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NETWORK ANALYSIS OF A SHARED GOVERNANCE SYSTEM

by

DEBRA REIFMAN WHITALL

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DISSERTATION APPROVAL

The abstract and dissertation of Debra Reifman Whitall for the Doctor of Philosophy in Public Administration and Policy were presented May 4, 2007, and accepted by the dissertation committee and the doctoral program.

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ABSTRACT

An abstract of the dissertation of Debra Reifman Whitall for the Doctor of Philosophy in Public Administration and Policy presented May 4, 2007.

Title: Network Analysis of a Shared Governance System

This study contributes to the growing body of literature on the role of networks in creating efficacious systems of governance. In particular, this study considers if, in addition to network structure, two network characteristics, network social capital and network management, each have direct and indirect effects on network performance. Also considered are the combined effects of these three network characteristics on network performance. The findings of this study re-examine the relationship between network characteristics and performance, especially the influence of network structure on performance. Thus, this study has practical implications for policy makers regarding effective collaborative strategies.

This study used an integrated model of network performance that drew upon social capital and alternative dispute resolution theories, as well as social network analysis to identify key components of network characteristics related to the population of 55 Forest Service Resource Advisory Committees (RACs), as authorized under the Secure Rural Schools and Community Self-Determination Act of 2000. In addition to correlational analyses, multiple linear regression analyses were used to test the direct and indirect effects of the predictor variables, network structure, network social capital and network management, on the outcome variable network performance.

Dedication

To Jack Williams for getting me started, and Jan Engert for helping me finish.

and

To my godchildren: Gabriel, Abraham, Isabella, Rowanne, and Troy

for showing me that love is the soul of genius.

and finally

To Rich: my sun, my moon and my shining star.

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I also extend a great deal of gratitude to the many Forest Service employees that pointed me in the right direction and volunteered to administer my questionnaire to the RACs.

I owe a special thanks to Bob Douglas for his very visible support; to Andrew Parker for his assistance in social network analysis; and to Tyrae Mahon for her statistical advice and expertise.

I will be forever grateful to the 825 active Resource Advisory Committee members whose willingness to serve our country demonstrated to all of us that collaboration works.

Finally, words alone cannot express my heartfelt thanks to my husband, Rich, who taught me to believe in myself and sacrificed himself more than I can possibly acknowledge. His love, support and patience throughout this long journey have at last seen success. I love you.

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INTRODUCTION

The concept of network has become central to research in inter-organizational relationships and public management (O'Toole & Meier, 1999; Provan & Milward, 1995; Choi, 2005). O'Toole (1997) states that, "...complex networks are not only relatively common; they are also likely to increase in number and importance" (p. 46). Choi (2005) argues "...the importance of networks is inescapable, not only because intergovernmental programs make up a sizable proportion of total government activities, but also because collective interactions have considerably increased by the expansion of quasi-governmental arrangements" (2005, p.1). Finally, the establishment of networks has become a response to increasing demand for cooperation; particularly as the complexity and contentiousness of natural resource management issues increases (Margerum & Whitall, 2004).

To measure the performance of networks, social network analysis has emerged as a key technique in sociology and organizational studies. Research in these academic fields have demonstrated that social networks operate on many levels, from the size of families up to the level of nations, and play a critical role in determining the way problems are solved, organizations are run, and the degree to which individuals succeed in achieving their goals (Wikipedia contributors, 2006).

The social relationships between individuals, in terms of nodes and ties, are instrumental to social network theory. Nodes are the individual actors within the networks, and ties are the relationships between the actors. There can be many kinds of ties between the nodes. In its most simple form, a social network is a map of all of

the relevant ties between the nodes being studied. These relevant ties, or relationships, can influence an individual's behavior through the discovery of new information and resources. Thus, the relationships forged within a social network help determine a network's usefulness to its individuals. Recent studies have assumed a direct relationship between a network's structure and the outcomes generated by the network (Provan & Milward, 1995; Ahuja & Carley, 1999). Lacking from these studies is consideration of other network characteristics, such as network social capital or network management. Network structure, while dominant in social network theory, is only one explanatory variable of network performance (Provan & Milward, 1995; Ahuja & Carley, 1999). By considering two other network characteristics in addition to network structure, this study proposes to address this gap in current social network theory.

Purpose of Study

This study builds on the recent work of social capital theorists who argue that, "... social contacts affect the productivity of individuals and groups" (Putnam, 2000, p. 19). The purpose of this study will be to consider if, in addition to network structure, two network characteristics, network social capital and network management, each have an effect on network performance. Another purpose is to consider the combined effects of these three network characteristics on network performance. This research addresses the following questions:

- Do the network characteristics of social capital, network management, and network structure influence network performance?

- What relationships exist between these three network characteristics and network performance?
- What influence do these network characteristics have on network performance?

Conceptual Framework

It has been argued that Federal natural resource agencies "cannot guarantee the stability of communities or insulate them from the larger social and economic forces that may affect their future" (MacCleery & Le Master, 1999, p.538). However, in the waning days of the 106th Congress President Clinton attempted to provide this stability by signing into law the Secure Rural Schools and Community Self-Determination Act of 2000 (P.L. 106-393, hereby referred to as "the Act"). The intent was to stabilize federal payments to qualifying counties during a six-year period (2000-2006) to encourage diversification of local economies.

Another primary purpose of the Act was to improve cooperative relationships. Central to achieving this goal was the establishment of Resource Advisory Committees (RACs) under Title II of the Act. Analytically, RACs can be considered a type of network, or set of connections between people, created for the purposes set out in this law.

Recent studies (Ingles, 2004; Kusel, 2006; Forest Counties Payments Committee; 2003; Wilson, 2003) suggest that the Act is effectively meeting its stated purposes, including improvement of cooperative relationships. Ingles (2004) used trends in fiscal data, including the amount of leveraged funds and the percentage of

increased funding to Title II projects, to conclude that some level of relationship-building was being achieved.

Yet, as acknowledged in the previous section, these and other studies have assumed a direct relationship between network characteristics and performance, and have focused on the influence of network structure on performance (Ingles, 2004; Kusel, 2006; Forest Counties Payments Committee, 2003; Wilson, 2003; Provan & Milward, 1995; Ahuja & Carley, 1999). These studies did not consider whether other network characteristics, such as network social capital or network management, might also contribute to network performance. A recent study by Choi (2005) did investigate the relationship of four network characteristics on network performance in the state of Florida. Choi (2005) stated, "The principle guideline of this study was that network structure is one important explanatory variable to explain network performance, but consideration of other network characteristics is also valid and useful" (p. 131).

This study seeks to expand current social network theory by incorporating two key network characteristics: network social capital and network management, in addition to network structure, into an analysis of network performance. In doing so, this study shall consider the entire population of Forest Service RACs authorized under the Act.

LITERATURE REVIEW

As acknowledged by Choi (2005), "There is a paucity of literature, which combines network structure factors with other network characteristics explaining network performance" (p. 11).

While network structure is one explanatory variable of network performance (Seibert, Kraimer & Liden, 2001; Granovetter, 1973; Burt, 1992), others have found that social capital, network learning and network management attributes may also influence network performance (Ring & Van de Ven, 1994; O'Toole, 1997; O'Toole & Meier, 1999; Ostrom, 1990; Plummer & FitzGibbon, 2006; Choi, 2005). Thus, as argued by Choi, "...the consideration of other network characteristics as well as the combination of network structure with other factors cannot be ignored" (p.11). In this section, three additional network characteristics will be identified and defined through relevant theories of network performance.

Definition of Network

Through his research on Italian regional government, Robert Putnam (1993) discovered that the most important explanatory force driving governmental performance is the quality and level of "horizontal" civic engagement in regional affairs by individuals and associations. Putnam's key explanatory variable is social capital, which itself is attained by networking. Putnam states, "[S]ocial capital here refers to features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions" (1993, p. 167).

Putnam's reference here to the trust and shared norms, or values, as critical features of social organization will serve as the functional components of social capital for the purposes of this research.

Building on Putnam's assertions, if a network inherently contains structural characteristics, such as nodes and ties, it is the addition of social organization features such as trust and shared norms that effectively improve the efficiency of that network. Further, Cross and Parker (2004) argue that it is the alignment of organizational context in support of social networks that improves network function, or performance. They further argue that a necessary aspect of organizational context, which leads to improved network performance, is the identification of a group's "natural unit of work" (Cross & Parker, 2004, p. 119). For a RAC, this unit of work was identified within the Act as reaching decisions on the selection of natural resource improvement projects. Thus the following definition of a network is offered for the purposes of this study: a network is an interdependent structure connected by some degree of trust and shared norms, which is capable of reaching decisions towards the attainment of an agreed- upon goal. This definition incorporates key characteristics of network performance, which has found little integration in the literature.

Network Performance

Organizational performance has been characterized as a socially constructed phenomenon that is subjective, complex, and particularly hard to measure in the public sector (Herman & Renz, 1998; Kraft, Jauch & Boatwright, 1996; Anspach, 1991). Adding to this complexity are the formal and informal dimensions of organizational

performance. While focus is frequently placed on formal performance and accountability measures, Wolf (1993) criticizes the inability of theories about organizational effectiveness to explain the informal dynamics or interactions of interorganizational relationships that lead to performance outcomes.

While public agencies have multiple constituencies demanding different performance emphases, Ring and Van de Ven (1994) argued that public administration scholars have focused on efficiency-related measures of performance at the expense of outcome-based measures. Certainly, a fragmented and limited focus on performance measures can lead to misleading conclusions about network efficacy. To overcome these limitations, Choi (2005) argued that, "...network studies need to collectively ask what is the network, and how is network performance measured?" (p. 4). Thus, to help make sense of this confusing body of literature, social network research should clearly delineate the organizational structure and specific outcomes of the networks being studied. Therefore, this study will use operational definitions and measures of network performance to avoid potential misconceptions.

For this study, a Resource Advisory Committee (RAC) network is defined operationally as a 15-member network composed of three broadly defined interest groups created to recommend projects as mandated by the Secure Rural Schools and Community Self-Determination Act of 2000. Network performance is measured by metrics identified in previous RAC studies including an efficiency measure; "project dollars leveraged," and an effectiveness measure "increase in Title II allocations over the lifespan of the Act," (Ingles, 2004; Kusel, 2006). Finally, to assess the level of

relational development, the "commitment of RAC members to continue meeting the goals and objectives set forth in the Act" will also be measured (Cross & Parker, 2004; Birkhoff & Lowry, 2003).

Antecedents of Network Performance

For the purposes of this study, antecedents of network performance have been broadly grouped into three categories: network structure, network social capital, and network management.

Network Structure

Network structure is focused on the positional characteristics of networks. Roch, Scholz and McGraw (2000) contend that different network structures have varying abilities to influence performance. To measure these characteristics, social network researchers regard relationships, or ties, as the basic data for analysis. The focal person in such an analysis is referred to as "*ego*," and those they are tied to are "*alters*" (Knoke & Kuklinski, 1982).

The development of social network analysis evolved out of three main traditions of theoretical involvement beginning in the 1930's (Scott, 2000). These paths are reflected by: the sociometric analysts, who focused on small groups and the advancement of graph theory; several Harvard researchers who explored patterns of interpersonal relations; and a group of Manchester anthropologists, who built on both these paths to study the structure of community relations in tribal and village societies (Scott, 2000). Scott (2000) further explains that these traditions were eventually

brought together in the 1960s and 1970s, again at Harvard, when contemporary social network analysis was created.

Key elements in the development of contemporary social network analysis during the 1960s and 1970s included the use of algebraic models to examine kinship and the development of scaling techniques for "...translating relationships into social distances and for mapping them in a social space" (Scott, 2000, p. 33). One of these techniques focused on the idea of centrality of individuals and organizations in their social networks. Freeman's influential study (1979) describes centralization as the overall cohesion or integration of individuals in a group. Implicit to the idea of centralization is the notion of a structural center around which a point (i.e., node) or set of points are organized. Thus, as suggested by Scott (2000), "The simplest and most straight forward way to measure point centrality is by the degrees of the various points in the graph" (p.83). The degree is the number of other points to which a point is directly adjacent to. A point is central, then, if it has a high degree; the individual in this sense is considered well connected (Freeman, 1979; Scott, 2000). Thus, a degree-based measure of point centrality corresponds to the intuitive notion of how well connected an individual is within their group.

Burt's (1992) "structural holes" approach focuses attention on another dimension of social network literature. A structural hole is said to exist between two *alters* who are not connected to each other. Burt (1992) argues that structural holes are likely to be found between *alters* who are members of different social groups, such as those defined by functional and hierarchical boundaries within organizations (e.g.,

departments), and that *ego,* by virtue of *ego's* social connections, functions as a bridge between two unconnected social groups. Thus, *ego,* by providing greater access to social resources for all network members, amplifies the benefits of belonging to a social network. According to structural holes theory (Seibert, Kraimer, & Liden, 2001), "...it is advantageous for *ego* to be connected to many *alters* who are themselves unconnected to the other *alters* in *ego's* network" (p. 221). According to Burt's theory (1992, 1997), networks rich in structural holes provide an individual with three primary benefits: "more unique and timely access to information, greater bargaining power and thus control over resources and outcomes, and greater visibility and...opportunities throughout the social system" (Seibert, Kraimer, & Liden, 2001, p. 221).

Thus, in the social network literature, degree centrality focuses on the number of ties, while structural holes theory focuses on the pattern of ties among *alters*. Both degree centrality and structural holes present an opportunity for considering the pattern of relationships among RAC participants. The literature demonstrates how these patterns can influence the exchange of information and resources, which is potentially related to the enhancement of RAC performance.

Network Social Capital

In contrast to the focus on *patterns* in network structure, network social capital focuses on the *interactions* of network members. These interactions create value and facilitate the productivity of network participants (Putnam, 1993; Ring & Van de Ven, 1994; Plummer & FitzGibbon, 2006). Ostrom (1992) initially identified concepts

such as common understanding, trust, and reciprocity as attributes of social capital. Social trust, as defined by Ring and Van de Ven (1994), "...emphasizes faith in the moral integrity or good-will of others, which is produced through interpersonal interactions that lead to social-psychological bonds of mutual norms, sentiments, and friendships in dealing with uncertainty" (p. 93). Social trust and shared values, enabled in this manner, gives organizations the necessary confidence that others will act reliably and competently. Studies that demonstrate relationships with a high degree of trust have found people more willing to engage in social exchange and cooperative interaction (Putnam, 1993; Ostrom, 1992; Ring & Van de Ven, 1994; Butler, 1991). Previous studies of RACS indicated that initial levels of trust varied widely among RACs, and suggested that increasing levels of trust would improve access to information and resources, enabling increased levels of performance (Ingles, 2004; Kusel, 2006; Forest Counties Payments Committee; 2003; Wilson, 2003). Thus, trust and shared values constitute two important variables in the examination of network performance.

Network Management

Work management practices constitute a key organizational element in the shaping of network patterns and performance outcomes (Cross & Parker, 2004). Cross and Parker (2004) argue that one of the most powerful attributes of work management practices for developing effective networks is the group's "natural unit of work" (p.119). In working together on an agreed-upon task, people are able to develop an awareness of group members' expertise and create social ties that increase the

likelihood of receiving timely assistance (Selznick, 1957; Mintzberg, 1993; Doppelt, 2003; and Cross & Parker, 2004). Thus, from this theoretical lens, network management that is temporally and spatially flexible within a given unit of work is viewed as a condition for network success (McGuire, 2002; O'Toole & Meier, 1999; Ostrom, 1990). For instance, the Act enables RACs to meet on a flexible schedule, in a location of their choice, and as often as needed to reach agreement.

For RACs, the Act clearly identified the unit of work as reaching agreement on the recommendation of specific projects (i.e., allocation of Title II funds) to the Designated Federal Official for final approval. While the Act defined a specific voting structure for reaching these decisions, Brogden (2003) acknowledges, "Many steps occur on the way to decision-making..." (p. 278).

The theory and practice of dispute resolution offers insight into understanding and assessing steps in the agreement-seeking process. For example, the ability of RACs to reach decisions on the allocation of funds could be characterized as the resolution of a distributional dispute (Susskind and Cruikshank, 1987). In this case, the dispute over the allocation of funds involves the tangible benefits and costs of implementing recommended projects.

Susskind and Cruikshank (1987) argue, "In most distributional disputes, the contending forces begin by concentrating all their energies on winning..." (p.19). Winning involves such transaction costs as building coalitions, lobbying for support, altering public opinion, or garnering executive action (Brunner, et.al., 2002; Gibson, McKean & Ostrom, 2000; Cortner & Moote, 1999; Carpenter & Kennedy, 1988;

Susskind & Cruikshank, 1987). These types of operational costs can be described as, "...the classic techniques of political bargaining" (Susskind and Cruikshank, 1987, p. 19). Yet Susskind and Cruikshank (1987) argue that, while, "There is nothing intrinsically wrong with such wheeling and dealing...it often produces minimally acceptable results, or no results at all" (p. 19). In essence, when competing groups are focused on winning, the result is often deadlock or stagnation.

The domain of dispute resolution also offers the concept of "all-gain agreements" as an alternative to "win-lose" disputes (Susskind & Cruikshank, 1987, p.33). Here, participants must recognize that stability depends upon relationships (Margerum & Whitall, 2004; Brunner, et.al., 2002; Gibson, McKean & Ostrom, 2000; Susskind & Cruikshank, 1987). If disputing parties build strong working relationships they are more likely to renegotiate and reach an agreement. To build strong working relationships several crucial components are required, including: the exchange of accurate information based on true priorities, the inclusion of diverse stakeholders, and an ability to satisfy individual needs while meeting the needs of others (Brunner, et al., 2002; Wondolleck & Yaffee, 2000; Gibson, McKean & Ostrom, 2000; Doppelt, 2003; Cross & Parker, 2004; Susskind & Cruikshank, 1987).

Thus, while Ingles (2004) acknowledged that RACs vary in their decision making processes relative to conducting business, their use of components associated with building strong working relationships will provide insight into their ability to reach agreement on the allocation of Title II funds.

