Factors of Successful Collaboration
Oregon's Watershed Councils as Collaborative Systems

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Executive Summary

The public sector, business professionals and organization leaders are among some of the diverse entities increasingly viewing collaboration as a useful, and at times necessary, practice. Collaborative *systems* are networks formed by individuals who repeatedly interact over long time horizons to solve problems and achieve goals they could not on their own. Throughout the academic literature, there are many references to and definitions of collaborative systems or networks, as well as various opinions on what factors enable these systems to be successful. However, these are usually context-specific or limited to the perspective of a certain discipline. Furthermore, empirical literature usually hones in on collaborative *projects*; networks working together within a predetermined timeframe and towards a specific desired outcome.

This research had two objectives. The first was to identify the common factors effecting collaborative performance and possible collaboration benefits from the various academic disciplines and use them to develop a construct for collaborative systems. The project then utilized the rich history of Oregon's watershed councils as a case study and applied this construct to their boards as they represent a diverse set of collaborative groups that have been in operation for over twenty years. This research measured the identified factors effecting collaborative performance and compared them to the benefits received through a combination of survey questions and outside research, resulting in averaged "factor" and "benefit" scores across all responses as well as for four case study watershed councils. The final step was to use regression analysis to understand the relationship between the factors and collaboration benefits.

After identifying this relationship, this research focused on a second objective; identify where watershed councils are proficient and where there are opportunities for enhancing board collaborative performance based on the construct's factor results. The approach here was to rank factor scores by mean, mode, and frequency.

The results of the regression analysis showed a positive relationship between the factors and benefits. Therefore, based on the data, this research found that better performance with respect to collaboration factors increased the collaboration benefits on average, thereby corroborating the construct developed from various literatures. In light of these findings, identifying factors where the watershed councils are proficient and where there is an opportunity for improvement may aid in enhancing overall board collaborative performance.

The highest scoring factors, meaning the areas where watershed councils exhibited proficiency, were establishing a neutral forum, institutionalizing a system of equality, setting clear expectations, mitigating opportunistic behavior and creating an atmosphere where members are willing to share information. This research identified a strong relationship between a council's willingness to share information and mitigating opportunistic behavior; the frequency analysis results from the four case study councils showed almost identical results for these two questions and the average factor scores from aggregate data were only different by .01. Overall, watershed councils seem to understand the advantage of these aspects of collaboration and have successfully executed them with various structures and processes.

Factors scoring in the middle of the ranking were establishing a shared interest, fostering individuals' dependence on the group, effectively resolving conflict, and mitigating members' threat to control. Based on case study analysis, this research found these factors to be context-specific and identified possible explanations for the inconsistent responses. For example, results

suggested smaller councils may be more successful with fostering dependence on the group, a history of conflict could create a strong incentive for effective conflict management, and more socially cohesive groups may excel with mitigating threat to control among members when compared with highly diverse groups. However, there was not sufficient data to test the general applicability of these findings.

Fostering a sense of group dependence on an individual, invulnerability to external changes, implementing a feedback mechanism, and lessening the complexity of exchanges were the lowest scoring factors across the aggregate data. Making individuals feel essential to the process scored significantly lower than any other factor. By looking at the small subgroup of survey respondents that indicated feeling essential (eight total), this particular factor was found to have an influence on overall benefit maximization. This research also identified a connection between two other low scoring factors, invulnerability to external changes and lessening complexity of exchanges. According to member perception, the main challenge for watershed councils is around funding, most councils are heavily dependent on the Oregon Watershed Enhancement Board for funding, and many struggle to leverage resources from within their collaborative system. The combination of these elements highlights a need for watershed councils to lessen vulnerability specifically around any monetary or funding changes, possibly through diversifying funding sources. The benefits analysis supported the finding that watershed councils are vulnerable to external changes since the ability to handle uncertainty was the benefit *least* experienced across aggregate data.

This research developed and tested a construct for collaborative systems by identifying commonly cited factors across varied academic disciples. Through application to Oregon's watershed councils, this research acquired preliminary data in order to identify the positive relationship between factors and benefits. In addition, it identified opportunities for enhancing watershed council collaborative performance by ranking these factor scores. Further research is needed to expand the application of these findings, as well as to test these factors in other collaborative systems.

Introduction

The public sector, business professionals and organization leaders are among some of the diverse entities increasingly viewing collaboration as a useful, and at times necessary, practice. Collaborative *systems* are networks formed by individuals who repeatedly interact over long time horizons to solve problems and achieve goals they could not on their own. This approach to complex problems has increased in popularity since the 1990s (Faulkner and De Rond 2000). Throughout the academic literature, there are countless definitions of collaborative systems or networks, as well as various opinions on what factors enable these systems to be successful. However, these are usually context-specific or limited to the perspective of a certain academic discipline (finance literature, or public administration literature, for example). Furthermore, empirical literature usually hones in on collaborative *projects*; networks working together within a predetermined timeframe and towards a specific desired outcome.

