculture interests	7	6.3
other	2	1.8
no information	6	5.4
Total	112	100.3

Table A.10. Satisfaction of Organizations (whether or not the organization is pleased with fisheries management in the PM watershed).

Response	N	%
satisfied	31	27.7
unsatisfied	13	11.6
undecided or neutral	35	31.3
no information	33	29.5
Total	112	100.1

Table A.11. Concerns of Organizations (the occurrence of issues or topics about which the organization is most interested). Organizations could indicate more than one concern. Concern types (type 1 = ecological concerns; type 2 = recreational concerns; type 3 = user behavior concerns) are used to determine the scope of concerns.

Response	N	% of 112
habitat (type 1)	51	45.5
recreational experiences (type 2)	31	27.7
fish population size (type 1)	29	25.9
access (type 2)	28	25.0
user conflicts (type 3)	27	24.1
sea lamprey (type 1)	25	22.3
regulations (type 3)	22	19.6
enforcement (type 3)	21	18.8
stocking (type 1)	18	16.1
none	14	12.5
other	4	3.6
no information	23	20.5
Total	293	

Table A.12. Scope of Organizations' Interests (the number of types of issues about which the organization is concerned).

Response	N	%
one type of issue (specialist)	31	27.7
multiple types of issues (generalist)	34	30.4
neither; interested in no issues	14	12.5
no information	33	29.5
Total	112	100.1

The following tables list attributes of the ties (i.e., relationships) as described by survey respondents. There were 1088 cases in which a chooser indicated having a relationship with a chosen organization. A response of "no information" indicates that the respondent did not answer the question. N = the number of ties with a given attribute. Percent (%) = the proportion of ties having a given attribute (percent may not equal 100 due to rounding).

Table A.13. Frequency of Ties (how often a given interaction occurred with another organization. This was the primary identifier of a tie; no response indicates no interaction).

Response	N	%
occasionally (once a month or less)	842	77.4
frequently (more than once a month)	246	22.6
Total	1088	100.0

Table A.14. Type(s) of Ties (the type(s) of ties indicated by choosers).

Response	N	%
communication, resource contribution, and collaboration	220	20.2
communication and resource contribution only	72	6.6
communication and collaboration only	64	5.9
resource contribution and collaboration only	27	2.5
communication only	301	27.7
resource contribution only	186	17.1
collaboration only	121	11.1
no information	97	8.9
Total	1088	100.0

Table A.15. Absolute Tie Type (the occurrence of each type of tie indicated in the 991 cases (1088 minus 97 with no information) in which a chooser indicated a relationship. Some choosers reported more than one type of tie).

Response	N	%	% of 991
communication	657	41.2	66.3
resource contribution	505	31.7	51.0
collaboration	432	27.1	43.6
Total	1594	100.0	

Table A.16. Absolute Tone (the perceived mood or attitude surrounding the interactions. Some choosers reported more than one type of tone for an interaction).

Response	N	%
cooperative (positive)	794	69.2
casual (positive)	225	19.6
tense (negative)	41	3.6
confrontational (negative)	25	2.2
no information	62	5.4
Total	1147	100.0

Table A.17. Importance of Ties (the perceived weight or significance that the chooser organization assigns to maintaining a tie with the chosen).

Response	N	%
not important	13	1.2
somewhat important	273	25.1
very important	750	68.9
no information	52	4.8
Total	1088	100.0

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