Integrating Network Characteristics

Each network characteristic presented above contains its own strengths and weaknesses regarding network performance. While individually they appear beneficial, the literature suggests that independently they cannot account for a network's overall performance. Therefore, this study will use a model composed of two intermediating dimensions between network structure and network performance, including network social capital and network management (Figure 1). These intermediating dimensions will be key variables in analyzing the network performance of RACs. It is expected that by accounting for network social capital and network management in an analysis of performance, insights may be gained regarding key factors in effective performance.

AN INTEGRATED MODEL OF NETWORK PERFORMANCE

Introduction

This study uses an integrated model of network performance that draws on social network theory as described in the previous section to identify the key components of network characteristics. This model argues that network performance is determined by three network characteristics: network structure, network social capital, and network management. While this study does not deny that each network characteristic may affect network performance directly, of primary concern are the mediating effects of network characteristics on network performance. Key here is the focus on the interdependence of network characteristics on network performance. This section explains network performance based on how each network characteristic is related to the others in the model. Figure 1 represents an overview of the integrated model of network performance.

Integrated Model of Network (RAC) Performance

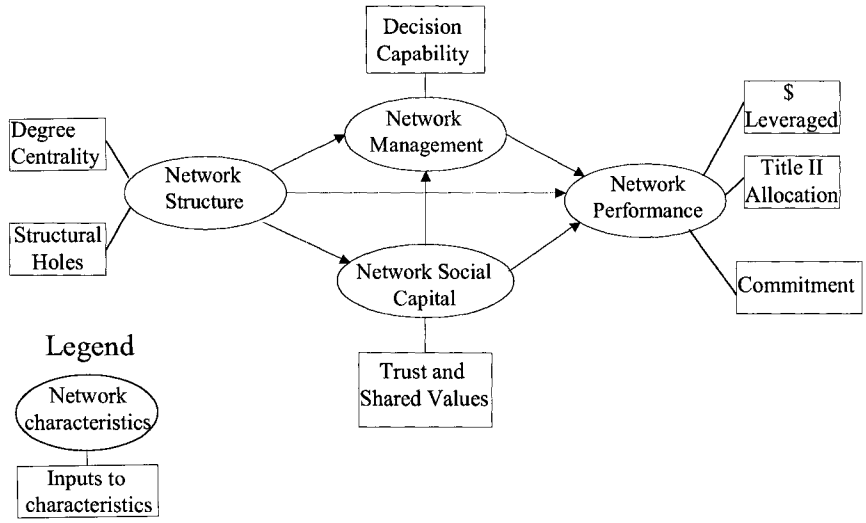


Figure 1. Integrated Model of Network Performance

Figure 1 shows, for example, that network structure can influence network performance directly, as well as indirectly, via the mediating variables network management and network social capital. Thus, as argued by Choi, "...network structure may have direct and indirect influences on network performance. Likewise, network social capital...and network management are affected by network structure and each of them affects network performance. Moreover network management is also affected by network social capital..." (2005, p. 35).

The following sections will present hypotheses for examining both direct and indirect relationships of network characteristics and network performance.

Network Structure and Network Performance

The work of Freeman (1979) and Scott (2000) brought to bear the idea of centrality of individuals and organizations in their social networks. By measuring the degree, or

number of other points to which a point (i.e., node) is directly adjacent, the level of connectivity of an individual within a group can be understood. Thus, a degree-based measure of point centrality corresponds to the intuitive notion of how well connected an individual is within their group.

Granovetter (1973) argued that ties, which reach outside of one's social clique, are likely to be weak, and can serve as a bridge between densely interconnected social cliques, and thus provide a source of unique information and resources. Also, Seibert, Kraimer, and Liden (2001) stress that, "According to structural hole theory, an alter who is already connected to other alters within ego's network is redundant and does not convey the types of benefits to ego that a non-redundant alter would" (p. 223). Burt (1992) and Ibarra (1993) found that structural holes are likely to be found between *alters* who are members of different social groups, and that *ego,* functioning as a bridge between two unconnected social groups, benefits all the unconnected individuals (*alters*) in both groups. Thus, due to *ego's* connections, both groups' *alters* benefit from greater access to the social resources of those groups.

Within a RAC, the 15 members equally represent the interests of three broad categories: commodity production interests; national and local environmental and recreation interests; and state, local and tribal interests (Appendix 1). This structure brings together a wide array of interests, increasing the potential for creating new ties among participants. Also, the likelihood for structural holes is present, providing an opportunity for brokering information-flows across these three broad categories of RAC members. This potential exists because each broker's (i.e., *ego's*) unique

information advantage creates the possibility for enhanced RAC performance. Thus, Hypotheses 1a and 1b tests the following propositions:

> *Hypothesis 1a: Richer patterns of ties, or structural holes, among RAC members lead to increased performance outcomes.*
>
> *Hypothesis 1b: Greater numbers of ties among RAC members lead to increased performance outcomes.*

Network Social Capital and Network Performance

As suggested by Putnam (1993) and O'Toole (1997) leveraging horizontal ties, building on trust, and encouraging the development of cooperative norms can also enhance governmental capacity. It is the premise of several studies (Ingles, 2004; Kusel, 2006; Forest Counties Payments Committee, 2003; Wilson, 2003) that RACs authorized under the Secure Rural Schools and Community Self-Determination Act of 2000 have been successful in enhancing governmental capacity in natural resource management. Kusel's (2006) findings stated,

> Perhaps most importantly, this study shows how successful the legislation has been in developing collaborative relationships among RAC members, and between RACs, and the counties and the federal agencies...[and]...have helped shape projects that are now improving forest and watershed health on federal lands...(p. 1).

Importantly, the Act requires that all decisions must be approved by a majority of each interest group (i.e., at least three votes from each group, for a minimum of nine). It is proposed that this requirement fosters trust, as RAC members seek to exchange

accurate information about their true priorities. Trust and shared values, as explicit features of social capital, are important because they increase access to resources and strengthen a network's ability to adapt to unforeseen problems (Uzzi, 1996). To recommend projects, RAC members are expected to share useful information and resources with one another. That is, they are required to trust others for their own benefit, which may play a significant role in enhancing RAC performance. To test this, the following hypothesis is offered:

Hypothesis 2: RAC members with high levels of trust and shared values lead to better performance outcomes.

Network Management and Network Performance

The establishment of a unique process for reaching mutually-acceptable decisions was mandated by the Act. Thus, the voting requirement serves as a control for the potential to reach agreement for the entire population of RAC members. However, as identified within alternative dispute resolution literature, a network's ability to fulfill its purposes and goals is also contingent on its ability to manage conflict, make decisions, and adapt to the environment in which it operates. In this manner, network participants can improve the chances of long-term success, or their decision capability, by developing the capacity to reach a zone of agreement through network management. This study will refer to the ability of RAC members to reach agreement as decision capability.

Thus, this study will look for a direct relationship between the potential for agreement and RAC performance.

Hypothesis 3: RAC members with greater decision capability lead to more effective or desirable performance outcomes.

Network Structure and Network Social Capital

According to Walker, Kogut, and Shan (1997) and Choi (2005), network structure exists where social capital is distributed. Further, Choi (2005) insists, "...network structure plays an important role in the development of social constraints which direct information flows in building and maintaining social capital" (p. 37). Thus, network social capital may serve as a significant mediator between network structure and network performance. As Choi explains, "...the effect of social capital is dependent upon its position in the network structure" (2005, p. 37). Consequently, these two network characteristics are interdependent for enhanced RAC performance.

Hypothesis 4: Among RAC members, network social capital is directly affected by network structure, and it mediates the effect of network structure on performance outcomes.

Network Social Capital and Network Management

Susskind and Cruikshank (1987) stress that to reach "all-gain agreements" conflict should not be suppressed (p.33). Dukes (1996) reinforces this notion when he argues that the attention granted to neutrality and environmental conflict resolution methods are in some ways misdirected. He states (1996),

> Neutrality is not a goal or a value in and of itself. Rather it is a means to another end: it is, in fact, trust, acceptance and ultimately, entry, which are the

desired products of neutrality and integral to the dispute resolution process (p. 176).

Thus, networks with a higher degree of trust will require fewer resources to manage existing relationships. This also means that RACs with greater degrees of trust have more resources available to establish higher levels of performance. In this sense, network social capital has a significant association with network management.

Hypothesis 5. Among RAC members, network social capital has a positive association with network management.

Network Structure and Network Management

It has been argued that multiple and diverse relationships among network participants are more likely to make networks stable and lead to increased network capacity (Brunner, et al., 2002; Wondolleck & Yaffee, 2000; Gibson, McKean & Ostrom, 2000; Doppelt, 2003; Cross & Parker, 2004; Susskind & Cruikshank, 1987). Thus, it is proposed that the greater the diversity of relationships among RAC members, the more likely they will develop capacity to reach agreement. To test this proposition, this final hypothesis is offered:

Hypothesis 6. Among RAC members, network management is determined by network structure, and it mediates the effect of network structure on performance outcomes.

Control Variables

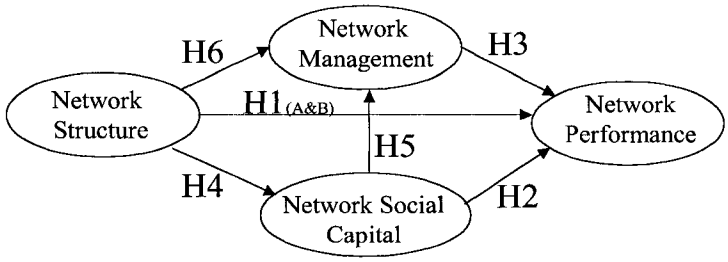
Numerous network studies have found that certain demographic variables including age, sex, ethnicity, physical location, tenure, and other variables influence

interpersonal communication in organizations (Allen, 1977; Lincoln & Miller, 1979; Rogers & Kincaid, 1981; Stork & Richards, 1992). Therefore, in an effort to compare respondents and non-respondents in order to isolate potential effects on the proposed hypotheses, gender, RACs in single and multi-county jurisdictions, and appointed interest group will be incorporated into this study. Ethnicity was considered as a potential control variable yet dismissed once it was determined that ethnic diversity is extremely low in the study population (U.S. Forest Service, October 6, 2005).

Summary

In this section a series of hypotheses were developed regarding direct and indirect effects of network characteristics (network structure, management and social capital) on network performance. Below is a summary of the hypotheses (Figure 2).

Integrated Model of Network (RAC) Performance



H1a: Richer patterns of ties, or structural holes, among RAC members lead to increased performance outcomes.

H1b: Greater number of ties among RAC members lead to increased performance outcomes.

H2: RAC members with high levels of trust and shared values lead to better performance outcomes.

H3: RAC members with greater decision capability lead to more effective or desirable performance outcomes.

H4: Among RAC members, network social capital is directly affected by network structure, and it mediates the effect of network structure on performance outcomes.

H5: Among RAC members, network social capital has a positive association with network management.

H6: Among RAC members, network management is determined by network structure, and it mediates the effect of network structure on performance outcomes.

Figure 2. Summary of Hypotheses

METHOD

This section outlines the methods, instruments and procedures developed to test the hypotheses in this study. To begin, a discussion of the unit of analysis and research setting will be presented, followed by data-collection methods and statistical analysis procedures. Survey validation and reliability will then be presented, followed by a discussion of the variables and their measurement.

Unit of Analysis

According to Trochim (2005), "The unit of analysis is the major entity that you are analyzing in your study" (p.1). For instance, any of the following could be a unit of analysis in a study: individuals, groups, artifacts, geographical units, or social interactions. This study analyzed the personal-network level (i.e., egocentric), focusing on the links, or relationships, that a focal individual had with other individuals and also how these other individuals were connected to one another. In other words, this approach sampled individual units, enumerated the local networks around them, and predicted individual outcomes (i.e., commitment, trust, shared values, decision capability, structural holes and degree centrality). Financial indicators of performance (i.e., dollars leveraged and changes in Title II funding), while applied individually, represent a group score for the RAC in which they participate.

Research Setting

Study Population

Resource Advisory Committees (RACs) are composed of citizens, usually from the county or counties of which they are comprised, for the purpose of making recommendations for projects to improve natural resource conditions on or adjacent to Federal lands. Importantly, money was available through the Act to fund the implementation of these projects, once approved by a Designated Federal Official.

The Secretary of Agriculture appoints RAC members for three-year terms, which can be extended for a second term. Each RAC is composed of fifteen members that represent various community interests. The Act groups these interests into three broad categories, with each category represented by five RAC members. Category A is comprised of traditional resource-based industry and mechanized recreational interests. Category B is comprised of environmental and non-motorized recreational interests as well as archeological and historical interests. Category C is comprised of elected officials, school officials, and those representing tribal interests (Table 1). The Act calls for "balanced representation" from all three categories, but does not require that all interests be represented on the committee (Table 1). Finally, RAC members must reside in the state or states where the RAC is located.

Table 1. *Community Interests Represented by RACs*[1]

Category A 1. Organized labor 2. Developed outdoor user recreation, off highway vehicle users, or commercial recreation 3. Energy and mineral development interests 4. Commercial timber 5. Federal grazing permittee or other land use permittee
Category B 1. Nationally recognized environmental organizations 2. Regionally or locally recognized environmental organizations 3. Dispersed recreation activities 4. Archaeological and historical interests 5. Nationally or regionally recognized wild horse and burro interest groups
Category C 1. State elected office holder or their designee 2. County elected office holder 3. Represent American Indian tribes within or adjacent to the area for which the committee is organized 4. School officials or teachers 5. Affected public at large

All 55 active RACs in thirteen states were studied: this equates to 825 RAC members[2]. RACs are closely split between single and multi-county jurisdictions (30 RACs are limited to a single county while 26 RACs involve one or more county). According to Ingles (2004), "In most states, the boundaries of the RAC coincide with county boundaries, however in Oregon and Washington, the RAC area is often defined by boundaries of one or more National Forests" (p. 23). The Ozark-Ouachita RAC in Arkansas and Oklahoma includes twenty-two different counties (Appendix 3).

[1] Secure Rural Schools and Community Self-Determination Act of 2000, § 205(d)

[2] This includes all RACs that have received Title II funds. Additional RACs have been chartered across the country but currently have no Title II funds available to them and no advisory committee members and therefore are not included in this figure.

Sample Size

This study deployed the written survey instrument to the entire population of 55 Forest Service RACs, which constitutes 825 RAC members in 13 states. Initially, because the entire population was surveyed, and results were not conceptualized to another population, power analysis was not necessary. The response rate, 37.1% resulted in 303 members of the population being surveyed, which is the sample size used for subsequent statistical tests.

Data Collection and Data Analysis Procedures

Sampling Method

This study used both a self-administered written survey as well as historical data located in existing Forest Service and General Services Administration databases. The method for collecting network data was a sociometric survey in which individuals were asked to describe their relationships with other organizational members (Dean & Brass, 1985; Nelson, 1989; Rogers & Kincaid, 1981; Tichy, Tushman, & Fombrun, 1980). A packet of 15 surveys, including a cover letter, was mailed to each of the 55 Forest Service RAC coordinators prior to a regularly scheduled RAC meeting. RAC coordinators were asked to read the cover letter to the group at the conclusion of the meeting, and to then distribute the surveys to those members wishing to participate. Written instructions were also provided on the survey. Once RAC members completed

the surveys they were asked to place them directly into a postage-paid, addressed envelope provided at the meeting, which was then mailed by the RAC coordinator.

This survey required the identification of the respondent by name. To maintain confidentiality, upon receipt of the survey each name received an alphanumeric code. The alphanumeric code was the same for each RAC: the letter A, B, or C designates the respondent's interest group (as appointed to by the Secretary of Agriculture), followed by a number, one through five (e.g. A1-A5, B1-B5, and C1-C5). Preceding each individual's alphanumeric code is a randomly assigned RAC number between one and 55, representing the total number of RACs (e.g., 55A3 or 46C5). This code was used in all analysis and reporting. All surveys shall remain locked in a file cabinet at the residence of the author for a period of three years following completion of this research, after which they will be destroyed.

Data Analysis Procedures

Descriptive information is provided for all variables, including means, variances, and standard deviations. In addition to correlational analyses, multiple linear regression analysis was used to test the direct and indirect effects of the predictor variables (network structure, network social capital and network management) on the outcome (network performance). Figure 3 depicts the variables in the hypothesized model and their relationships to each other.

The Baron and Kenny (1986) approach to testing mediational models establishes whether the individual paths between the variables are significant. If they are, then

mediation can be further tested with Baron and Kenny's (1986) fourth step. However, it is preferable to test the significance of the indirect effect. Thus, the approach employed in this study involves computing the partial regression coefficients and calculating standard errors. Preacher and Hayes (2004, 2005) have developed freeware (acquired at http://www.comm.ohio-state.edu/ahayes/SPSS%20programs/indirect.htm), which provides the necessary calculation of coefficients and standard errors. Because all RAC's were surveyed, values represent population parameters rather than sample statistics.

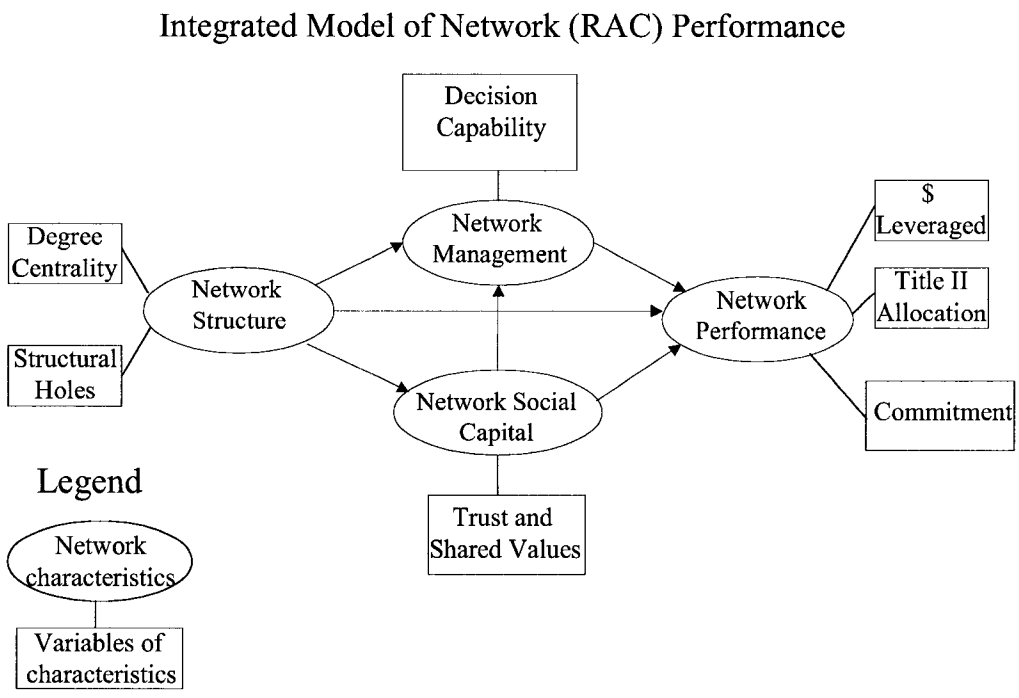


Figure 3. Variables and Model of Network Performance

Survey Validation and Reliability

In consideration of accuracy, validity, and reliability for measurements, this study used tested items from the literature. When necessary, tested items were adapted to fit the situational characteristics of this study. As suggested by Trochim (2005), a deductive scale development process was used to design the survey used in this study. In this manner, derived items were designed to tap a previously defined theoretical universe. The survey was pretested with a sample of respondents to provide feedback on design layout, wording, or clarification of any ambiguous measurement items.