This research identifies the common factors effecting collaborative performance and possible collaboration benefits from the various academic disciplines and uses them to develop a construct for collaborative systems. Through the lens of this cross-discipline paradigm, this project evaluates collaboration in connection with long-term benefits.

Taking a qualitative and quantitative approach, this research contributes to collaboration literature by showing how the theoretical conception of collaborative systems compares with actual systems in existence, all varying in terms of success, lifecycle, resources, structure, etc. The project utilizes the rich history of Oregon's watershed councils as a case study and applies this construct to their boards as they represent a diverse set of collaborative groups that have been in operation for over twenty years.

Objective 1: *Develop a construct for collaborative systems and test it through application to the boards of Oregon's watershed councils.*

After identifying the relationship between collaboration factors and benefits, this research will focus on a second objective; identify where watershed councils are proficient and where there are opportunities for enhancing board collaborative performance based on the construct's factor results.

Objective 2: *Identify where watershed councils are proficient and where there are opportunities for enhancing board collaborative performance.*

After identifying the assumptions governing the project, this report presents the key theories and their perspective on collaboration factors and benefits. The next section identifies common themes used to build the collaborative systems construct this project tests. Subsequently, there is an explanation of the methodology, as well as an overview of the survey design process. Survey results, analysis and implications follow as well as a discussion regarding ideas for further research.

Assumptions

This research constrained the "collaborative system" to the board members of the watershed councils. The exclusion of the staff and other stakeholders comes from the definition of collaborative systems presented earlier; people who collaborate in an ongoing manner to solve problems that require interaction.

Relevant literatures not only cite factors for successful collaboration, but in some cases, they also highlight "barriers." This project operates under the assumption that mitigation of a barrier is just as relevant for collaboration as the presence of a success factor. Therefore, while the literature review will highlight both "success factors" and "barriers," the construct for collaborative systems this research presents and tests will simply contain "factors." The methodology section will explain the scoring and means of evaluation for these factors.

Literature Review

Collaboration as a defined problem-solving or decision-making strategy became popular in the academic world in the 1990s, in part due to increased connectivity through globalization and the development of technology for enhanced communication (Faulkner and De Rond 2000). The literature contextualizes collaboration in many theoretical backgrounds. This paper will present the main, relevant theories and their unique characterization of the factors for success, barriers and benefits of collaboration.

The following theories each contain a particular take on collaborative systems. However, as any theory working within the context of analyzing human nature and human interaction, the lines where one theory ends and another begins are frequently blurred. Therefore, it is difficult to pin down strict definitions and rules for each theory, or even to clearly categorize them. This paper will work to understand the ambiguity and complexities of collaboration's theoretical foundation in light of these challenges.

This research broadly groups the following theories in two categories: *social or organizational theories* and *economic theories*. In general, social and organizational theories approach collaboration from a relational standpoint, whereas economic theories focus more on the transactional elements. However, both of these broad categories offer unique insight into collaborative systems, as well as offer specific success factors, barriers, and collaboration benefits.

Social and Organizational Theories
Public Administration Theory/Public Management
Starting in the 1980s, a trend towards "smaller" or "less intrusive" government coupled with concern for the growing national debt resulted in two movements, *new public management* and *new public governance*. New public governance "emphasizes the importance of taking a collaborative approach to the provision of public services, working with partners within and across the public, private, and nonprofit sectors" (Morgan and Shinn 2014). Today, public managers are inevitably involved in collaborative networks (Agranoff and McGuire 2003; McGuire 2006). As such, public administration literature has taken a recent interest in examining networks, specifically concerning how to make them most effective. Whereas social networks view collaboration from societal relationship standpoint, public administration and public management focus on *inter-organizational collaboration* or *multi-organizational arrangements;* it applies similar elements to actual public entities and managers (Agranoff 2006; McGuire 2006). Generally, public administration theory deals with the distribution of power and resources, as governments are "ultimately held accountable for the satisfactory delivery of public goods and services" (McGuire 2006). Contrary to economic theory's focus on overall benefit maximization, this theory seeks to identify *who* wins and losses (Gray and Wood 1991). Collaboration within this theoretical context has its foundation in the American political system since values such as equality and participation are pillars to democracy in addition to American

federalism being a longstanding collative model (Thomson and Perry 2006; McGuire 2006; Agranoff and McGuire 2003)