In this study, a seven-point Likert scale was used because, "...as the number of rating scale categories decreases, so does the correlation coefficient, apart from any inherent relationship between the variables being correlated" (Peterson, 2000, p. 65). Trochim (2005) has suggested. "There are two basic concerns with respect to reliability, consistency of items within a measure and stability of the measure over time" (p.18). Although reliability may be calculated in a number of ways, the most commonly accepted measure, and the measure used in this study, was internal consistency reliability using Cronbach's Alpha (Price & Mueller, 1986). Mahan (2005) suggested that an alpha of .80 be the minimum acceptable standard for demonstrating internal consistency. What follows is the description of individual variables and measurement. The full questionnaire is included in Appendix 2.

Variables and Measurement

Network Structure: Degree Centrality and Structural Holes

To determine degree centrality and structural holes, RAC members were asked to identify RAC members (alters) with whom they had exchanged information, advice, or

other types of support regarding RAC project recommendations according to the following scale:

2 = I exchange a great deal of information, advice or support with this person.

1 = I exchange some or little information, advice or support with this person.

0 = I exchange no information, advice or support with this person.

Degree centrality is the number of direct connections a person has. Two people (or points) that are connected are considered adjacent to one another (Scott, 2000). Adjacency expresses the fact that two people represented by points are directly related or connected with one another. Scott (2000) further elucidates, "Those points to which a particular point is adjacent are termed its neighborhood, and the total number of other points in its neighborhood is termed its degree. Thus, the degree of a point is a numerical measure of the size of its neighborhood" (p. 67).

While several measures of structural holes exist, this study used the measure effective size, as developed by Burt (1992). To calculate effective size, redundancies for each of ego's alters are summed then subtracted from the total number of alters in the network. For a typical RAC with 15 members, the number of alters is 14 for any given individual. Thus, if none of ego's alters were connected with any of the others, the effective size would be 14.

Network Social Capital: Trust and Shared Values.

Butler (1991) undertook an in-depth study to develop a content theory of trust conditions and to then derive valid scales for measuring them. These conditions of trust include: "availability; competence; discreetness; fairness; integrity; loyalty;

openness; promise fulfillment; and receptivity" (Butler, 1991, p. 653). In Butler's study, Cronbach's alpha for these conditions ranged from a low of .84 for openness to a high of .92 for receptivity. Based on these conditions of trust, and by adapting survey questions for trust from Leach & Sabatier's study (2003) of interpersonal trust (Cronbach's alpha was .83) and Choi's research (2005) incorporating trust and shared values (Cronbach's alpha was .86), the following questions were asked of RAC members (using a seven-point Likert scale ranging from "strongly disagree to strongly agree"):

- This RAC is achieving the goals set forth in P.L. 106-393.
- In addition to the goals required by P.L. 106-393, this RAC is achieving its own goals.
- When RAC members agree to something, I know they will keep to that agreement.
- Other RAC members reciprocate acts of good will or generosity.
- Other RAC members listen and sincerely try to understand other points of view.
- Other RAC members propose solutions that are compatible with the needs of most RAC members.
- This RAC works hard to solve disagreements.
- I am able to freely express new ideas, opinions or recommendations during all meetings.
- I easily accept changes to RAC rules and procedures.

- In my everyday life I always trust people, even those I don't know.
- I trust RAC members of the commodity production/motorized recreation group.
- I trust RAC members of the environmental/non-motorized recreation group.
- I trust RAC members of the state, local and tribal representative group.
- I understand what is expected of RAC members.
- I carefully follow guidelines or rules created by the RAC.
- I believe RAC recommendations should focus on road, trail and infrastructure maintenance.
- I believe RAC recommendations should focus on road, trail, and infrastructure obliteration.
- I believe RAC recommendations should focus on soil productivity improvement.
- I believe RAC recommendations should focus on improvements to forest ecosystem health.
- I believe RAC recommendations should focus on watershed restoration and maintenance.
- I believe RAC recommendations should focus on restoration, maintenance and improvement of wildlife habitat.
- I believe RAC recommendations should focus on restoration, maintenance and improvement of fish habitat.

- I believe RAC recommendations should focus on control of noxious and exotic weeds.
- I believe RAC recommendations should focus on re-establishment of native species.

One final question related to shared value asked respondents to rank the level of importance from one (highest importance) to nine (lowest importance) the categories of project objectives as listed in the Act.

Network Management: Decision Capability

As stated earlier, network management involves developing a network's potential for reaching agreement. It must be clarified that in this context "reaching agreement" is not synonymous with reaching consensus, but rather on building good working relationships. To build good working relationships several components have been recognized as critical, including: the exchange of accurate information based on true priorities, the inclusion of diverse stakeholders, and an ability to satisfy individual needs while meeting the needs of others (Brunner, et al., 2002; Wondolleck & Yaffee, 2000; Gibson, McKean & Ostrom, 2000; Doppelt, 2003; Cross & Parker, 2004; Susskind & Cruikshank, 1987). Likewise, collaboration, as a process driven by multiple stakeholders, usually involves the use of several components for reaching agreement: (1) agreeing on a common purpose; (2) ensuring the process is both inclusive and transparent; (3) allowing participants to design the process; (4) promoting joint fact finding and creative problem solving; (5) insisting on accountability; (6) developing an action plan; and (7) developing collaborative

leadership (Wondolleck & Yaffee, 2000; McKinney, 2001; Pess *et al.*, 2003). Therefore, the processes examined in this study are a type of collaborative network management.

Building on these concepts, I have adapted questions from Brogden's (2003) "Assessment of Environmental Outcomes" and Choi's (2005) research on network characteristics (Cronbach's alpha was .69). Using a case study, Brogden's research centered on the development of a proactive tool to assess multi-stakeholder partnership approaches to conservation. The tool was developed during the November 2000 to July 2001 International Association of Fish and Wildlife Agencies sponsored national policy dialogue on State Conservation Agreements. Over the course of the national dialog, "More than 225 individuals participated in at least one of the eight workshops" (2003, p. 283). From these workshops Brogden (2003) developed a prospective evaluation checklist to assess environmental outcomes. Several questions for use in this study's survey were adapted from Brogden's checklist. Finally, one question from Ingles' (2004) survey (no reliability measure was reported), was added considering the importance of reaching agreement relative to the requirement that project approval requires a majority vote in each 5-member subgroup. The following questions were asked of RAC members (using the same seven-point Likert scale):

- The mandate that project approval requires a majority in each 5-member subgroup has been helpful to this RAC's decision-making processes.
- All interest groups with a stake in a specific project have been represented in RAC discussions prior to decisions being made regarding that project.

- As a result of discussion or recommendation from others, my RAC readily adapts to new rules and processes.
- If there was a subcommittee, discussions and conclusions of that subcommittee were disclosed to the full RAC during regular meetings.
- When making decisions, this RAC identifies options that address the concerns of all members.
- This RAC evaluates options using specific criteria and /or procedures.
- Once decisions are made, an action plan is developed to determine tasks and a timeline.
- A process for resolving disputes was agreed to early, and followed during all proceedings.
- This RAC addresses problems or issues openly and effectively.
- If written agreements are made, they list who will accomplish what actions, and a specific date for their completion.

Network Performance. Network performance was defined using the following variables: dollars leveraged outside of Title II and appropriated Forest Service funds for approved projects; change in Title II allocation over the lifespan of the legislation; and level of RAC commitment (Refer to Appendix A for a description of Title II).

Ingles (2004) found that, "The ability to leverage funds suggests that multiple groups have a stake in or deem a net benefit from a project" (p. 36). He also found that increases to Title II funding have occurred over the life of the legislation. Specifically he noted, "The trend has been towards the placement of more funds into

Title II and less into Title III, suggesting that the relationship building activities that are occurring between the groups involved in the RACs have been positive" (2004, p. 37). Both of these measures, leveraged funding and increased Title II funding, were accessed through the existing U.S. Forest Service national RAC project database.

Finally, RAC commitment was measured by several attributes, including distance traveled to meetings, willingness to serve additional terms of appointment, frequency of meeting attendance, and desire for re-authorization of the Act. Roch, Scholz and McGraw (2000) suggest that travel distance reflects the personal investment an individual is willing to make in their participation on a network. Thus, greater travel distances are one component of an increased level of commitment. To ascertain this, RAC members were asked approximately how far they traveled to participate in regularly scheduled RAC meetings (including any required subcommittee meetings). Also to be included will be Ingles' (2004) item related to RAC satisfaction:

- "I feel that P.L. 106-393 should be renewed after fiscal year 2006" (p. 61).

Control Variables

To isolate potential effects on the proposed hypotheses, gender, RACs in single and multi-county jurisdictions, and appointed interest group were assessed. Information was attained through existing Forest Service and General Services Administration (GSA) Federal Advisory Committee Act (FACA) databases. Forest Service data is updated continuously by RAC Coordinators while GSA data is updated annually by the agency FACA Coordinator.

RESULTS

This chapter describes the data collection process and presents the results of the research hypotheses tests. The validity and reliability of measurement models are examined and descriptive statistics are presented. Finally, diagnostic analyses and the results of regression and mediational analyses are presented.

Data Collection

The study sample is composed of the entire population of 55 Forest Service RACs, which potentially constitute 825 RAC members in 13 states (Appendix C). At the time of this study, eight positions were unfilled leaving a total of 817 RAC members. Information about individual RAC members as well as group information was located in two separate government-sponsored websites: the Forest Service Payments to States RAC database and the GSA Federal Advisory Committee Act (FACA) database (http://wwwnotes.fs.fed.us:81/r4/payments_to_states.nsf, http://www.fido.gov/facadatabase/public.asp). Information included each member's name, group affiliation, and gender. Group information included whether the RAC served one or multiple counties, meeting minutes, and locations and dates for future meetings. Because each database was updated by different people at varying times during the year, both were used to obtain information on RAC members by cross-referencing each member's name and group affiliation. When members could not be cross-referenced, the local Forest Service RAC Coordinator was contacted to verify RAC members' names and group affiliations. In this manner, data was compiled for

RAC member names, group affiliation, gender, and whether the RAC served single or multiple counties.

In order to assess content validity, researchers at Portland State University and experts in the U.S. Forest Service Research and Development branch examined measurement scales for the model. Further, prior to administering the main survey, a pilot survey was conducted on 10 participants representing a cross-section of RAC members and Forest Service RAC Coordinators. Through these procedures, the content validity of the measurement scales was verified prior to administering the final instrument.

The pilot test resulted in minor re-wording of some items and confirmed that respondents were able to answer the seven-point scaled questions without difficulty. To improve understanding, one question was re-worded to rate project types using the exact language of the Secure Rural Schools and Community Self-Determination Act of 2000. The final survey instrument included 42 items: six related to level of commitment; one to rating the level of information exchange among individual members; 10 related to network management; 15 related to trust; and 10 rating the level of shared values among members. The instrument is included as Appendix B and approval for its use from the Portland State University Human Subjects Review Board can be found in Appendix D.

Each RAC's Forest Service Coordinator was asked to deliver and collect the self-administered survey questionnaire. Prior to mailing the survey package, an electronic message was sent to each Forest Service RAC Coordinator explaining the purpose of

the study, the voluntary nature of their participation, and the timeline for completion. A packet of materials was then mailed to each Coordinator on July 7, 2006 including: a letter of instruction to each Coordinator, 15 letters of explanation and Human Subjects Informed Consent Disclosure; 15 questionnaires; a letter of introduction and support from the President of the National Forest Counties and Schools Coalition, a return postage paid envelope and 15 survey response privacy envelopes. After the survey packets were mailed, electronic mail notices were sent to each Forest Service RAC Coordinator.

Each Coordinator was asked to administer the survey after the committee had completed all other business during a regularly scheduled meeting. They were further instructed to read aloud the letter from the President of the National Forest Counties and Schools Coalition and to then distribute the letter of explanation and Human Subjects Informed Consent Disclosure to each member. While RAC members read the letter of explanation and disclosure, the Coordinator distributed the individualized surveys and privacy envelopes. After completing the questionnaire and placing it in the privacy envelope, respondents then placed that envelope into the larger postage paid return envelope. Finally, before sealing the postage paid envelope, RAC Coordinators ensured surveys not completed were also enclosed before mailing the packet back to the author.

Because RAC meeting dates varied, survey packets were returned over a four-month period, ending in early November 2006. A total of 303 surveys were returned for an initial response rate of 37.1%. However, following diagnostics analyses, the

final sample size contained a total of 302 respondents. Of the 55 RACs, 38 responded to the survey, for a group response rate of 69.1%.

To conduct a network analysis, it was initially necessary to identify RAC members by name. To protect the privacy of respondents, a coding system was developed. Upon receipt of the surveys each name was replaced by an alphanumeric code. Preceding each alphanumeric code a number between one and 55 was assigned, representing that individual's random RAC number. This code for each respondent (e.g., 23C1) was used in all subsequent analysis and reporting.

To analyze the dependent performance variables "Dollars Leveraged" and "Title II Allocation," raw data was collected from the U.S. Forest Service Payments to States RAC database (http://wwwnotes.fs.fed.us:81/r4/payments_to_states.nsf). Specifically, data was derived from the U.S. Forest Service All Service Receipts (ASR) 18-1 Reports for Fiscal Years 2001-2006 as well as data contained in the P.L. 106-393, Title II Project Submission Forms located on the website. Data for these variables were collected for all 55 RACs. The next section will describe how the raw data derived from the survey instrument and the government-sponsored databases were developed into measurements of the inputs to each of the characteristics in the integrated model of network performance.

Measurement Models

Network Structure

Regarding network structure, the inputs degree centrality and structural holes were derived from question number five on the survey instrument. This question asked

respondents to rate the working relationship they had with other RAC members on their committee. Data of this type is referred to as relational data as it focuses on the ties and connections that relate one individual to another and so cannot be reduced to the properties of the individuals themselves. The methods most appropriate to relational data are those of network analysis, whereby relations are treated as linkages that run between individuals. In short, network analysis consists of a body of qualitative measures of network structure.

To record connections from the data collected, a square case-by-case matrix was constructed in which each individual was listed twice, once in the row and once in the column (Table 2). With the rows and columns representing cases, the individual cells of the matrix show to what extent particular pairs of individuals are connected.

Table 2. *Square Case-by-Case Matrix*

	12A1	12A2	12A3	12B1	12B2	12B3	12C1	12C2	12C3
12A1	0	2	2	1	2	1	2	1	1
12A2	1	0	1	0	1	1	1	1	0
12A3	2	2	0	0	0	0	2	0	0
12B1	1	2	2	0	2	2	1	0	1
12B2	1	2	2	2	0	1	0	0	0
12B3	0	1	1	1	1	0	1	0	1
12C1	2	2	2	1	1	1	0	1	1
12C2	0	1	1	2	2	1	0	0	0
12C3	2	2	1	1	1	1	1	1	0

In this type of square matrix it is important to note the line of diagonal cells running from the top left to the bottom right. The cells in this diagonal are different from all others in the matrix because they show the relation between any particular case and itself (or an individual's relationship to himself). For this study, these cells

have no meaning, and are always "0," as the concern of this study relates to the inter-personal relations of an individual. Therefore these cells are ignored in all analyses.

Missing Data

Knoke and Kuklinski (1982) write that there is "no failsafe solution to the missing data problem" in network analysis (p. 35). For this study, an available case approach using both fully described links (two descriptions) and links that are partially described (one description) was employed. As described by Stork and Richards (1992), "To use partially described links, the assumption is that *if* A describes a relationship with B, that, indeed, a relationship does exist between them. This assumption is operationalized by ascribing Person A's description of the A-B linkage to B as well" (p. 197). They refer to this approach as "reconstruction," and argue that while it may seem analogous to imputation, where missing values are replaced by estimated values, there is a difference (p. 197). They maintain, "Reconstruction in network analysis does not add links to the data set where there were none. Rather reconstruction simply allows the description supplied by one person to be how the link between two people is described" (p. 197). Simply, one description rather than two determines the presence or strength of a relationship.

In ascribing the respondents' descriptions of relationships that they have with nonrespondents to their nonresponding partners, a symmetrical data set resulted. Because it is not known with whom the nonrespondents talk to, an assumption was made that they talk to people who report talking to them. Thus, this study ascribes the link descriptions supplied by the respondents to their nonresponding partners.

To justify the use of reconstruction, Stork and Richard's (1992) two recommended criteria were employed: "...the first is that respondents should not be systematically different from nonrespondents...the second is that the data available from respondents should be reliable descriptions of the relationships that they have with nonrespondents" (p. 198).

Respondent and Nonrespondent Similarity

Variables such as sex, age, race, department, and level in the organization have been shown to influence or constrain communication in organizations (Allen, 1977; Lincoln & Miller, 1979; Rogers & Kincaid, 1981). Of the available data for this study, the variables gender and group (i.e., Categories A, B, and C) are most aligned with those variables just described to show influence or to constrain communication among RAC members. Thus, these variables were tested for similarity between respondents (n=303) and all RAC members (n=816).