Political leaders, policy makers, and public managers are increasingly viewing collaboration as an essential practice, partially due to the rise of organizational interdependencies (Thomson and Perry 2006). There are two conflicting political traditions to understand collaboration within public administration. The first is classic liberalism or the translation of private preferences into collective choices "through self-interested bargaining" (Thomson and Perry 2006). The second is that of civic republicanism, which emphasizes collective goals and utilizes an integrative process to gain shared understanding among actors (Thomson and Perry 2006). Collective goals and mutual benefits as main drivers of collaboration are echoed across public administration literature (Emerson, Nabatchi, and Balogh 2012; Agranoff 2006; McGuire 2006; Ansell and Gash 2007). Agranoff (2006) cites the bringing together of many parties, knowledge expansion, and possibility of new solutions as additional benefits of successful collaboration. Emerson, Nabatchi, and Balogh (2012) discuss "uncertainty" as a main driver for collaboration, and the potential to reduce, diffuse, and share risk throughout the process. Finally, several case studies showed how working together over a sustained period of time allowed "collective process skills" to accrue (Agranoff 2006). This positive reinforcing of collaboration as a benefit was corroborated by empirical research conducted by Ansell and Gash (2007).

Several sources identify the need for the "right people" to be incorporated in the collaborative process (a strategy referred to as "activation" and "selective activation" throughout the literature) (Agranoff and McGuire 2001a; Agranoff and McGuire 2001b; Scharpf 1978; Emerson, Nabatchi, and Balogh 2012). In addition to this inclusivity element, successful collaboration requires an acknowledgement of the interdependence among actors as well as a need for joint commitment (Gray 1989; McGuire 2006; Thomson and Perry 2006; Emerson, Nabatchi, and Balogh 2012; Ansell and Gash 2007). As conflict or dealing with differences is likely with such a large, diverse stakeholder group, successful collaboration will identify processes for effectively dealing with these situations (Gray 1989; Agranoff 2006). These may require acknowledging an inherent power imbalance within the network; "different actors can occupy different role positions and carry different weights" (Agranoff 2006). Empirical research by Ansell and Gash (2007) also highlight the influence power and resource imbalance can have within a collaborative system. Several sources cite the utilization of purposeful interaction to build trust and combat these possible issues (McGuire 2006; Ansell and Gash 2007). Emerson, Nabatchi, and Balogh (2012) refer to this as "principled engagement" and highlight the advantage of face-to-face dialogue at the onset. As legal charters or strict mechanisms for behavior are often absent in a collaborative public management setting, trust among members becomes necessary for future success (McGuire 2006; Ansell and Gash 2007). Roberts and Bradley (1991) add to these elements by stressing the need for an "interactive process" governed by rules the collaborating parties agreed on.

In addition to previously mentioned power imbalances, the main challenge for collaboration within the public sector speaks to the historical environment the theory has operated within until recently. Public administration has a foundation in clear, hierarchical, traditional arenas. Therefore, a transition to collaborative systems model will require a surrendering of autonomy and overall cultural change (Agranoff 2006; Thomson and Perry 2006). This resistance to change may be due to an individual agency wishing to maintain control over its operations, or a

hesitation to give resources, whether financial or otherwise, to a collaborative process in light of unclear returns (Hudson 1987; Agranoff 2006).

Social Network Theory/Social Contract Theory
Social network theory examines how individuals or groups interact with each other and within their network. It uses the connections, or relationships among actors to understand the greater network as well as individual behavior. Rather than a classification as a strict theory or method, Scott and Carrington (2011) see social network theory as a *paradigm,* highlighting its fluidity and adaptability. They define it as "analysis of systems of social relationships represented by networks" and use density, centrality, and connectivity as means to understand them. Here, the connection among actors and within a larger network influences organizations' actions and provides them with opportunities for goal attainment (Granovetter 1985). Social network theory is similar to social contract theory, which acknowledges society's influence on an individual's "moral and/or political obligations" (Friend 2004).

From a collaboration standpoint, social networks are "persistent and structured sets of autonomous players (persons or organizations) who cooperate on the basis of implicit and open-ended contracts" (Faulkner and De Rond 2000). The foundation is that organizations and actors interact with each other and inherently form a structure ruled by socially, rather than legally, binding contracts. Here, collaboration is an inevitable aspect of networks and a means for organizations to increase their legitimacy and gain access to network information through linkages (Faulkner and De Rond 2000; Gulati and Westphal 1999).