To test whether group membership (i.e., Group A, B, or C) and gender were associated with participation in the survey, contingency chi-square analyses were conducted. The results of the analyses indicated that group membership ($X^2 = .945$, $p = .623$) and gender ($X^2 = .182$, $p = .670$) were independent of whether or not they responded. Therefore, the results suggest that there was no difference between respondents and all RAC members with regard to either gender or group.

Thus, using individual data for the two variables gender and group, the first criterion for using reconstruction was met, as no significant difference between respondents to the survey instrument and all RAC members exists.

Respondent Reliability

The second criterion for justifying reconstruction is that the data available from respondents should be reliable descriptions of the relationships that they have with nonrespondents. Reliability in this context is operationalized in network studies as "...confirmation, or the extent of agreement between people on the nature of the relationship (or relationships) between them" (Stork & Richards, 1992, p. 199). Stork and Richards (1992) further elaborate,

> Confirmation can be operationalized only for pairs of respondents, so the confirmation rate in a network depends on the proportion of pairwise links described similarly by both people involved. If non-respondents are similar to respondents and the confirmation rate is high, the assumption is that a single linkage description can reliably characterize the link between a respondent and a nonrespondent (p. 199).

Stork and Richards (1992) describe the distinction between directed and undirected communication as another important factor in considering confirmation. With directed communication, the message is sent *from* one person *to* another, and was defined in this study as the "exchange of information, advice or support." Undirected communication, on the other hand, has been described as two communication partners effectively serving as "...transceivers in the communication process" (Stork & Richards, 1992, p. 199). Thus, undirected communication indicates a reciprocal relationship whereas, in the case of directed communication, confirmation is not the same as reciprocity, making the case for reconstruction more complicated. Yet, for the

purposes of this study, the important consideration is the presence or absence of a relation and not its direction. Therefore, the directionality of the data was ignored and reduced to undirected data.

The confirmation of ties for this study was calculated by first removing all the nonrespondents from the network analysis. Next, to further simplify the analysis the valued data (i.e., 0, 1 or 2) were converted into binary data by using a cut-off value for 'slicing' or dichotomizing the matrix. Data were dichotomized and tested at two levels, greater than or equal to one and greater than or equal to two. In so doing, values above a certain level are sliced off and used to construct a new matrix in which values at or below this level are replaced by '0' entries and values above it are replaced by '1' entries. Finally, the data were then symmetrized and run in the network analysis program UCINet[3] to determine the percent of reciprocated ties for every RAC that responded to question five in the survey instrument.

The percent-reciprocated ties for 38 RACs, when dichotomized at greater than or equal to one, ranged from a low of 36% to a high of 100% with an average of 69%. When dichotomized at greater than or equal to two, the number of reciprocated ties for the same 38 RACs ranged from a low of 0% to a high of 71% with an average of 33%. The average of 33% for 38 RACs when dichotomized at greater than or equal to two indicates a much lower confirmation of ties than when the same 38 RACs were dichotomized at greater than or equal to one. Thus, while there is no standard for

[3] UCINet is a social-network analysis tool capable of performing most standard sociometric measures of network structure and dynamics including centrality and ego-networks (e.g., structural holes) Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

deciding when confirmation rates are "high enough," or when nonrespondents and respondents are "similar enough," the 69% reciprocated ties when dichotomized at greater than or equal to one confirmed a greater level of respondent reliability, and was used in further analysis.

Thus, the two criteria recommended by Stork and Richards (1992), similarity of respondents to nonrespondents, and respondent reliability, were met for using the reconstruction method to minimize the impact of missing data within RAC networks.

Degree Centrality

Degree centrality in its simplest form is the number of direct connections a person has. Two people (or points) that are connected are considered adjacent to one another (Scott, 2000). Adjacency expresses the fact that two people represented by points are directly related or connected with one another. As Scott (2000) explains, "Those points to which a particular point is adjacent are termed its neighborhood, and the total number of other points in its neighborhood is termed its degree. Thus, the degree of a point is a numerical measure of the size of its neighborhood" (p. 67). The degree of a point is illustrated in the square case-by-case matrix (Table 2) by the number of non-zero entries for that point in its row or column. UCINet was used to calculate the degree centrality of each point and to also provide the overall network degree centralization.

To assess the normality of this measure, Osborne (2002) suggests an examination of skew and kurtosis. Skewness defines the disproportionate frequency of certain scores; while kurtosis describes the quality of a distribution such that it is flat or

peaked (Salkind, 2000). Herein, the distribution of this measure was assessed for normality using SPSS. Skewness for the measure degree centrality was -.234 and the kurtosis was –1.324. Curran, West, and Finch (1996) recommend skewness less than or equal to two and kurtosis less than or equal to seven. Thus, these results are well below the suggested maximum levels, indicating that the criteria for normalizing data were met.

Structural Holes

A structural hole is an egocentric approach to measuring the density, or general level of linkage among points - with a difference. In addition to the focal individual and his or her direct contacts, structural holes evaluate the links that exist among these contacts. While several measures of structural holes exist, this study used the measure effective size, as developed by Burt (1992). To calculate effective size, redundancies for each of *ego's alters* are summed, then subtracted from the total number of alters in the network. For a typical RAC with 15 members, the number of alters is 14 for any given individual. Thus, if none of *ego's alters* are connected with any of the others, the effective size would be 14, which is the highest possible score. Conversely, the higher the number of connections among *ego's alters*, the lower the effective size for that *ego*. UCINet was used to compute effective size for all points in the network, treating each one in turn as *ego*.

The distribution of this measure was assessed for normality using SPSS. Skewness for the measure effective size was 1.867 and the kurtosis was 3.740. These results are

below the recommended maximums indicating the criteria for normalizing data were met.

Network Social Capital

Measures of the characteristic network social capital included trust and shared values. The variable trust was derived from 15 items in the survey instrument. Respondents rated each item using a seven-point Likert scale ranging from a rating of 1 (strongly disagree) to a rating of 7 (strongly agree). A total trust score was calculated for each individual by adding together the self-selected Likert scale values for all 15 items.

The input shared values was derived from 11 items on the survey instrument. One item, question 42, asked respondents to rank categories of projects on a scale from one to nine (9 = lowest importance, 1 = highest importance). Because 25% of respondents incorrectly filled out this question, it was separated from the other shared value items and tested separately. For the remaining ten items an individual's score was calculated as the deviation from the RAC's shared values, mean. To obtain this score, the RAC mean for each item was first calculated by summing the self-selected Likert scale values then dividing by the number of respondents for that RAC. The statistical program SPSS was then used to calculate an individual's deviation from the RAC mean for each item. All items were then averaged for a total average shared values score. This score represents the level of shared values among members of a given RAC. Question 42 was computed separately using the same methodology for each of the nine ranked items.

Cronbach's alpha is a common measure of internal reliability and is generally considered to be acceptable if over .80 (Mahan, 2005). Internal consistency refers to the degree to which the subparts of the instrument are all measuring the same input or characteristic. The standardized Cronbach's alpha of the 15-item trust scale was computed to be .88 (N=291), which suggests high internal reliability. Yet, the item total statistics (alpha if item deleted) indicated that if question 27 were removed, the reliability would increase. Upon examination of this question it was determined that it alone did not measure the level of trust within a RAC but instead focused on a person's general level of trust. Because of this difference this item was deleted and the resulting standardized Cronbach's alpha was computed to be .89 (N=291). The standardized Cronbach's alpha of the 10-item average shared values scale was computed to be .70 (N=300) and .51 (N=233) for question 42 (9-item). Because of this low reliability, question 42 was eliminated from further analysis.

The distributions of these measures were also assessed for normality using SPSS. Skewness for the measures trust and average shared values was -.444 and –1.292 respectively. The kurtosis was -.289 for trust and 4.226 for average shared values. These results are below the recommended maximums, indicating the criteria for normalizing data were met.

Network Management

The characteristic network management was measured by a single variable, decision capability. Decision capability was derived from 10 items in the survey instrument. Respondents rated each item using the same seven-point Likert scale as

before. A total decision capability score was calculated for each individual by adding together the self-selected Likert scale values for all 10 items. The standardized Cronbach's alpha of the 10-item decision capability scale was computed to be .85 (N=134), which suggests high internal reliability. However, the item total statistics (alpha if item deleted) indicated that if question 8 were removed the reliability would increase. Upon examination of this question it was determined that it alone did not measure the decision capability of a RAC but instead focused on the intent of the legislation. Because of this difference this item was deleted and the resulting standardized Cronbach's alpha was computed to be .87 (N=134).

The distribution of this measure was assessed for normality using SPSS. Skewness for the measure decision capability was -.720 and the kurtosis was -.010. These results are well below the recommended maximums, indicating the criteria for normalizing data were met.

Network Performance

The characteristic network performance was measured by three separate dependent variables: commitment, Title II allocation, and dollars leveraged. To assess an individual's overall level of commitment, an index was created from six items in the survey instrument: percent meeting attendance, miles traveled to meetings, desire for re-authorization, number of terms held, level of understanding of the Act, and desire to serve additional terms. A range of possible points were assigned for each item (Table 3), then values for items three and four were multiplied together and summed with the remaining items to create an individual's overall commitment score.

Table 3. *Commitment Index*

Item Number	Point Assignment→ By Category						
	"Yes"	"No"					
1	5	0					
2	5	0					
	90-100%	80-89%	70-79%	60-69%	50-59%	<50%	
3	20	10	6	4	2	1	
	0-15 (Miles)	16-50	51-100	101-150	151-200	201-200	>300
4	1.0	1.2	1.4	1.6	1.8	2.0	2.2
	1 (Likert)	2	3	4	5	6	7
6	0	0	1	2	3	4	5
	1 (Likert)	2	3	4	5	6	7
7	0	0	1	2	3	4	5

The distribution of this measure was assessed for normality using SPSS. Skewness for the measure commitment was -.336 and the kurtosis was .470. These results are well below the recommended maximums indicating the criteria for normalizing data were met.

The dependent variable "Title II allocation" was derived from the U.S. Forest Service All Service Receipts (ASR) 18-1 Reports for Fiscal Years 2001-2006. These annual reports list by state and county the "full payment base amount," as authorized by the Act. These reports also itemize the full base payment amount into dollars and percentages allocated to Titles I, II, and III of the Act. For those RACs that serve a single county, data were used directly from the ASR 18-1 reports. However, it is important to note that some RACs do not follow county boundaries. The dollar values

attributed to those RACs that served multiple counties included the sum of allocations from each of the contributing counties. In the Pacific Northwest, for example, many RACs cross county boundaries. In this situation the Payments to States Election Form was referenced to determine the actual percentage of Title II funds allocated by a county to a specific RAC.

Because of regional differences in allocations it was necessary to develop a methodology for normalizing the data. Data were transformed to eliminate regional differences by creating a measure of the average percent change from Title III to Title II over the life of the legislation by RAC. Counties that received over $100,000 must designate 15-20% of their full payment to some proportion of Titles II and III. Thus, it is possible to measure the average percent change from Title III to Title II. The first step in calculating this measure included adding together Titles II and III for each year and then computing the percent of Title III. These percentages were then subtracted, one year from the next to calculate the annual percent change. These annual percent changes were then summed up, dividing by five to give the average percent change in Title III. Because not all change from Title III to Title II is positive, values were aligned to reflect negative changes. This means that where a negative change from Title III to Title II occurred, more money went to Title III on average than to Title II.

The distribution of this measure was assessed for normality using SPSS. Skewness for the measure average percent change from Title III to Title II was .182 and the kurtosis was .050. These results are well below the recommended maximums, indicating that the criteria for normalizing data were met.

The final dependent value, dollars leveraged, was derived from the ASR 18-1 reports and data contained in the P.L. 106-393, Title II Project Submission Forms (http://wwwnotes.fs.fed.us:81/r4/payments_to_states.nsf). Again, data were transformed to eliminate regional differences, in this case by creating a measure of the average percent "other" funds leveraged with Title II funds. The term "other" is a category in the Title II Project Submission Form that relates to the amount of money a RAC was able to acquire in addition to Title II funds and Forest Service contributed funds (e.g., grants) (http://wwwnotes.fs.fed.us:81/r4/payments_to_states.nsf). To compute this measure, the percent of other dollars leveraged was calculated by dividing other dollars leveraged by the same year's Title II allocation. Annual percentages were then summed and divided by the total number of years to give the average percent "other" funds leveraged with Title II funds.

Again, the distribution of this measure was assessed for normality using SPSS. Skewness for the measure average percent "other" funds leveraged with Title II was .891 and the kurtosis was -.059. These results are below the recommended maximums, indicating that the criteria for normalizing data were met.

Descriptive Statistics

The means, standard deviations, and variances for each of the network characteristic input measures were calculated in SPSS and are reported in Table 4.

Table 4. *Descriptive Statistics*

Input Measure	Sample Size (*N*)	Mean	Standard Deviation (s)	Variance (s^2)
Effective Size	566	2.46	2.16	4.66
Degree Centrality	566	8.35	4.51	20.33
Trust	291	85.72	8.08	65.29
Average Shared Value	300	6.02	.42	.18
Decision Capability	134	47.69	5.93	35.16
Commitment	300	37.48	8.98	80.59
Average percent change from Title III to Title II	566	4.87	8.15	66.50
Average percent "other" funds leveraged with Title II	566	41.78	33.68	1134.21

Effective size for this study ($N = 566$) occurred within a range of 0 to 14 enumerating the number of ties among *ego's alters* with an average of 2.46 ties ($s = 2.16$, $s^2 = 4.66$). Degree centrality ($N = 566$) also has a range of 0 to 14, but in this case, enumerates the number of direct connections a RAC member has with an average of 8.35 ties ($s = 4.51$, $s^2 = 20.33$). The overall trust score ranged from 7 to 98 possible points. The lowest trust score among respondents ($N = 291$) was 59 and the highest trust score 98 with a mean score of 85.72 ($s = 8.08$, $s^2 = 65.29$). Average shared values ranged from 1 to 7, with a higher score indicating a greater level of shared values. Respondent's average shared value scores ($N = 300$) ranged from a low of 4.10 to a high of 7.00 with a mean score of 6.02 ($s = .42$, $s^2 = .18$). The decision capability score ranged from 8 to 56 possible points. The lowest decision capability

score among respondents (N = 134) was 29 and the highest decision capability score 56 with a mean of 47.69 (s = 5.93, s^2 = 35.16). The commitment index ranged from 1 to 64 possible points. The lowest commitment score among respondents (N = 300) was 11.40 and the highest 64 with an average score of 37.48 (s = 8.98, s^2 = 80.59). The average percent change from Title III to Title II (N = 566) ranged from –17.28 percent to 20.00 percent with an average percent change of 4.87 (s = 8.15, s^2 = 66.50). A negative percent indicates that more money went to Title III on average while a positive percentage indicates that more money went to Title II. Finally, the average percent "other" funds leveraged with Title II (N = 566) ranged from 0 – 119 percent with an average of 41.78 percent leveraged (s = 33.68, s^2 = 1134.21).

Diagnostic Analyses

Correlation Analysis

Table 5 summarizes correlation coefficients among the measurement variables to check whether the data have possible collinearity issues among variables for hypothesis testing. Trust and effective size are each positively correlated to both commitment and degree centrality. Thus as expected, commitment and the number of ties increased with an increasing level of trust and effective size. Also expected, decision capability was positively correlated to commitment, degree centrality and trust. The number of counties was positively correlated to commitment, meaning that RACs representing two or more counties had increasing levels of commitment. Also a control variable, group, was positively correlated to trust, decision capability, and

gender. The greatest numbers of women were found in Group C, followed by Group B.

The results in Table 5 indicate that trust and decision capability have a correlation value higher than .80 (.803) (see discussion below). This is not surprising, given that some degree of trust factors into a Committee's decision capability. The remaining correlation coefficients listed in Table 5 are not high, which suggests the variables are very likely to be measuring different constructs.

Table 5. *Correlation among Variables*

Subscale	1	2	3	4	5	6	7	8	9
1 – Commitment	1.00								
2 – Degree Centrality	.082	1.00							
3 – Trust	.353**	.401**	1.00						
4 – Decision Capability	.238**	.343**	.803**	1.00					
5 – County	.274**	-.057	-.107	-.153	1.00				
6 – Effective Size	.179*	.422**	.116	.083	.139	1.00			
7 – Gender	.150	.017	.121	.050	-.112	.083	1.00		
8 – Group	.117	-.030	.228**	.186*	-.025	-.091	.192*	1.00	
9 – Mean SharedValues	.031	-.026	-.058	-.032	.063	.005	.077	.168	1.00

Note. $N = 134$. * $p < .05$, two-tailed. ** $p < .01$, two-tailed. Pearson Correlation coefficients are used.

Outliers, Influential Cases, Multicollinearity, and Heteroscedasticity

Of the initial respondents, one outlier was deleted who was identified based on the results of case-wise diagnostics (studentized deleted residual) and then confirmed for deletion due to answering the survey questions incorrectly.

Prior to conducting regression analyses, additional diagnostic analyses were undertaken to identify outliers, influential cases, multicollinearity, or heteroscedasticity. The dependent variable commitment was regressed on the following independent variables: degree centrality, effective size, trust, decision capability, mean shared value, single or multiple counties, group, and gender.

Outliers on "y" were identified by computing studentized deleted residuals and comparing the values to recommended scores (Neter, Wasseman, & Kutner, 1989). Neter et al. (1989) recommend that values not exceed 3.0. By comparing computed centered leverage values to the recommended cutoff of .2, outliers on "x" were identified (Neter et al., 1989). By computing Cook's Distance, Standard DFFit, and DFBetas and comparing them to the suggested cutoff of 1.0, influential cases were identified (Bollen & Jackman, 1990).

Two cases, 64 and 86, were identified as outliers (centered leverage value = .225 and .217, respectively). One case, 492, was identified as an influential case (Standard DFFit = 1.069). The data input for these cases was checked and found to be correct. The model was run with and without the outliers and the influential case, and because there was no difference in the study results, the cases were retained.

Multicollinearity statistics were computed in SPSS and are shown in Table 6. Recommended cutoffs for collinearity include tolerance greater than .16 and a variance inflation factor (VIF) less than 7 (Neter et al., 1989). Results indicate multicollinearity was not an issue for this study.