As the contracts are not legally binding, trust among parties is essential for successful collaboration. Overtime, trust allows for "value creating interactions," or norm-building among participants (Calton and Lad 1995). Empirical research analyzing mental health systems by Provan and Milward (1995) uses case study analysis to test the relationship between a network's structure and that of overall network effectiveness. Through a multilevel analysis (individual, agency, and network), they identified four means to evaluate this relationship: network integration, external control, system stability, and environmental resource munificence. The most influential factor for success was centralization (the structure around power dynamic and network control). Whether organized around one organization or a small group, the more centralized a network, the more effective a network was. This highlights the need to form close ties within the network. In addition, the study identified mechanisms for monitoring as beneficial.

Instability within the system, whether they are brought on by external shocks (such as policy changes) or internal conflicts (high turnover, for example), are not always barriers for organizations to collaborate but can hinder the process if an individual organization is unable to adapt quickly to these changes. The Provan and Milward (1995) study also identified poor funding as a limiting factor, but maintained that well-funded networks are not necessarily guaranteed effectiveness either. Finally, Calton and Lad (1995) acknowledge the possible moral hazard of "participant opportunism."

Institutional Theory
Within the broad category of organizational theory, institutional theory looks at the processes dictating the structure, rules, and norms of an institution or institutional network. More specifically, it evaluates the process organizations take for creating, adapting, and dismissing the guidelines for social behavior.

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In terms of collaboration, this theory observes the interaction within the "institutional environment," and if certain alliances influence it. The formation of patterns link parties within the same institutional network. This is complementary to social network theory, but here the focus in primarily on process over relationships or interactions. This perspective highlights an organization's increased likelihood of survival if it is able to conform to the norms and social expectations of the institutional environment (Guo and Acar 2005).

Within this theory, collaboration is an inherent part of an organization's process as they are constantly interacting with the institutional environment. Successful collaboration allows for increased social capital, earning an organization a better reputation and improved relationships within the network. According to Gray and Wood (1991), the goal of collaboration within this theory is to attain legitimacy with institutional actors. Sharfman, Gray, and Yan (1991) echo this outcome as they highlight an organization's need to maintain alignment with their environment. In addition, collaboration may be mandated within the institutional environment. Guo and Acar (2005) give the example that many nonprofits are required to collaborate by their funding sources, thereby making resource dependency an impetus for collaboration.

Within this theoretical context, successful collaboration requires organizations to be aware of their institutional environment and the expectations it sets. Shared understanding of the structure and process is essential for collaboration (Gray and Wood 1991).

As funding sources or the general institutional environment frequently mandate collaboration within this context, sudden external changes effecting the network's organizations can greatly hinder the collaborative process. In addition, Ostrom's (1990) research on self-governance of common pool resources highlights the challenge of identifying optimal institutions, and states that the process can be time consuming and conflict-ridden. If organizations are unable to manage successful interaction within their institutional environment due to foundational differences (due to conflicting cultures, political beliefs, etc.), collaboration will be more challenging.

Organizational Learning Theory
This theory acknowledges that for organizations, continually studying their processes can allow for better adaptability, overall organizational enhancement, among other benefits. According to Child and Faulkner (1998), this theory examines the ability of organizations to improve performance through discovering, understanding, and utilizing new knowledge.

In terms of collaboration, organizational learning theory identifies two categories: cooperative learning (learning *with* the other collaborating party) and competitive learning (learning *from* them) (Hamel 1991; Faulkner and De Rond 2000). Cooperative learning entails building relationships based on complementary knowledge and expertise. Here, ongoing interaction and trust are characteristics of the alliance. Competitive learning is purely about a knowledge or information transfer. Successful collaboration within this context can lead to mutual benefit among participants where both learn pertinent information from the alliance. Depending on the type of organization, acquiring new information or perspective on issues can enhance its goals (improved ability to compete for profit-driven firms or better service provided for nonprofit organizations, for example) (Bleeke and Ernst 1993). In addition, this expanded knowledge base can improve decision-making and aid in their adaptability (Child and Faulkner 1998).

As with any theoretical perspective, organization learning theory requires the collaborating parties to see the mutual benefit and value of the alliance by identifying their mutual learning intent (Child and Faulkner 1998). This requires acknowledging a dependence on the other, specifically by entering into agreements with others holding a complementary skill set or knowledge base. The learning intention should be defined and entail a "clear direction" (Child and Faulkner 1998). Larsson et al. (1998) likens competitive learning with the prisoner's dilemma game; each player is initially trying to maximize gains through information extraction. Similarly, with repeated interaction, trust forms overtime and the desire for longer-term benefits can outweigh short-term gains. In order to avoid the knowledge transfer scenario of competitive learning, trust, transparency, receptivity, and a mutual commitment to learning will aid a collaborative learning alliance (Child and Faulkner 1998; Faulkner and De Rond 2000). In addition, commitment and openness to learning is not enough, but collaborating parties must also have competence to codify new knowledge (Nonaka 1991; Faulkner and De Rond 2000).