Table 6. *Collinearity Statistics, Dependent Variable is Commitment*

Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	-7.50	12.79		-.59	.56		
Degree Centrality	-.45	.36	-.12	-1.25	.21	.68	1.47
Effective Size	.57	.38	.13	1.49	.14	.78	1.29
Trust	.45	.14	.44	3.22	.00	.32	3.12
Mean Shared Values	.42	1.68	.02	.25	.80	.95	1.05
Decision Capability	-.06	.18	-.05	-.35	.73	.93	1.08
Gender	2.34	1.57	.12	1.49	.14	.92	1.09
Group	.15	.78	.02	.19	.85	.87	1.15
Single/Multiple Counties	5.34	1.41	.30	3.77	.00	.93	1.08

The standardized residuals were plotted against the standardized predicted values to display the distribution of errors. As shown in Figure 4 (next page), heteroscedasticity is not a concern.

Evaluation of Multi-level Structure

The data for this study is hierarchically structured, with individuals belonging to groups, specifically RAC's. In such samples, the individual observations may not

be completely independent of each other, which is a standard assumption of statistical tests. If the assumption is violated, the estimates of standard errors are too small, leading to spurious results (Bryk & Raudenbush, 1992). Therefore, the effect of grouping was considered prior to completing analysis by calculating the coefficient of intra-class correlation (ICC). The ICC is the ratio of the between group variance to the total variance. Intraclass correlation is large and positive when there is no variation within the groups, but group means differ. Its maximum value is 1.0. The ICC for the study data was computed using SPSS and was determined to be 13%, indicating little of the variance is explained at the group level and the analysis can proceed at the individual level.

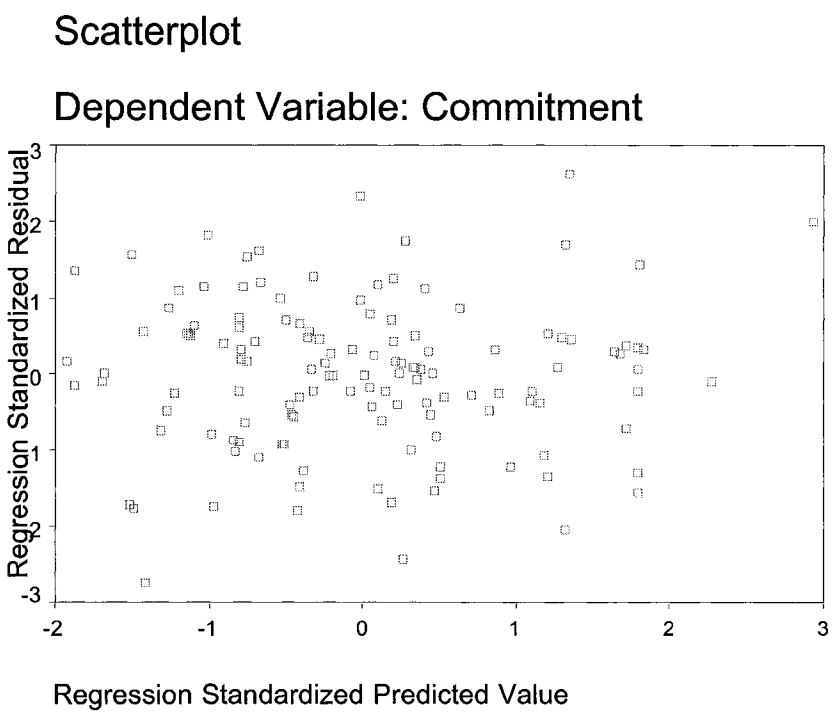


Figure 4. Commitment, Plot of Standardized Residuals.

Testing the Hypotheses with Multiple Linear Regression

Hypothesis 1a

This hypothesis stated that richer patterns of ties, or structural holes, among RAC members lead to increased performance outcomes. To test this hypothesis, regressions for the independent variable effective size were run separately in SPSS for each of the dependent performance variables: commitment ($N = 300$), average percent "other" funds leveraged with Title II ($N = 566$), and average percent change from Title III to Title II ($N = 566$). The regression analyses revealed that effective size significantly predicts the performance measure commitment (B = .461, $\beta = .119$, p = .039), but did not significantly predict either average percent "other" funds leveraged with Title II (B = .772, $\beta = .050$, p = .240), or average percent change from Title III to Title II (B = .042, $\beta = .011$, p = 791). The R^2 for effective size and commitment was .014, accounting for 1.4% of the variance. Thus, while Hypothesis 1a was partially supported, it accounted for a small percent of the variance. Positive effective size was significantly associated with positive commitment.

Hypothesis 1b

This hypothesis stated that greater numbers of ties among RAC members leads to increased performance outcomes. Here, regressions for the independent variable degree centrality were run separately with each of the dependent performance variables: commitment ($N = 300$), average percent "other" funds leveraged with Title II ($N = 566$), and average percent change from Title III to Title II ($N = 566$). These regression analyses revealed that degree centrality significantly predicted both

commitment (B = .680, β = .207, p = .000) and the average percent change from Title III to Title II (B = -.187, β = -.104, p = .014). Degree centrality did not, however, predict the average percent "other" funds leveraged with Title II (B = .152, β = .020, p = .628). The R^2 for degree centrality and commitment was .043 and .011, respectively for the average percent change from Title III to Title II. Therefore, Hypothesis 1b was also partially supported. Positive degree centrality was significantly associated with positive commitment. However, positive degree centrality was significantly associated with a negative average percent change from Title III to Title II. In other words, a greater number of ties were significantly associated with a decreasing percentage of Title II funds (this finding further explored in the Discussion section).

Hypothesis 2

This hypothesis stated that RAC members with high levels of trust and shared values lead to better performance outcomes. Regressions for the independent variables trust and mean shared value were run separately for each of the dependent performance variables: commitment ($N = 291$ for trust, $N = 298$ for mean shared value), average percent "other" funds leveraged with Title II ($N = 291$ for trust, $N = 300$ for "avg. other"), and average percent change from Title III to Title II ($N = 291$ for trust, N = 300 for "Title III to II"). Results of regression analyses are summarized in Table 7.

Table 7. *Regression Statistics for Hypothesis 2*

Independent Variable	*Dependent Variable*	*B*	*S.E.*	□	*t - value*	*Significance*
Trust	Avg. Other	.132	.236	.033	.559	.577
	Title III to II	-.116	.057	-.119	-2.04	.043
	Commitment	.281	.062	.256	4.51	.000
Mean Shared Value	Avg. Other	2.010	4.489	.026	.488	.655
	Title III to II	-.195	1.101	-.010	-.177	.860
	Commitment	-.254	1.234	-.012	-.206	.837

Results of the regression analyses indicated that trust significantly predicted both the average percent change from Title III to Title II (B = -.116, β = -.119, p = .043) and commitment (B = .281, β = .256, p = .000), yet did not predict the average percent "other" funds leveraged with Title II (B = .132, β = .033, p = .577). The R^2 for trust and Title III to II was .014 and .066 for trust and commitment. Mean shared value did not predict any of the performance variables (B = 2.010, β = .026 p = .655 for avg. other; B = -.195, β = -.010, p = .860 for Title III to II; and B = -.254, β =-.012, p = .837 for commitment). Thus Hypothesis 2 was partially supported: positive trust was significantly associated with positive commitment. Again, positive trust was significantly associated with a negative average percent change from Title III to Title II. In other words, a greater level of trust was significantly associated with a decreasing percentage of Title II funds (further explored in the Discussion section).

Hypothesis 3

This hypothesis asserts that RAC members with greater decision capability have more effective or desirable performance outcomes. Regressions for the independent variable decision capability were run separately with each of the dependent performance variables: commitment ($N = 134$), average percent "other" funds leveraged with Title II ($N = 134$), and average percent change from Title III to Title II ($N = 134$). These regression analyses suggested that decision capability significantly predicted commitment (B = .334, β = .238, p = .006), but did not predict either the average percent "other" funds leveraged with Title II (B = .051, β = .010, p = .912) or the average percent change from Title III to Title II (B = -.123, β = -.086, p = .321). The R^2 for decision capability and commitment was .057. Thus, Hypothesis 3 was partially supported where positive decision capability was significantly associated with positive commitment.

Testing Mediation with Linear Regression

The Baron and Kenny (1986) approach to testing mediational models establishes whether the individual paths between the variables are significant: if they are, then mediation can be further tested with Baron and Kenny's (1986) fourth step. However, it is preferable to test the significance of the indirect effect. The approach involves computing the partial regression coefficients and calculating standard errors. Preacher and Hayes (2004, 2005) have developed freeware, accessed from (http://www.comm.ohio-state.edu/ahayes/SPSS%20programs/indirect.htm), which provides the necessary calculation of coefficients and standard errors.

The mediational model tested is shown in Figure 5. In this figure, *c* is the *total effect* of *X* on *Y*, *c'* is the *direct effect* of *X* on *Y*, and the specific indirect effect of *X* on *Y* through mediator M_i is defined as $a_i b_i$. The test was run in SPSS and allows for multiple mediators, statistical control of covariates, and all possible pairwise comparisons between indirect effects. The software produces bias-corrected and bias-corrected and accelerated bootstrap confidence intervals in addition to percentile-based bootstrap confidence intervals.

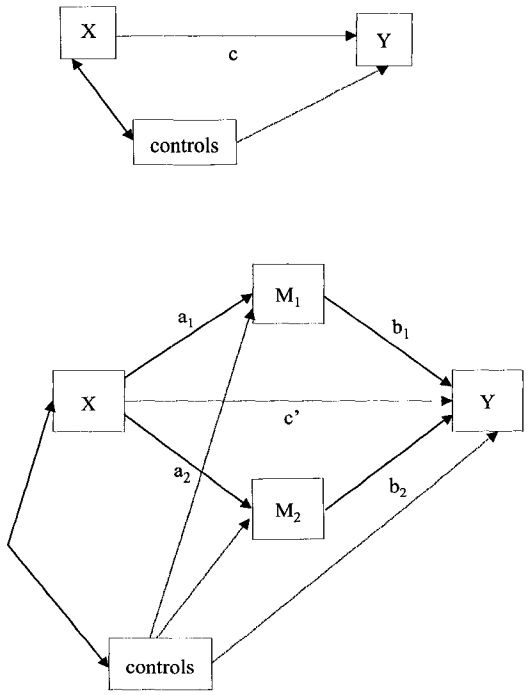


Figure 5. Multiple Mediator Model.

Hypothesis 4

This hypothesis states that within a RAC, network social capital is directly affected by network structure, and it mediates the effect of network structure on performance outcomes.

Three paths for this hypothesis were tested for mediational effects: trust mediating the effect of degree centrality on both commitment and the average percent change from Title III to Title II, and trust mediating the effect of effective size on commitment. Results of testing mediation with multiple linear regressions for each path are reported in Tables 8, 9 and 10.

Table 8. *Trust Mediating Effect of Degree Centrality on Commitment*

Independent Variable (IV) to Mediators (a paths)

	Coeff	se	t	p
Trust	.7320	.1716	4.2664	.0000

Direct Effects of Mediators on Dependent Variable (DV) (b paths)

	Coeff	se	t	p
Trust	.2455	.0639	3.8432	.0001

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Degree Centrality	6242	.1907	3.2727	.0012

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Degree Centrality	.4444	.1921	2.3135	.0214

Fit Statistics for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.0828	.0764	12.9955	2.0000	288.0000	.0000

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.1797	.1792	-.0005	.0648
Trust	.1797	.1792	-.0005	.0648

Bias Corrected and Accelerated Confidence Intervals

	Lower	Upper
TOTAL	.0712	.3252
Trust	.0712	.3252

Note. $N = 291$. Confidence Intervals = 95. Number of Bootstrap Re-samples = 1000.

Table 9. *Trust Mediating Effect of Degree Centrality on Title III to II*

Independent Variable (IV) to Mediators (a paths)

	Coeff	se	t	p
Trust	.7320	.1716	4.2664	.0000

Direct Effects of Mediators on Dependent Variable (DV) (b paths)

	Coeff	se	t	p
Trust	-.0939	.0586	-1.6019	.1103

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Degree Centrality	-.3428	.1714	-1.9998	.0465

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Degree Centrality	-.2741	.1763	-1.5550	.1210

Fit Statistics for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.0224	.0156	3.2935	2.0000	288.0000	.0385

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	-.0687	-.0703	-.0016	.0517
Trust	-.0687	-.0703	-.0016	.0517

Bias Corrected and Accelerated Confidence Intervals

	Lower	Upper
TOTAL	-.2032	.0101
Trust	-.2032	.0101

Note. $N = 291$. Confidence Intervals = 95. Number of Bootstrap Re-samples = 1000.

Table 10. *Trust Mediating Effect of Effective Size on Commitment*

Independent Variable (IV) to Mediators (a paths)

	Coeff	se	t	p
Trust	.5470	.2094	2.6120	.0095

Direct Effects of Mediators on Dependent Variable (DV) (b paths)

	Coeff	se	t	p
Trust	.2670	.0630	4.2373	.0000

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Effective Size	.4889	.2308	2.1180	.0350

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Effective Size	.3429	.2270	1.5105	.1320

Fit Statistics for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.0731	.0666	11.3521	2.0000	288.0000	.0000

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.1461	.1451	-.0010	.0617
Trust	.1461	.1451	-.0010	.0617

Bias Corrected and Accelerated Confidence Intervals

	Lower	Upper
TOTAL	.0401	.2886
Trust	.0401	.2886

Note. $N = 291$. Confidence Intervals = 95. Number of Bootstrap Re-samples = 1000.

Results of the mediational paths indicate that the effects of degree centrality and effective size on commitment were mediated by trust (confidence intervals .0712 to .3252 and .0401 to .2886, respectively). Trust partially mediated the effect of degree centrality on commitment as the direct path c' was still significant, whereas effective size was fully mediated by trust as the direct path c' was no longer significant. The effect of degree centrality on the average percent change from Title III to Title II was not mediated by trust (confidence interval -.2032 to .0101).

It was also important to test whether the mediational paths were influenced by the control variables: gender, single or multiple counties, and group (i.e., Group A, B, or C). To determine this, the three mediational paths were tested again, this time incorporating the control variables. Results of testing mediation for each of the three paths with the control variables are reported in Tables 11, 12, and 13.

The results of the mediational tests indicated that trust continued to mediate the effect of degree centrality and effective size on commitment, controlling for gender, number of counties, and group. Again, trust partially mediated the effect of degree centrality on commitment and fully mediated the effect of effective size on commitment. As expected, with the addition of covariates, R^2 values increased somewhat.

Table 11. *Trust Mediating Effect of Degree Centrality on Commitment with Controls*

Independent Variable (IV) to Mediators (a paths)

	Coeff	se	t	p
Trust	.7571	.1693	4.4708	.0000

Direct Effects of Mediators on Dependent Variable (DV) (b paths)

	Coeff	se	t	p
Trust	.2699	.0635	4.2488	.0000

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Degree Centrality	.6091	.1872	3.2532	.0013

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Degree Centrality	.4048	.1881	2.1516	.0323

Fit Statistics for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.1377	.1226	9.1060	5.0000	285.0000	.0000

Partial Effect of Control Variables on DV

	Coeff	se	t	p
County	3.9148	1.0009	3.9113	.0001
Gender	1.2427	1.1899	1.0444	.2972
Group	-.8993	.6005	-1.4977	.1353

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.2043	.2055	.0012	.0702
Trust	.2043	.2055	.0012	.0702

Bias Corrected and Accelerated Confidence Intervals

	Lower	Upper
TOTAL	.0860	.3661
Trust	.0860	.3661

Note. $N = 291$. Confidence Intervals = 95. Number of Bootstrap Re-samples = 1000.

Table 12. *Trust Mediating Effect of Degree Centrality on Title III to II with Controls*

Independent Variable (IV) to Mediators (a paths)

	Coeff	se	t	p
Trust	.7571	.1693	4.4708	.0000

Direct Effects of Mediators on Dependent Variable (DV) (b paths)

	Coeff	se	t	p
Trust	-.0776	.0595	-1.3036	.1934

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Degree Centrality	-.3584	.1706	-2.1011	.0365

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Degree Centrality	-.2997	.1762	-1.7006	.0901

Fit Statistics for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.0420	.0252	2.5002	5.0000	285.0000	.0309

Partial Effect of Control Variables on DV

	Coeff	se	t	p
County	-.4718	.9376	-.5033	.6152
Gender	-2.6315	1.1146	-2.3609	.0189
Group	.0544	.5625	.0967	.9230

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	-.0587	-.0618	-.0031	.0570
Trust	-.0587	-.0618	-.0031	.0570

Bias Corrected and Accelerated Confidence Intervals

	Lower	Upper
TOTAL	- .1823	.0393
Trust	- .1823	.0393

Note. $N = 291$. Confidence Intervals = 95. Number of Bootstrap Re-samples = 1000.

Table 13. *Trust Mediating Effect of Effective Size on Commitment with Controls*

Independent Variable (IV) to Mediators (a paths)

	Coeff	se	t	p
Trust	.5999	.2112	2.8409	.0048

Direct Effects of Mediators on Dependent Variable (DV) (b paths)

	Coeff	se	t	p
Trust	.2963	.0627	4.7262	.0000

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Effective Size	.3629	.2321	1.5637	.1190

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Effective Size	.1852	.2270	.8156	.4154

Fit Statistics for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.1258	.1104	.2012	5.0000	285.0000	.0000

Partial Effect of Control Variables on DV

	Coeff	se	t	p
County	3.8608	1.0292	3.7511	.0002
Gender	1.1032	1.1961	.9223	.3572
Group	-.9596	.0651	-1.5858	.1139

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.1461	.1451	-.0010	.0617
Trust	.1461	.1451	-.0010	.0617

Bias Corrected and Accelerated Confidence Intervals

	Lower	Upper
TOTAL	.0401	.2886
Trust	.0401	.2886

Note. $N = 291$. Confidence Intervals = 95. Number of Bootstrap Re-samples = 1000.

Thus, Hypothesis 4 was supported where trust was positively associated with both degree centrality and effective size. Also supported in this hypothesis were the mediational effects of trust on commitment.

Hypothesis 6

This hypothesis states that within a RAC, network management is determined by network structure, and it mediates the effect of network structure on performance outcomes. Thus, this hypothesis tested whether decision capability mediates the effect of degree centrality on commitment. In addition, trust and decision capability were tested together in a mediational path. Results are reported in Tables 14 and 15.

Results indicate that the effect of degree centrality on commitment was fully mediated by decision capability (confidence interval .0618 to .6050). This suggested the effect of degree centrality on commitment occurred only through decision capability. However, when the mediational analysis was run with both trust and decision capability as mediators, the results indicated that when controlling for trust, the mediational affect of decision capability is no longer significant.

Here again, it was important to test whether the mediational paths were influenced by the control variables: gender, single or multiple counties, and group (i.e., Group A, B, or C). To determine this, the mediational paths were tested again, this time incorporating the control variables. Results of testing mediation for both paths with the control variables are reported in Tables 16 and 17.

Table 14. *Decision Capability Mediating Effect of Degree Centrality on Commitment*

Independent Variable (IV) to Mediators (a paths)

	Coeff	se	t	p
Decision. Capability	.9508	.2269	4.1899	.0001

Direct Effects of Mediators on Dependent Variable (DV) (b paths)

	Coeff	se	t	p
Decision Capability	.3337	.1265	2.6381	.0093

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Degree Centrality	.3187	.3371	.9454	.3462

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Degree Centrality	.0015	.3510	.0042	.9967

Fit Statistics for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.0568	.0424	3.9470	2.0000	131.0000	.0217

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.3173	.3141	-.0031	.1369
Dec. Cap.	.3173	.3141	-.0031	.1369

Bias Corrected and Accelerated Confidence Intervals

	Lower	Upper
TOTAL	.0618	.6050
Dec. Cap.	.0618	.6050

Note. $N = 134$. Confidence Intervals = 95. Number of Bootstrap Re-samples = 1000.

Table 15. *Decision Capability and Trust Mediating Effect of Degree Centrality on Commitment*

Independent Variable (IV) to Mediators (a paths)

	Coeff	se	t	p
Trust	1.5149	.3011	5.0318	.0000
Dec. Cap.	.9508	.2269	4.1899	.0001

Direct Effects of Mediators on Dependent Variable (DV) (b paths)

	Coeff	se	t	p
Trust	.4940	.1446	3.4159	.0008
Dec. Cap.	-.1733	.1919	-.9032	.3681

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Degree Centrality	.3187	.3371	.9454	.3462

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Degree Centrality	-.2649	.3464	-.7647	.4458

Fit Statistics for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.1345	.1145	6.7350	3.0000	130.0000	.0003

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.5836	.5790	-.0046	.1686
Trust	.7484	.7596	.0112	.2661
Dec. Cap.	-.1648	-.1806	-.0158	.2117

Bias Corrected and Accelerated Confidence Intervals

	Lower	Upper
TOTAL	.3045	1.0291
Trust	.3386	1.3652
Dec. Cap.	-.6763	.1759

Note. $N = 134$. Confidence Intervals = 95. Number of Bootstrap Re-samples = 1000.

Table 16. *Decision Capability Mediating Effect of Degree Centrality on Commitment with Controls*

Independent Variable (IV) to Mediators (a paths)

	Coeff	se	t	p
Dec. Cap.	.9470	.2228	4.2507	.0000

Direct Effects of Mediators on Dependent Variable (DV) (b paths)

	Coeff	se	t	p
Dec. Cap.	.3794	.1227	3.0926	.0024

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Degree Centrality	.3861	.3206	1.2044	.2306

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Degree Centrality	.0268	.3315	.0809	.9357

Fit Statistics for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.1869	.1552	5.8854	5.0000	128.0000	.0001

Partial Effect of Control Variables on DV

	Coeff	se	t	p
County	5.9456	1.4377	4.1353	.0001
Gender	3.2365	1.6031	2.0189	.0456
Group	.4150	.7874	.5270	.5991

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.3593	.3464	-.0129	.1414
Dec. Cap.	.3593	.3464	-.0129	.1414

Bias Corrected and Accelerated Confidence Intervals

	Lower	Upper
TOTAL	.1302	.7059
Dec. Cap.	.1302	.7059

Note. $N = 134$. Confidence Intervals = 95. Number of Bootstrap Re-samples = 1000.

Table 17. *Decision Capability and Trust Mediating Effect of Degree Centrality on Commitment with Controls*

Independent Variable (IV) to Mediators (a paths)

	Coeff	se	t	p
Trust	1.5214	.2927	5.1976	.0000
Dec. Cap.	.9470	.2228	4.2507	.0000

Direct Effects of Mediators on Dependent Variable (DV) (b paths)

	Coeff	se	t	p
Trust	.4420	.1394	3.1715	.0019
Dec. Cap.	-.0631	.1831	-.3445	.7310

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Degree Centrality	.3861	.3206	1.2044	.2306

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Degree Centrality	-.2266	.3302	-.6862	.4938

Fit Statistics for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.2466	.2110	6.9279	6.0000	127.0000	.0000

Partial Effect of Control Variables on DV

	Coeff	se	t	p
County	5.7632	1.3906	4.1443	.0001
Gender	2.6641	1.5597	1.7080	.0901
Group	.0753	.7685	.0980	.9221

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.6127	.5863	-.0264	.1737
Trust	.6724	.6660	-.0065	.2348
Dec. Cap.	-.0597	-.0796	-.0199	.1760

Bias Corrected and Accelerated Confidence Intervals

	Lower	Upper
TOTAL	.3189	1.0093
Trust	.2873	1.2224
Dec. Cap.	-.4392	.2659

Note. $N = 134$. Confidence Intervals = 95. Number of Bootstrap Re-samples = 1000.

By adding the controls, the results of the mediational paths indicated that the effect of degree centrality on commitment remained fully mediated by decision capability. However, when the mediational analysis was run with both trust and decision capability, the results confirmed that when accounting for trust, the mediational affect of decision capability is no longer significant.

Hypothesis 5

This hypothesis asserts that within a RAC, network social capital has a positive association with network management. Regressions for the independent variables trust and mean shared value were each run separately for the dependent variable decision capability ($N = 134$). These regression analyses indicated that trust significantly predicted decision capability (B = .590, β = .803, p = .000) while mean shared value did not predict decision capability (B = -.492, β = -.032, p = .711). The R^2 for trust and decision capability was .645. However as discussed previously, a correlation of .803 exists between trust and decision capability indicating that the two variables may be tapping the same construct. In addition, the mediational model, which tested both trust and decision capability predicting performance, indicated that decision capability was no longer significant when controlling for trust.

DISCUSSION

Contributions

The main contribution of this study to social network literature is the re-examination of the assumed direct relationship between network characteristics and performance, especially as it pertains to the influence of network structure on performance. Three network characteristics: network structure, network social capital and network management, were examined for their predictive capability of network performance. Multiple linear regression analysis was used to test the direct and indirect effects of the predictor variables (network structure, network social capital and network management) on the outcome (network performance). Results of these analyses indicate that, while a direct relationship does exist between network structure and performance, the effects of network social capital and network management also mediate it. Thus, while network structure is one important explanatory variable of network performance, the variables network management and network social capital are also valid and useful in explaining network performance.

This study also provides practical implications for policy makers in the use of network structures for achieving effective natural resource management outcomes. These implications include: the need to develop existing, and hire new government employees with network skills more reflective of today's demands; balancing accountability measures with the decentralized, flexible, and creative nature of networks, and; building discursive democracy by understanding that sharing information from non-traditional sources potentially transforms the knowledge base

for decisions. In this manner, joint understanding is created, frequently reshaping public understanding of the problem and alternatives for its resolution.

Study Findings

Introduction

Antecedents of network performance were broadly grouped into three categories: network structure, network social capital, and network management. Together, these antecedents of network performance constitute the definition of a network presented in this study: an interdependent structure connected by some degree of trust and shared norms, which is capable of reaching decisions towards attainment of an agreed-upon goal. This definition highlights the integral nature of the studied network characteristics as well as their unique contribution to network performance. Thus, the findings presented in this section will discuss the direct effect of each network characteristic on performance first, followed by a discussion of the mediational effects of network social capital and network management on network structure.

Network Structure

The direct effect of this network characteristic on performance was tested in Hypotheses 1a and 1b. Results indicated that while Hypothesis 1a was partially supported, it accounted for a small percent of the variance ($R^2 = .014$). Thus, while positive effective size was significantly associated with positive commitment, the overall contribution of effective size in predicting the performance outcome commitment was minimal. Further Hypothesis 1a did not significantly predict either

average percent "other" funds leveraged with Title II (B = .772, β = .050, p = .240), or average percent change from Title III to Title II (B = .042, β = .011, p = 791).

Hypothesis 1b stated that greater numbers of ties among RAC members lead to increased performance outcomes. Here, results revealed that degree centrality did significantly predict both commitment (B = .680, β = .207, p = .000) and the average percent change from Title III to Title II (B = -.187, β = -.104, p = .014). Degree centrality did not, however, predict the average percent "other" funds leveraged with Title II (B = .152, β = .020, p = .628). Again, results of Hypothesis 1b accounted for a small percent of the variance ($R^2 = .043$ for commitment, and $R^2 = .011$ for the average percent change from Title III to Title II), indicating that the overall contribution of degree centrality in predicting performance outcomes was minimal.

Yet contrary to the positive relationship hypothesized between degree centrality and the average percent change from Title III to Title II, positive degree centrality was significantly associated with a negative average percent change from Title III to Title II. These results indicate that a greater number of ties were significantly associated with a decreasing percentage of Title II funds over the course of the legislation. A potential reason for this result may be that as the number of ties among RAC members increased, access to new information and resources may have led members to consider other types of needed projects. For example, while Title II funds were appropriately used for the implementation of ecosystem health projects, these projects could not be implemented without the necessary planning documents in place. Title III funds however, could appropriately be used to develop the needed planning documents

through Community Wildfire Protection Planning processes. This situation does not necessarily reflect a lack of performance, but rather an integrated approach to achieving the goal of improving ecosystem health.

This possibility brings into question whether the measure average percent change from Title III to Title II serves as a positive indicator of RAC performance. Previous studies (Ingles, 2004; Kusel, 2006; Forest Counties Payments Committee, 2003) as well as other traditional government accomplishment reporting mechanisms, have focused on the expenditure or leveraging of financial resources as a primary outcome of effective resource management. While accounting for the appropriate expenditure of financial resources is necessary, it does not reflect whether there is actual improvement in ecological, social or economic conditions. Thus, RAC performance could better be measured in the future by focusing on environmental, social, and economic outcomes.

Network Social Capital

Hypotheses 2 and 5 tested the direct effects of this network characteristic. Hypothesis 2 tested whether RAC members with high levels of trust and shared values lead to better performance outcomes. Results indicated that trust significantly predicted both the average percent change from Title III to Title II ($B = -.116$, $\beta = -.119$, $p = .043$) and commitment ($B = .281$, $\beta = .256$, $p = .000$), yet did not predict the average percent "other" funds leveraged with Title II ($B = .132$, $\beta = .033$, $p = .577$). The R^2 for trust and Title III to II was .014 and .066 for trust and commitment. Mean shared value did not predict any of the performance variables ($B = 2.010$, $\beta = .026$ p =

.655 for avg. other; B = -.195, β = -.010, p = .860 for Title III to II; and B = -.254, β =-.012, p = .837 for commitment).

Thus, increasing levels of trust were significantly associated with positive commitment. This finding, while not surprising, validates the importance of nurturing trust among group members as a top priority in building commitment towards the network's stated goals. As with degree centrality, increasing trust levels were significantly associated with a negative average percent change from Title III to Title II (i.e., a greater level of trust was significantly associated with a decreasing percentage of Title II funds). Again, this finding is contrary to the positive relationship hypothesized between trust and the average percent change from Title III to Title II. Here, the potential reasons for this result parallel those of degree centrality. As will be discussed in the *Mediational Analyses* section of this Chapter, positive degree centrality is significantly associated with positive trust indicating that as the number of ties among RAC members increases, so does their level of trust. Thus, it is possible that increasing trust levels among RAC members may have also led to consideration of other types of needed projects, such as Community Wildfire Protection planning using Title III funds.

Hypothesis 5 tested whether network social capital has a positive association with network management. The results indicated that trust significantly predicted decision capability (B = .590, β = .803, p = .000) while mean shared value did not predict decision capability (B = -.492, β = -.032, p = .711). The R^2 for trust and decision capability was .645. However, as discussed previously, a correlation of .803 exists

between trust and decision capability, indicating that the two variables may be tapping the same construct. In addition, as will be discussed in the Mediational Analyses section of this Chapter, decision capability was no longer significant when controlling for trust.

One reason why trust is more powerful than decision capability may be the result of RAC members' increasing tendency toward "all gain" agreements, as encouraged by the voting structure in the Act. As argued by Susskind and Cruikshank (1987), reaching "all-gain" agreements necessitates the exchange of accurate information about true priorities. Critical to this type of exchange is trust among group members (Susskind & Cruikshank, 1987; Goldsmith & Eggers, 2004). Therefore, as the trust level among RAC members increases, they are able to share information and knowledge more reflective of their true priorities. This, in turn, allows them to increase their potential to reach "all gain" agreements, or decisions, in concert with the goals of the Act.

Network Management

This network characteristic was tested in Hypothesis 3, which asserted that RAC members with greater decision capability have more effective or desirable performance outcomes. The results of this test suggested that decision capability significantly predicted commitment ($B = .334$, $\beta = .238$, $p = .006$), but did not predict either the average percent "other" funds leveraged with Title II ($B = .051$, $\beta = .010$, $p = .912$) or the average percent change from Title III to Title II ($B = -.123$, $\beta = -.086$, p

= .321). The R^2 for decision capability and commitment was slightly higher than most variables at .057 thus accounting for a slightly larger percent of the overall variance.

This test verified that in building greater decision capacity, RAC members effectively demonstrated their ability to reach "all gain" agreements to achieve the goals of improving relationships and allocating Title II funds to improve ecological conditions as set out in the Act. This high level of performance in achieving these goals has not gone unnoticed in the Congress as will be further discussed in the *Policy Implications* section of this Chapter. Significantly, it is the successful performance of RACs that stands out as a key point of agreement among Congressional Representatives and Administration Officials as they debate and discuss re-authorization of the Act (personal notes from the Senate Sub-Committee for Energy and Natural Resources hearing on Senate Bill, S.380, on March 1, 2007).

Mediational Analyses

Mediational analyses were used to test Hypotheses 4 and 6. Hypothesis 4 tested whether network social capital was directly affected by network structure, and whether it mediated the effect of network structure on performance outcomes.

In testing the direct effects of Hypothesis 4, the results indicated that the numbers of ties among RAC members (i.e., degree centrality) and structural holes significantly predicted trust. The impact of these results are perhaps best illustrated in the following two network diagrams, where Figure 6 displays a RAC with low structural holes and Figure 7 displays a RAC with a large number of structural holes.