As previously, stated, competitive learning is a possible outcome of collaboration within this theory, and is more likely when either party is engaging in opportunistic behavior or is unable to mitigate barriers to learning. These barriers can be emotional (difficulty surrendering autonomy or a previous held belief system), cognitive (the new knowledge is intangible, technical or difficult to attain in some way), and organizational (lacking a capacity to utilize the new knowledge) (Child and Faulkner 1998; Faulkner and De Rond 2000). All of these factors can increase the complexity of the information exchanges and can cause the alliance to break down. In addition, a poor strategic or cultural match can hinder collaboration or lead to unwanted outcomes (Child and Faulkner 1998).

Corporate Social Performance Theory
This theory examines companies choosing to integrate social and environmental impacts into their day to day operations (Castelo Branco and Lima Rodriques 2007). Corporate social performance (CSP) refers to a company's "responsibilities to multiple stakeholders, such as employees and the community at large, in addition to its traditional responsibilities to economic shareholders" (Turban and Greening 1997). Corporate social responsibility encompasses economic, legal, ethical, and philanthropic concerns (Castelo Branco and Lima Rodriques 2007). In its foundation, this theory highlights an organization's obligation to society in addition to its stakeholders, whether it be from an altruistic desire for societal betterment or a response to external pressures (Castelo Branco and Lima Rodriques 2007).

In terms of collaboration, this theory views alliances as a means to balance the interests of a corporation's "participating organs and those of larger environment" (Gray and Wood 1991). Similar to stakeholder theory, corporate social performance theory requires companies to evaluate all the effects of their actions (Castelo Branco and Lima Rodriques 2007). According to Wood (1991) business and society "are interwoven rather than distinct entities; therefore, society has certain expectations for appropriate business behavior and outcomes."

As Wood (1991) notes, not all social problems are a corporation's responsibility under this theory, but the ones they directly or indirectly cause are. On an organizational level, these responsibilities must still fit within the corporation's interests in order to incentivize mitigating action. It needs its stakeholders for its survival; it cannot operate if it loses legitimacy. In terms of collaboration, a corporation can engage the effected parties and identify solutions that allow for mutual benefit as well as increasing its ability to resolve/prevent conflicts among

stakeholders. In addition, by working together and acknowledging societal impact, a corporation may improve its legitimacy or reputation. Inherent consequences or benefits of these processes are increased interaction among participants and the possibility of better problem solving.

As this theory relates to the interaction between business and society, a level playing field among stakeholders and open communication are essential factors for successful collaboration. Highlighting evidence from the related institutional economics field, Wood (1991) presents a case study analysis by Pasquero (1991) that suggests mechanisms to understand a corporation's interaction with the external environment. These include structured roundtable processes, or related techniques (environmental assessments, stakeholder management, or issue management, etc.). Without understanding the effect on society, firms will be unable to successfully prevent or mitigate conflict. Gray and Wood (1991) and Pasquero (1991) state that commitment must go both ways; all parties must establish mutual buy in to the social, economic, and environmental responsibilities ("principle of shared responsibilities").

Resource Dependence Theory
This theory examines the effect that the need for resources has on an organization's behavior (J Pfeffer 1982). Within this context, an organization's goals are to not only access needed resources, but also do so in a way that protects the "commons" and ensures long-term sustainability (Gray and Wood 1991). In terms of collaboration, accessing these resources may come from forming strategic alliances.

Possible benefits that may motivate organizations to collaborate according to this theory include finding solutions (or a resource exchange) that allows for mutual benefit among participants. This may involve acquiring financial resources, access to different skill sets or expertise, or market access. Contrary to the resource-based view coming from purely economic motives (described later in this paper), resource dependence theory does not seek strategic competitive advantage but rather looks to cooperation as a means to mitigate resource deficiencies. Sharing of resources inherently increases interdependence among participants, decreases individual risk and diversifies risk among participants. According to Gray and Wood (1991), this theory "qualifies motivation for collaboration around protecting the commons through alliances and resource exchange (burden sharing, mutual costs and benefits)." Finally, accessing a larger resource base and creating these alliances can aid in their managing of "uncertainties in their resource environment" and increasing their ability to adapt to the changing environment (Jeffrey Pfeffer and Salancik 1978).

Gray and Wood (1991) cite empirical research by Logsdon (1991) who utilized a resource dependence perspective to understand two successful cross-sector collaborations. Through her research, Logsdon highlights "high stakes and high interdependence" as prerequisites to successful collaboration within this theoretical framework. In addition, identification of shared interests (acquiring needed resources or skill sets and protecting the commons) along with a willingness to exchange is necessary for successful collaboration (Gray and Wood 1991). It is also important to tailor the contract or alliance to the specific situation. For example, "formal types of collaborations allow stronger control of critical resources, yet these relationships are almost always accompanied by a greater loss of autonomy and thus involve relatively higher costs in terms of managerial autonomy" (Guo and Acar 2005; Zuckerman and DAunno 1990).