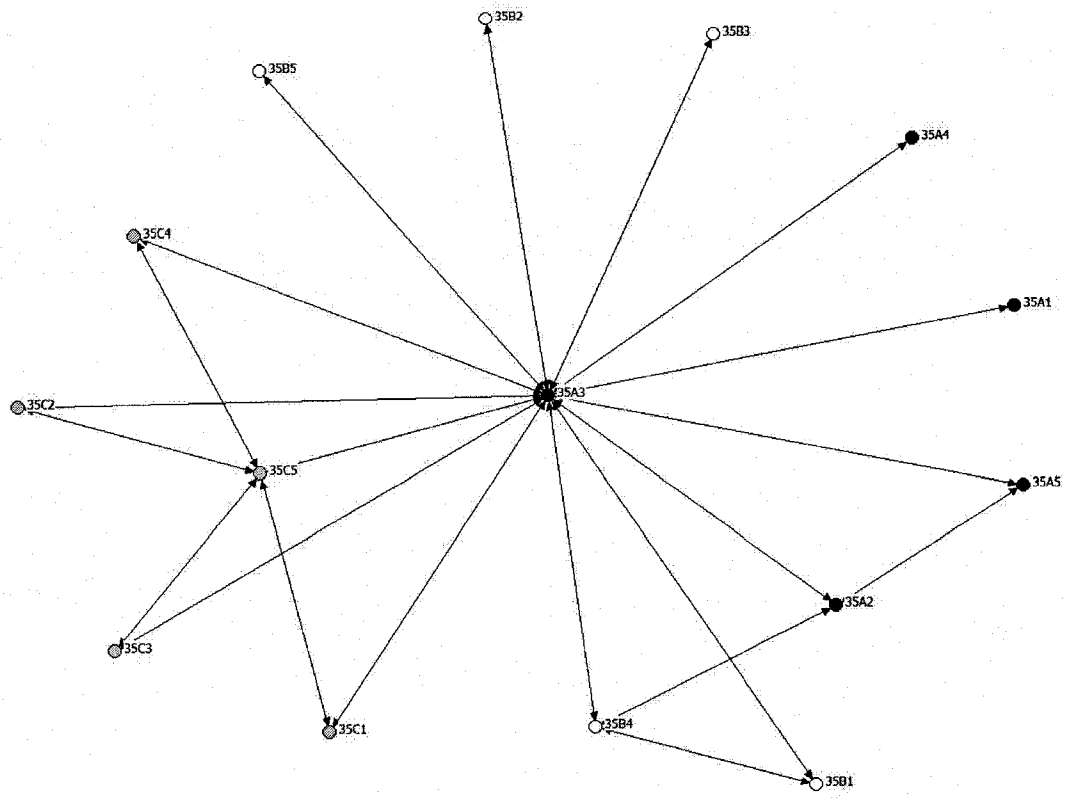


Figure 6. Example of RAC with Low Structural Holes

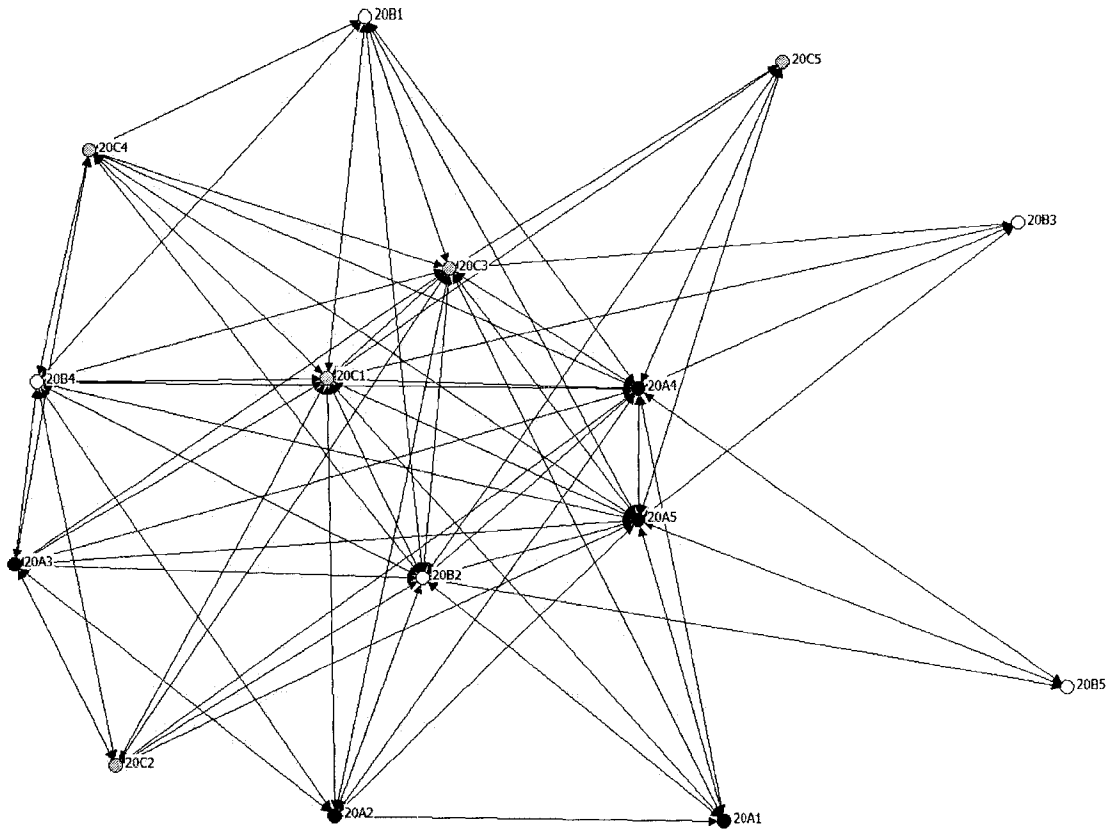


Figure 7. Example of RAC with High Structural Holes

In Figure 6, the paucity of interconnecting lines indicates a low number of ties between nodes. Also evident in this figure is the clustering of similar shaded points, where black represents Group A, white represents Group B, and gray represents Group C. Here, the person with the greatest number of structural holes is 35A3 who clearly gains access to the greatest level of information and resources as inferred by the number of ties to other points. Person 35C5 also has multiple structural holes spanning other members of the same group, while illustrating limited access to information and resources from Groups A and B.

In contrast, Figure 7 illustrates a RAC with a greater number of structural holes as illustrated by the greater number of ties connecting nodes. Members representing each

of the groups are central in this figure, indicating greater access to information and resources across groups. Thus, by increasing the number of structural holes (and ties), greater access to information and resources is gained across groups. As indicated by the regression analyses, greater numbers of structural holes as well as increasing the total number of ties is significantly associated with higher levels of trust. This finding emphasizes that as trust increases so does the benefits of brokering information between RAC members, particularly across the different interest groups.

Of the three paths tested for mediational effects in Hypothesis 4 the results indicated that the effects of degree centrality and effective size on commitment were mediated by trust (confidence intervals .0712 to .3252 and .0401 to .2886, respectively). Trust partially mediated the effect of degree centrality on commitment as the direct path c' was still significant, whereas effective size was fully mediated by trust as the direct path c' was no longer significant. The effect of degree centrality on the average percent change from Title III to Title II was not mediated by trust (confidence interval -.2032 to .0101). When the mediational paths were tested again incorporating the control variables gender, single or multiple counties, and group, the results remained unchanged; however, with the addition of covariates, the R^2 values increased somewhat.

Hence, trust played a critical role in mediating the effect of network structure on the level of commitment. This finding substantiates the primary premise of this study, that in addition to the direct effects of network characteristics on network performance, the mediating effect of network social capital on network structure is

significant in predicting network performance. Accordingly, it is argued that trust mediates the effect of both structural holes and the total number of ties (i.e., degree centrality) in predicting the level of RAC members' commitment to achieving the goals set forth in the Act. It has been suggested that structural holes encourages competitive behavior among group members (Burt, 1992, 1997). Yet, it is argued here that, because structural holes span traditionally adverse groups, the increased access to information and resources actually results in increased levels of trust leading to greater network performance.

Hypothesis 6 tested whether network management was determined by network structure, and whether it mediated the effect of network structure on performance outcomes. Thus, this hypothesis tested whether decision capability mediated the effect of degree centrality on commitment. In addition, trust and decision capability were tested together in a mediational path.

The results indicated that the effect of degree centrality on commitment was fully mediated by decision capability (confidence interval .0618 to .6050). This suggests that the effect of degree centrality on commitment occurred only through decision capability. However, as discussed earlier, when the mediational analysis was run with both trust and decision capability as mediators, the results indicated that, when controlling for trust, the mediational affect of decision capability was no longer significant. The findings for Hypothesis 5 suggest a possible reason for why the mediational affect of decision capability is no longer significant when controlling for trust. As stated, it may be the result of RAC members' increasing tendency toward

"all gain" agreements, where trust is a prerequisite for the accurate exchange of information about true priorities.

Limitations of Study

The social network design of this study called for the collection of data at one point in time. Fortuitously, this study was conducted at the conclusion of the authorizing legislation, enabling participants to share a comprehensive view of the manner in which the studied network characteristics influenced their performance. Yet, missing from this study was an initial view of how these same characteristics affected their early performance, precluding the analysis of trends in performance over the life of the legislation.

The network model tested represents a single trajectory from network characteristics to network performance. It is likely that network performance in turn, affects the evolution of the tested network characteristics. This cyclical phenomenon is similar to the concept of adaptive management, where outcomes present an opportunity for network participants to adapt their behavior to improve performance outcomes over time. While conducting this type of research is complex, it could add value to the literature domain.

Also, this study focused on those RACs authorized under the Secure Rural Schools and Community Self-Determination Act of 2000. However, the use of RACs is not unique to the Act. Both the Forest Service and the Bureau of Land Management have used RACs to assist in other land management issues, including the use of recreation fees. Because these other RACs include a different mix of interests and geographical

locations, this study may be somewhat limited in the assessment of RAC characteristics and their influence on performance.

Perhaps most challenging in this study was the overall response rate of RAC members (37.1%). While surveys were prepared for each RAC member, their ability to complete and return the survey was reliant on a Forest Service RAC Coordinator to voluntarily administer and return the completed surveys. Also problematic was the infrequent meeting schedule of RACs. For example, some RACs only met once a year, outside of the period of study. Because network analysis is particularly sensitive to missing data, the breadth and depth of all RAC member relationships were not captured.

Finally, the measured variables in this study accounted for 50% of the variance in performance, suggesting there may be other factors affecting RAC performance that were not included in this study. Other factors not considered included network learning characteristics and other network management variables such as leadership style, incentives and rewards, and program stability. Also not considered were the relationships of RAC members with Forest Service officials. Considering the importance of ongoing re-authorization hearings, the addition of these and other types of variables are worth pursuing.

Limitations of the Act in Assessing Natural Resource-based Outcomes

To ascertain whether or not forest ecosystems are enhanced, the Act requires a detailed monitoring plan for every RAC project, to assess, "Whether or not the project met or exceeded desired ecological conditions..." (P.L. 106-393 § 203 (b)(6)). These

reports and their associated outcomes, were considered as a potential indicator of network performance for this study, but ultimately were not included. The reason for this decision centered on the lingering question of whether or not RAC projects actually enhance forest ecosystems. Based on my 20 years of field experience as a professional Forest Hydrologist with the U.S. Forest Service, I understand that the small and isolated nature of most RAC projects make it difficult to monitor and detect ecological change distinct from other on-the-ground activities within the same watershed (Rogue Basin Restoration Technical Core Team, 2004; U.S. Forest Service, 2005). Thus, while monitoring ecological change is imperative to assessing our impact on the land, ultimately enabling us to adapt our behavior towards more sustainable outcomes, the requirement to assess each RAC project's contribution separate from other activities may not be desirable or even possible. This does not mean that RAC projects should not be monitored for certain attributes. However, their *effect* on the ecological condition should be considered along with all on-going activities as part of a larger, ongoing monitoring effort within a watershed.

Implications for Future Research

This study applied social network analysis to new governance structures in the public sector. The application of this type of analysis within the government sector remains largely untapped, and could provide a wealth of knowledge about building effective networks in support of the public good. In particular, the value of RACs in effecting positive community involvement in natural resource management outcomes should not be underestimated. Further research could consider how the increased level

of trust among RAC members extends to the community it serves in building community resilience and adaptive capacity. Should RACs now authorized under the Act be re-authorized, a longitudinal study would provide valuable information on how their dynamics continue to evolve and change over time. Also, the addition of other network characteristics, such as network learning, or how leadership styles contribute to network management, could broaden the scope of how network characteristics influence performance. It would also be interesting to extend the RAC network to include Forest Service officials, particularly Designated Federal Officials and RAC Coordinators to assess trust levels between community interests and government interests. Finally, as governments rely less on public employees and more on partners to conduct the public's work, this type of research provides a platform for other research to increase our understanding of the key attributes needed to build long-term public, private, and non-profit relationships.

Policy Implications

It has been suggested in recent reauthorization hearings before Congress that Resource Advisory Committees hold promise as an effective alternative governance structure in achieving positive natural resource management outcomes. This research was partly developed to assist in these ongoing deliberations and will discuss several important policy implications.

Networks and Discursive Democracy

The growing importance of network governance structures creates policy implications when applied to democratic theory and practice. While history tells us

that the American form of government evolved from the liberal traditions of Hobbes, Locke, and Madison, the contributions of Rousseau and the Anti-Federalists cannot be ignored in consideration of the resurgent demand for citizen involvement in the governance process (Marshall & Ozawa, 2004). As discussed by Held (1996):

> Rousseau saw individuals as ideally involved in the direct creation of the laws by which their lives are regulated, and he affirmed the notion of an active and involved citizenry: all citizens should meet together to decide what is best for the community and enact the appropriate laws...In Rousseau's account...a political order offering opportunities for participation in the arrangement of public affairs should not just be a state but a type of society (p.57).

Marshall and Ozawa (2004) suggest that the resurgence of a more participatory approach is found in the deliberative/discursive democracy movement. Here, the *quality* of participation in the democratic process is as important as who participates in it. Extending this discursive democratic notion of participation within the administrative setting opens the door for improving the responsiveness of government to solving issues of ecological importance. It has been argued that, "...the structure of liberal democracy itself is ultimately incapable of responding effectively to ecological problems" (Dryzek, 2000, p.143). Essentially, this argument recognizes that ecological problems are marked by a high degree of complexity and uncertainty, as well as substantial collective action problems. Thus, any adequate political mechanism for dealing with them must accommodate the ability to change when a natural system's equilibrium is disturbed and to coordinate across different scales and

actors. Dryzek believes, "Coordination is often problematical because the currency of interest group pluralism consists of tangible rewards to particular interests. Such particular interests do not add up to the general ecological interest" (2000, p. 144). Consequently, interests may be mollified in proportion to their material political influence, and compromise achieved across them, while at the same time large-scale ecosystem damage may yet occur.

However, given the ecological limitations associated with liberal democracy, it remains a healthier alternative than most political mechanisms. The fact remains that the way in which political systems are structured can influence how ecological values associated with an individual's sense of well-being are realized. Within the past several decades, Americans have been challenging prevailing natural resource management policies developed in the Progressive era. Our understanding and perception of natural systems seems to be undergoing substantial change. Cortner and Moote believe, "The convergence of changing social values, growing scientific knowledge, and evolving professional and managerial experiences around concepts of integration and ecological sustainability signals a potential revolution in natural resource management" (1999, p.28).

Correspondingly, Dryzek suggests, "...rather than jettison democracy in the search for an ecologically rational political economy, we might better proceed by detaching democracy from liberal anthropocentrism, while retaining an emphasis on deliberation and communication" (2000, p. 147). He argues, "...discursive democracy is better placed than any alternative model to enter into fruitful engagement with natural

systems..." (2000, p. 140). The contention here is that authentic deliberation involves enlarged thinking, as intention must be cast in terms of persuading others, rather than just stating one's case for change.

Dryzek substantially expands the debate by suggesting, "The interests that become internalized in the processes of enlargement need not be confined within the boundaries of the human world" (2000, p. 140). While this may sound far-fetched, its pragmatic expression lies in the ability of humans to perceive ourselves situated both socially *and* ecologically. Therefore, humans-as-ecosystem-members would be in a position to challenge others' interpretations of the needs of ecosystems in which they are component parts. Making the connection to deliberation, Goodin argues that, "...discursive democracy in the public sphere...creates a situation in which interests other than your own are called to mind" (1996, p. 847). Again, this refers to promoting an aura of "enlarged thinking" as we attempt to influence one another in matters larger than ourselves.

How then does a Resource Advisory Committee, as an alternative governance structure, contribute to this deliberative, democratic approach? As a perfunctory measure, RACs are essentially inserted into an existing process. The outcome of this process legally constitutes a recommendation to the Designated Federal Official, who holds formal decision-making authority. As acknowledged by Marshall and Ozawa (2004), "In a strict sense, because the official decisionmaker is not obligated to decide in a manner consistent with the recommendation, these processes offer little that is new in terms of the democratic nature of decision making" (p.133). Yet, they also

suggest another view that such processes, "...in fact challenges the hegemonic power of institutions and dominant elites" (Marshall & Ozawa, 2004, p.133). Critical to this view, participants share information from non-traditional sources, thus transforming the knowledge base for decisions. In this manner, joint understanding is created, frequently reshaping public understanding of the problem and alternatives for its resolution. The fact that over 4400 resource improvement projects were recommended, approved by the Designated Federal Official, and implemented *without appeal* lends strong credence to the suggestion that this type of alternative governance process offers a positive step toward discursive, democratic governance.

Networks and Traditional Bureaucratic Models

How then does a bureaucracy, such as a federal land management agency, adapt to this deliberative, democratic approach? Managing a government entity, such as a National Park, that achieves most of its mission through networks of partners, requires an approach and skill-set different from traditional government models (Brian O'Neill, Golden Gate National Recreation Area Superintendent, personal communication October 24, 2006). Thus, a network approach to governance appears incongruent with the dispersed professional bureaucracy currently used by federal land management agencies to deliver public services and to fulfill public policy goals. This traditional model, developed during the Progressive Era of the late 1800's and early 1900's created a professional, scientifically-based cadre of resource management disciplines. Mintzberg (1993) has characterized this traditional type of bureaucracy as an, "...inflexible structure, well-suited to producing standard outputs but ill-suited to

adapting to the production of new ones" (p. 209). Thus, a traditional bureaucratic model of government simply does not meet the demands of our complex, rapidly changing age.

To institute collaborative policies and procedures that better reflect today's demands; the government needs employees with new network skills. This will require that government personnel systems transform the way they recruit, train, and reward employees. Hence, job descriptions and personnel policies must allow this change to happen. These changes, while far from being institutionalized, are not out-of-reach; recent initiatives such as those recommended by the Interagency Cooperative Conservation Team have established a set of core competencies at the executive-level that are focused on the skills needed to effectively work in collaboration and partnership (U.S. Government Accountability Office, October 2005). Perhaps the most pervasive challenge to actively pursuing and valuing collaborative skills are the cultural norms embedded within federal land management agencies that persistently draw innovative practices back to traditional patterns of convergent thinking.

Networks and Accountability

A final, practical policy implication of network governance concerns questions of accountability, such as: How does government give up some control and still ensure results? Perhaps more fundamental is the question, what results are important?

Goldsmith and Eggers (2004) argue, "Key to unraveling the accountability conundrum is understanding the hierarchy of responsibility. Who should be held accountable, and by whom?" (p. 122). Traditionally, government accountability

issues have been addressed through narrow audit and control mechanisms. Although such tools can help, Goldsmith and Eggers (2004) argue, "An over reliance on box checking and rule compliance – in which government contract monitors focus on wrongdoing instead of making partnerships work – leads to an adversarial relationship with partners" (p.123). In creating adversarial relationships, innovation is stymied and trust suffers, thereby reducing the value of the relationship. Over 20 years ago, Hendee (1984) emphasized this point when he asserted that the public, "...is increasingly distrustful of decision making by technical experts" and called for reestablishing a relationship with local communities (p. 340). While formal accountability structures provide an avenue for establishing the human element in natural resource management, more often, it is the day-to-day informal interactions and exchanges between government officials, business interests, landowners and community members that build sustainable relationships. Frenz, et al. (2000) found that, "...community relationship building has the potential to benefit communities by contributing to community economic stability, cohesion, and social equity" (Davenport, et al., 2007, p. 44).

If we accept this premise, should we then, as local citizens in a global economy, be accountable for this potential? If, in securing economic stability, improving cohesion and social equity through the sustainable use of our remaining natural resources, have we not then, achieved significant results? Further, if these results are in alignment with the mission of federal agencies such as the U.S. Forest Service, then a focus on community relationship building becomes critical to meeting the agency's mission.

Thus, the key is balancing formal accountability structures with the purpose of a network: to provide a decentralized, flexible, creative response to our potential for achieving sustainable social, environmental, and economic communities.

Pragmatically, the procedures set forth in Title II of the Act outlined a functional system of accountability measures including: clear definitions of the public good to be produced; a determination of who was accountable for what and by whom; incentives for producing results (i.e., the allocation of funds to implement recommended and approved projects); open and transparent public input processes; and government control systems for tracking expenditure of funds. Lacking from this system was transparency related to internal government service costs. Funding to coordinate RAC activities was the responsibility of the local government unit (i.e., Ranger District or National Forest) and not accounted for in the overall cost of implementing the statutes set forth in the Act. This "hidden cost" often caused frustration on the part of unit supervisors, which at times was perceived by RAC members as a lack of commitment on the part of the agency. Thus, to improve accountability, government service costs should be transparent and incorporated into the overall cost of implementing the statutes set forth in the Act.