Inability to surrender the needed amount of autonomy is therefore a possible challenge to collaboration within this theoretical model (Guo and Acar 2005; Provan 1984; Zuckerman and

DAunno 1990). An organization should work to balance its need for resources/its resource dependence with that of maintaining its autonomy (Gray and Wood 1991). In addition, as willingness to share is a success factor, opportunistic behavior can also be a roadblock. In general, common resource management is particularly susceptible to free riding behavior.

Economic Theories

Market Power Theory

Market power theory views collaboration as a means for firms to increase their market power, or their ability "to raise and maintain price above the level that would prevail under competition" (The Organization for Economic Co-operation and Development 2002). Instead of perfect competition leading to market equilibrium, a firm having market power and raising the price above marginal cost leads to reduced output and an overall loss of economic welfare. Often referred to as "price makers," firms with significant market power are able to raise prices to exceed both marginal cost and average cost over the long run, thereby making profit. A firm controlling the entire market is a monopoly, the extreme representation of market power.

Within this theoretical context, the goal of firms is to either maintain or increase their market power, which they may achieve through collaborative strategic positioning (Porter 1980). According to Hymer (1972), collaboration comes in two forms- offensive coalitions and defensive coalitions. Offensive coalitions refer to collaborative strategies aiming to develop a firm's competitive advantage, diminish other firms' market share, or raise their production/distribution costs. Defensive coalitions work to create barriers to entry to limit new firms entering the market as well as other means to secure their position and increase overall profitability (Hymer 1972).

In addition to increasing market power, there are other impetuses for collaboration within this framework. Faulkner (1995) identifies acquiring needed assets, minimizing costs, increasing efficiency, diversifying financial risk, handling market uncertainty, and adapting to changes in technology or products as possible benefits.

Shifting away from a focus on an individual firm, the broader strategic management literature characterizes this type of profit-driven collaboration by firms' ability to find "strategic fit" where multiple firms' respective strategies complement each other (Faulkner and De Rond 2000). Therefore, all members of the alliance benefit and are incentivized to continue collaborating. In order to attain strategic fit, firms must identify their mutual dependence (complementary relationships regarding actions and resources) and shared interests (or at least how their goals can independently be achieved by working together).

Perfectly competitive markets are those where no firm has market power, therefore, their characteristics are some of the barriers for firms working to increase their market power. Perfectly competitive markets contain many buyers and sellers, few barriers to entry, firms acting as "price takers" (they cannot influence the market price), marginal cost equal to marginal revenue, among others (The Organisation for Economic Co-operation and Development 2003). In addition to these barriers, there are often legal limitations curbing a firm's ability to increase their market power. For example, antitrust laws are "statutes developed by the U.S. Government to protect consumers from predatory business practices by ensuring that fair competition exists in an open-market economy" (Bynum 2014). Finally, imperfect information and market uncertainty

can hinder these efforts, as finding strategic fit requires identifying needed resources and complementary partners.

Transaction Cost Theory
Transaction Cost Theory views collaboration as a means to reduce costs. Here, firms are organizational entities that oversee exchanges, or transactions, between parties (Coase 1937). Firms actively work to reduce costs associated with these transactions; the costs of participating in a market from "arranging, managing, and monitoring transactions across markets" (Faulkner and De Rond 2000). There are two main methods to reduce costs with hybrid variations existing in between. The first involves strategies to internalize the cost with actions that replace or augment the market such as foreign direct investment and creating strategic alliances. The second works to reduce costs within the market through exchanges (Faulkner and De Rond 2000).

This theory emphasizes "collaboration as a mechanism to reduce transaction costs and thereby maximize economic or psychological benefits" (Foster and Meinhard 2002; Sharfman, Gray, and Yan 1991). Firms focus on efficiency and initiate collaboration if there is a potential cost reducing strategy. The way collaboration evolves within this framework varies on the nature of the transaction costs. For example, collaboration may be a single event or ongoing based on the time horizon of costs the parties are working to minimize. Generally, market exchange minimizes costs that are short term, whereas firms should consider internalization strategies for the more complex, ongoing costs. Firms that are relatively more vulnerable are likely to benefit from internalization strategies (Faulkner and De Rond 2000).

Collaboration can take many forms within this framework, from simple exchanges to joint ventures, but as contracts are purely cost-focused and transactional, collaborating parties must both benefit and realize their mutual dependence in order for it to be successful.