Conclusion

This re-examination of the assumed direct relationship between network characteristics and performance, especially as it pertains to the influence of network structure on performance, will improve future studies in the burgeoning field of social network analysis.

This study provided practical implications for policy makers in the use of collaborative strategies for achieving effective natural resource management outcomes. By gaining understanding of the social mechanisms used by individuals to increase the level of cooperation among diverse stakeholders, our ability to create governance structures capable of encouraging those same social mechanisms can improve. It is clear from this study that trust is a vital component of performance, particularly in collaborative networks. Thus, our natural resource management agencies currently have an opportunity to improve public trust by placing more emphasis on networked systems of governance.

Ultimately, I believe that increasing our understanding of the benefits and challenges facing networked governance structures (such as Resource Advisory Committees) will lead to a local community's ability to remain resilient in the face of outside social, economic and even environmental forces. RACs represent an excellent foundation on which to build this process of increased adaptive capacity. More models of collaboration, and further study of this phenomenon, will provide agencies and communities more effective tools for addressing the complex challenges to come.

Americans of all ages, all conditions, and all dispositions, constantly form associations...if they never acquired the habit of forming associations in ordinary life, civilization itself would be endangered.

-Alexis De Tocqueville

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Appendix A.

Secure Rural Schools and Community Self-Determination Act of 2000 (P.L. 106-393)

Since 1908, the Forest Service has shared 25% of the gross receipts derived from the sale or use of national forest commodities with the counties where national forests are located. The program was enacted to compensate local governments for the tax-exempt status of federal lands. The program was called Payments to States, because each state allocates the funds to road and school programs, usually based on the national forest acreage in each county. The funds for the 25% payment are permanently appropriated from the National Forest Fund, an account used to collect receipts (Gorte, 2000).

The Secure Rural Schools and Community Self-Determination Act of 2000 (P.L. 106-393) was authorized by Congress to ameliorate the impact of a precipitous decline in the 1908 Receipt Act payments made to counties beginning in the late 1980's. For example, in some areas of eastern Oregon, payments to the local counties declined by as much as 97% from over $10 million in fiscal year 1991 to $309,000 in fiscal year 1998 (Gorte, 2000). The decline had severe and continuing impacts to public education and county road systems, particularly in rural communities.

The Act established a new collaborative model and an increased role for community interests in federal land projects and decisions. It also provided mechanisms for communities to invest funding for projects in or adjacent to federal lands, and set aside funds to use for other specific community needs related to federal land.

Implementation of the Act is ultimately the responsibility of the executive branch, and is legislated to end in 2006. There are three express purposes of the Act (Secure Rural Schools and Community Self-Determination Act of 2000, § 2(b)):

1. To stabilize payments to counties to provide funding for schools and roads.
2. To make additional investments in, and create additional employment opportunities through, projects that improve the maintenance of existing infrastructure, implement stewardship objectives that enhance forest ecosystems and restore and improve land health and water quality.
3. To improve cooperative relationships among the people that use and care for Federal lands and the agencies that manage these lands.

Title I of the Act offers counties the option of continuing to receive payments under the 1908 Receipt Act or to receive their share of the average of the three highest 25-percent payments made to the State during the period of fiscal year 1986 through fiscal year 1999. Those counties electing to receive their share of the high-three payment, referred to as the full-payment amount, and receiving a payment of $100,000 or more, are also required to reserve between 15 – 20 percent of the funds to be spent on projects defined under Titles II and III of the Act.[4] Title II authorizes reinvestment of payments for federal land projects as recommended by Resource Advisory Committees (RACs) created under the Act, subject to approval by the agency.[5] The Act also stipulates that the Secretary concerned (i.e., Secretary of Agriculture for the

[4] Ibid, §102(d)(1)(A)(B). Titles II and III do not apply if the total payment is less than $100,000. If the county does not make an annual election for Titles II and/or III, the funds automatically revert to the Treasury.

[5] Secure Rural Schools and Community Self-Determination Act of 2000, § 203(a)

Forest Service and Secretary of Interior for the BLM) establishes and maintains members of these committees.[6] Title III authorizes counties to spend funds on non-federal land but restricts expenditures to search and rescue, community service, easement purchases, forestry education, fire prevention and planning, and community forestry.[7]

Title II under P.L. 106-393. Title II projects on federal land are recommended by RACs and must reside within the RAC boundary area (e.g., county boundary or combinations of county boundaries).[8] While 50 percent of project funds must be used for either road maintenance/obliteration or watershed improvement/restoration the Act does not preclude the recommendation of revenue generating projects. In addition to following all applicable environmental studies and federal laws, project proposals must include: purpose of project, duration, cost, proposed source(s) of funding, expected outcomes, as well as a detailed monitoring plan.[9]

Resource Advisory Committees.[10] All RACs must comply fully with the Federal Advisory Committee Act (FACA), the General Services Administration (GSA) regulations implementing FACA, and USDA departmental regulations. The four primary duties assigned to an individual RAC include: 1) reviewing projects proposed under Title II of the Act by participating counties and other persons; 2) proposing projects and funding to the Secretary of Agriculture; 3) providing early and continuous

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[6] Ibid, § 205(a)(1)
[7] Ibid, § 302(b)
[8] Ibid, § 203(a)(1)
[9] Ibid, § 203(b)
[10] This discussion of Resource Advisory Committees is limited to those authorized under the Secretary of Agriculture.

coordination with appropriate Forest Service officials, and; 4) providing frequent opportunities for interested parties to participate openly and meaningfully, beginning at the early stages of project development.[11]

Each RAC consists of 15 members appointed by the Secretary of Agriculture. Committee members are required to represent the interests of the following three categories (Secure Rural Schools and Community Self-Determination Act of 2000, § 205(d)):

- Five persons who-represent organized labor; represent developed outdoor recreation, off-highway vehicle users, or commercial recreation activities; represent energy and mineral development interests; represent the commercial timber industry; or hold Federal grazing permits or other land use permit within the area for which the committee is organized.
- Five persons representing-nationally recognized environmental organizations; regionally or locally recognized environmental organizations; dispersed recreational activities; archaeological and historical interests; or nationally or regionally recognized wild horse and burro interest groups.
- Five persons who-hold State elected office or their designee; hold county or local elected office; represent American Indian tribes within or adjacent to the area for which the committee is organized; are school officials or teachers; or represent the affected public-at-large.

RAC members serve three-year terms and may be reappointed to subsequent three-year terms.[12] While each RAC has a Chairperson, elected from among its members for

[11] Secure Rural Schools and Community Self-Determination Act of 2000, § 205(b)

a term of one year, the Secretary of Agriculture is responsible for appointing a Designated Federal Officer (DFO) for each RAC.[13] Although RAC composition is encouraged to be local, members need only reside within the State or States under which the RAC has jurisdiction.

RACs are encouraged to meet as often as necessary to carryout their assigned duties; some RAC meetings occur on a monthly basis while others meet only once every six months (Chris Nota, personal communication, May 27, 2004). As required by FACA, all RAC meetings are open to the public and announced in the local newspaper of record one week in advance as well as in the Federal Register. The voting structure requires that a majority of RAC members must be present to constitute an official meeting of the committee and importantly, the approval of a majority of the members of each of the three membership categories is required to approve a project for recommendation to the Secretary.[14]

Appendix B.

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[12] Ibid, § 205(c)(1)
[13] Secure Rural Schools and Community Self-Determination Act of 2000, § 205(d)(5)
[14] Ibid, § 205(e)(1)(2)

A1. *(RAC member name)*

RAC Performance Survey

PART ONE – About You

Please place a check (✓) next to the most correct answer:

1. **Have you served on this RAC for more than one term?** ____yes ____no

2. **Would you like to serve another term?** ____yes ____no

3. **What percentage of RAC meetings (including subcommittees) do you attend?**

____90-100% ____80-89% ____70-79% ____60-69% ____50-59% ____less than 50%

4. **Approximately how far, on average, do you travel to reach these meetings?**

____0-15 miles ____16-50 miles ____51-100 miles ____101-150 miles ____151-200 miles

____201-300 miles ____over 300 miles

PART TWO – Network Structure

5. **Please rate the working relationship that you have with the other RAC members by placing a "2", "1", or "0" next to each name according to this scale:**

2= I exchange a great deal of information, advice or support with this person.
1= I exchange some or a little information, advice or support with this person.
0= I exchange no information, advice or support with this person.

____ A2. *(name-code stays with RAC member name)*
____ A3.
____ A4.
____ A5.
____ B1.
____ B2.
____ B3.
____ B4.
____ B5.
____ C1.
____ C2.
____ C3.
____ C4.
____ C5.

(Please continue on next page)

PART THREE – Your Feedback

The following questions ask about your opinions regarding RAC policies, procedures, and the workings of your RAC. Please indicate your level of agreement with each statement by circling the number on the scale that most closely matches your opinion.

6. **I have a clear knowledge and understanding of P.L 106-393, the "Payments to States" legislation.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

7. **"Payments to States" legislation (PL 106-393) should be renewed after fiscal year 2006.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

8. **The mandate that project approval requires a majority in each 5-member subgroup has been helpful to this RAC's decision-making processes.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

9. **All interest groups with a stake in a specific project have been represented in RAC discussions prior to decisions being made regarding that project.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

10. **As a result of discussion or recommendations from others, my RAC readily adapts to new rules and processes.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

11. **If there was a subcommittee, discussions and conclusions of that subcommittee were disclosed to the full RAC during regular meetings.** (leave blank if not applicable)

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

(Please continue on next page)

12. **When making decisions, this RAC identifies options that address the concerns of all members.**

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

13. **This RAC evaluates options using specific criteria and/or procedures.**

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

14. **Once decisions are made, an action plan is developed to determine tasks and a timeline.**

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

15. **A process for resolving disputes was agreed to early, and is followed during all proceedings.**

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

16. **This RAC addresses problems or issues openly and effectively.**

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

17. **If written agreements are made, they list who will accomplish what actions, and a specific date for their completion.**

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

18. **This RAC is achieving the goals set forth in P.L 106-393.**

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

19. **In addition to the goals required by P.L. 106-393, this RAC is achieving its own goals.**

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

(Please continue on next page)

20. **When RAC members agree to something, I know they will keep to that agreement.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

21. **Other RAC members reciprocate acts of good will or generosity.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

22. **Other RAC members listen and sincerely try to understand other points of view.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

23. **Other RAC members propose solutions that are compatible with the needs of most RAC members.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

24. **This RAC works hard to solve disagreements.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

25. **I am able to freely express new ideas, opinions or recommendations during all meetings.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

26. **I easily accept changes to RAC rules and procedures.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

27. **In my everyday life I always trust people, even those I don't know.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

(Please continue to next page)

28. **I trust RAC members of the commodity production/motorized recreation group.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

29. **I trust RAC members of the environmental/non-motorized recreation group.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

30. **I trust RAC members of the state, local and tribal representative group.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

31. **I understand what is expected of RAC members.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

32. **I carefully follow guidelines or rules created by the RAC.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

****The final 10 questions focus on your priorities regarding the <u>categories of project objectives</u> in Title II of P.L. 106-393:**

33. **I believe that RAC recommendations should focus on <u>road, trail and infrastructure maintenance</u>.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

34. **I believe that RAC recommendations should focus on <u>road, trail and infrastructure obliteration</u>.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

(Please continue to next page)

35. **I believe that RAC recommendations should focus on soil productivity improvement.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

36. **I believe that RAC recommendations should focus on improvements in forest ecosystem health.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

37. **I believe that RAC recommendations should focus on watershed restoration and maintenance.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

38. **I believe that RAC recommendations should focus on restoration, maintenance and improvement of wildlife habitat.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

39. **I believe that RAC recommendations should focus on restoration, maintenance and improvement of fish habitat.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

40. **I believe that RAC recommendations should focus on control of noxious and exotic weeds.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

41. **I believe that RAC recommendations should focus on re-establishment of native species.**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

(Please continue to final page)

42. **Please rank in importance to you, from one to nine, the <u>categories of project objectives</u> from Title II of P.L. 106-393:**

1 = Highest importance
9 = Lowest importance

_____ Road, trail and infrastructure maintenance

_____ Road, trail and infrastructure obliteration

_____ Improvements in forest ecosystem health

_____ Soil productivity improvement

_____ Watershed restoration and improvement

_____ Restoration, maintenance and improvement of wildlife habitat

_____ Restoration, maintenance and improvement of fish habitat

_____ Control of noxious and exotic weeds

_____ Re-establishment of native species

<u>Thank you very much</u> for your assistance with this research! Please place this survey in the envelope provided by the individual who gave the instructions, and return the sealed envelope to them. It will be mailed directly to me, and your confidentiality will be protected. *Debra Whitall*

Appendix C.

RACs and their locations by state and county or borough

State	RAC	County or Borough
Alaska	Ketchikan	Ketchikan Gateway
	Prince of Wales	Unincorporated
	Upper Lynn Canal – Icy Strait	Unincorporated
	Wrangell-Petersburg	Unincorporated
	Yakutat	Yakutat
Arizona	Eastern Arizona Counties	Apache, Gila, Graham, Greenlee, Navajo
Arkansas/Oklahoma	Ozark – Ouachita	Baxter, Crawford, Franklin, Garland, Johnson, Logan, Madison, Montgomery, Newton, Perry, Polk, Pope, Saline, Scott, Searcy, Sebastian, Stone, Van Buren, Washington, Yell and Le Flore, McCurtain in Oklahoma
California	Alpine County	Alpine
	Del Norte County	Del Norte
	Fresno County	Fresno
	Glenn/Colusa County	Glenn, Colusa
	Lake County	Lake
	Lassen County	Lassen
	Madera County	Madera
	Mendocino County	Mendocino
	Modoc County	Modoc
	Plumas County	Plumas
	Shasta County	Shasta
	Sierra County	Sierra
	Siskiyou County	Siskiyou
	Tehama County	Tehama
	Trinity County	Trinity
	Tuolumne County	Tuolumne

State	RAC	County or Borough
Idaho	Central Idaho	Lemhi, Custer, Butte
	Eastern Idaho	Bannock, Bear Lake, Bonneville, Caribou, Clark, Franklin, Fremont, Jefferson, Madison, Oneida, Power, Teton
	Idaho Panhandle	Boundary, Bonner, Kootenai, Shoshone, Benewah
	North Central Idaho	Nez Perce, Clearwater, Latah, Lewis, Idaho
	Southwest Idaho	Adams, Boise, Elmore, Gem, Valley, Washington
Mississippi	Southwest Mississippi	Jefferson, Copiah, Adams, Franklin, Lincoln, Wilkinson, Amite, Lawrence, Pike
Montana	Flathead County	Flathead
	Lincoln – Beaverhead	
	Mineral County	Mineral
	Ravalli County	Ravalli
	Sanders County	Sanders
	Tri – County	Deerlodge, Granite, Powell
Oregon	Deschutes/Ochoco	Crook, Deschutes, Grant, Jefferson, Klamath, Lake, Wheeler
	Fremont – Winema	Klamath, Lake
	Hood – Willamette	Jefferson, Wasco, Hood River, Multnomah, Clackmas, Marion, Linn, Lane, Douglas
	Northeast Oregon	Baker, Crook, Grant, Harnery, Malheur, Morrow, Umatilla, Union, Wallowa, Wheeler
	Rogue – Umpqua	Lane, Douglas, Jackson, Josephine, Klamath
	Siskiyou	Coos, Curry, Josephine
	Siuslaw	Benton, Coos, Douglas, Lane, Lincoln, Polk, Tillamook, Yamhill

State	RAC	County or Borough
South Dakota	Custer County	Custer
Texas	Davy Crockett	Houston, Trinity
Washington	Columbia County	Columbia
	Colville	Ferry, Pend Oreille, Stevens
	Grays Harbor	Grays Harbor
	North Gifford Pinchot	Lewis, Skamania
	North Mt. Baker – Snoqualmie	Skagit, Whatcom
	Olympic Peninsula	Clallam, Jefferson, Mason, Thurston
	Snohomish County	Snohomish
	South Mt. Baker – Snoqualmie	King, Pierce
	Southeast Washington Forests	Asotin, Garfield
	Wenatchee – Okanogan	Chelan, Kittitas, Okanogan, Yakima
Wyoming	Crook County	Crook

Appendix D.

Portland State University HSRRC Memorandum

To: Debra Whitall

From: William Helsley, Chair, HSRRC 2006

Date: June 23, 2006

Re: Approval of your application entitled, "Network Analysis of a Shared-Governance System" (HSRRC Proposal # 06192)

In accordance with your request, the Human Subjects Research Review Committee has reviewed your proposal referenced above for compliance with DHHS policies and regulations covering the protection of human subjects. The committee is satisfied that your provisions for protecting the rights and welfare of all subjects participating in the research are adequate, and your project is approved. Please note the following requirements:

Changes to Protocol: Any changes in the proposed study, whether to procedures, survey instruments, consent forms or cover letters, must be outlined and submitted to the Chair of the HSRRC immediately. The proposed changes cannot be implemented before they have been reviewed and approved by the Committee.

Continuing Review: *This approval will expire on June 23, 2007*. It is the investigator's responsibility to ensure that a *Continuing Review Report* (available in ORSP) of the status of the project is submitted to the HSRRC two months before the expiration date, and that approval of the study is kept current.

Adverse Reactions: If any adverse reactions occur as a result of this study, you are required to notify the Chair of the HSRRC immediately. If the problem is serious, approval may be withdrawn pending an investigation by the Committee.

Completion of Study: Please notify the Chair of the Human Subjects Research Review Committee (campus mail code ORSP) as soon as your research has been completed. Study records, including protocols and signed consent forms for each participant, must be kept by the investigator in a secure location for three years following completion of the study.

If you have questions or concerns, please contact the HSRRC in the Office of Research and Sponsored Projects (ORSP), (503) 725-4288, 111 Cramer Hall.

cc: Craig Shinn approval memo