Major barriers from this theoretical perspective include self-interested behavior, especially within contracts that are longer term. In addition, Faulkner and Rond (2000) cite "bounded rationality" as an impediment to collaboration as informational or cognitive limits add more risk to the transaction. High complexity of exchanges, market uncertainty, and asymmetry of knowledge regarding the costs ("information impactedness") also pose challenges to parties working together to minimize their transaction costs (Faulkner and De Rond 2000).

Resource Based View
Resource based view moves away from the neoclassical economic idea of forces inevitably driving a market to equilibrium, and instead focuses on firms' long run sustainability. Within this theoretical context, a firm's goal is to achieve sustainable competitive advantage, which is when "a particular company consistently outperforms other companies in the same industry" over a long time horizon (Davis 2014). Therefore, collaboration manifests as strategic alliances but inherently includes competitive behavior.

As the impetus for collaboration is achieving sustainable competitive advantage, firms form these strategic alliances in order to expand their resource base (information, problem-solving options, knowledge, etc.). Within this context, firms should focus specifically on resources and competencies that are unique, durable, and non-appropriable in order to get ahead of their competitors (Faulkner and De Rond 2000). This theory operates within longer time horizons as

opposed to focusing on short-term gains. Therefore, collaboration/strategic alliances are a means to increasing a firm's ability to adapt to changing environment (Faulkner and De Rond 2000).

In addition to identifying firms with a shared interest or potential mutual benefit from forming an alliance, firms must ensure the other parties have complementary skills and resources. For all parties to stay involved in this collaborative process, they must be gaining something and therefore experience a degree of interdependence within the alliance. To achieve sustainable competitive advantage, firms want to strategically trade resources and acquire knowledge based on their deficiencies (Barney 1991; Faulkner and De Rond 2000). This requires receptivity, learning intent, and transparency among the parties (Faulkner and De Rond 2000).

The main barrier to collaboration within this context relates to complexity of exchanges and/or high transaction costs. Tangible items such as specific resources or access to capabilities/improved systems are easier than acquiring more ambiguous or advanced competencies. In addition, many firms will be subjected to high transactions costs, especially regarding the trading of resources with "imperfect imitability," which are necessary for truly gaining sustainable competitive advantage (Chi 1994).

Agency Theory
Agency theory views collaboration as a means to improve the relationship between the "principal" and the "agent" within a firm. Generally, the principal is the one who delegates the work to the agent who performs it. This dynamic can be between shareholders (principal) and executives (agent), as well as managers (principal) and staff (agent), and even to situations where the firm as a whole (principal) outsources specific tasks to an external party (agent) (Child and Faulkner 1998). Rooted in the understanding that human nature is inherently self-interested, bounded by rationality and risk aversion, these relationships often encounter issues with trust in the early stages (Faulkner and De Rond 2000). Agency theory, therefore, focuses on two problems that occur within the principal-agent relationship. The first is the agency problem, which refers to conflict of interests among the parties as well as transparency and accountability issues. These can range from the parties having different goals to the principal being unable to measure the agent's work. The other is the problem of risk sharing, where there are different attitudes towards risk among the parties (Eisenhardt 1989). In order to mitigate these problems, agency theory examines which mechanisms, or contracts, serve the principal and agent's specific situation.

Collaboration within agency theory is a way to mitigate the previously mentioned problems common to these relationships. Parties are governed by contracts, which are categorized as either behavior-oriented contracts (salary structure, hierarchical governance) or outcome based contracts (commission structure, market governance) (Eisenhardt 1989). Previous research suggests a broad guideline that when the principal has more information regarding the agent's activities, an outcome based contract would be more effective for ensuring the agent's compliance (Logan 2000). In general, an outcome-based contract puts more risk on the agent and a behavior-based outcome is risky for the principal (as they will have to pay the agent regardless of performance under this structure).

Identifying and implementing a successful contract can lead to many benefits, the most obvious of which is problem solving; mitigating whichever specific principal-agent problem was present. In addition, context specific contracts should allow for mutual benefits among the parties and therefore improved decision-making. Collaboration through contracts can allow for decreased

individual risk (especially in respect to the principal), increased risk sharing among participants, increased ability to resolve/prevent conflicts among participants, increased opportunities for efficiency, and increased ability to handle uncertainty.

The main factor necessary for successful collaboration within agency theory is to create mutual incentives by establishing shared interest; these contracts work best when all parties are aware and agree with them (Faulkner and De Rond 2000) . Furthermore, contracts and expectations should be clear and documented so that everyone has a shared understanding. Similar to other theories regarding collaboration, agency theory discourages a "one size fits all" approach and instead looks to the specific relationship and resulting problems in order to tailor a solution. Finally, contracts should include some monitoring mechanism, to ensure transparency and accountability (Faulkner and De Rond 2000).

In addition to trust issues, which usually cause principal-agent problems, other factors can complicate collaboration. These include either party acting in their self-interest at the expense of the other (the agent taking advantage of the lack of transparency, for example), differences in costs and benefits (thereby creating less incentive for cooperation for one party) as well as differences in risk, risk perception, and risk aversion. If either party tries to act only in their own interest, they will be more susceptible to either principal-agent problem. If one party is more vulnerable (whether it be by having more to lose, or more fear of losing), the temptation for opportunistic behavior may be greater. All of these could hinder the parties from establishing the correct contract or collaborative solution.

Game Theory
Used in political science, economics, and psychology disciplines, among others, game theory examines outcomes from "games," or interactions between individuals with interdependent interests (Zagare 1984). Rooted in the belief that people are rational beings, game theory involves strategic decision-making between two parties by utilizing mathematic models of conflict and cooperation (Myerson 2013). In its simplest form, game theory uses zero-sum games where one participant can gain the equivalent amount of the other's losses. The most popular application is the Prisoner's Dilemma, where two parties are given the choice to cooperate with the other or not, but they are unable to communicate and are without the knowledge of what the other party will do. In this game, two criminals who have been accused of a punishable offense are being questioned separately. As rational actors, both want to minimize their prison time and both are given the option to plead guilty or not guilty (Investopedia 2015). There are variations of the game, but usually the participant gains the most if they plead not guilty (the option that does not help the other party) while the other pleads guilty. This option is the "temptation outcome." The second best option is cooperation ("reward outcome") where they both plead guilty and split the prison time among them. Next is mutual defection ("punishment outcome") where they both plead not guilty and share a longer prison sentence, and the least favorable option being pleading guilty while other does not ("sucker outcome") (Balliet and Van Lange 2013; Axelrod 1984). Game theory characterizes an individual's goal as to maximize gains, as defined by the specific situation.

Prisoner's Dilemma and other games usually involve one interaction opportunity among the parties; they make the choice to plead guilty or not and that is the end of the game. However, an extended variation of the game involves multiple interactions, thereby highlighting the potential benefits from ongoing collaboration. For example, Axelrod (1984) found increased reciprocity

with repeated interaction when applying the game in computer simulations. First, there is the initial goal to find solutions that allow for mutual benefit among participants. In terms of prisoner's dilemma, this would be shortening the prison sentence. When parties know they will be interacting again, early defection becomes less desirable. Instead, continued cooperation allows trust and understanding to evolve. Eventually, the interaction can move from the "mutual hostages" idea (if I defect they may, and then I lose) to a focus on joint benefits (Myerson 2013; Rabin 1993; Faulkner and De Rond 2000). As they become more trusting and reliant on each other, they can improve decision-making in light of shared information, decrease individual risk, and prevent conflict.

In order to have successful collaboration under the game theory model, it is essential for the parties to realize their shared interests and the influence their decision has on each other. Here, cooperation develops with the knowledge that you will encounter the other party again, and that their behavior affects your payoff (Faulkner and De Rond 2000). Repeated interaction also highlights the importance forgiveness (Axelrod 1984). If one party defects early on, but both parties realize they will have to continue to interact in the future, and then it is advantageous to resolve the conflict that may occur around the defection.

In successful collaboration scenarios within the game theory context, repeated interaction helps build trust and norms among the parties. If, despite these efforts, opportunistic behavior persists for any reason, trust will break down and the alliance will end (Faulkner and De Rond 2000).

Real Options Theory
This theory views collaboration primarily as a means to diversify risk. It elucidates a corporation's need for autonomy, and therefore argues that a firm should resist making resource commitments before necessary. In fact, parties should "play the field" and delay commitment as long as possible (Faulkner and De Rond 2000). As the future is uncertain, companies should look to expand their investment options in order to diversify risk. "Options" come in two categories; compound options and learning options. Compound options refer to those that "open up further options," such as sequential investments (Faulkner and De Rond 2000). Learning options are small investments to explore specific technologies, new competencies, or other potential opportunities (Faulkner and De Rond 2000).

Within this theoretical perspective, collaboration may be an inherent part of the risk diversifying process, and it evolves as complementing relationships form and new capabilities develop through networks (Faulkner and De Rond 2000). An additional benefit of collaboration in real options theory is to increase a corporation's ability to handle uncertainty. According to Copeland (1998), "real options are especially valuable for projects that involve both a high level of uncertainty and opportunities to dispel it as new information becomes available." These efforts are bolstered by how effective the complementary relationships are; there must be a perceived interdependence among parties. Unlike other collaboration theories, a strong commitment from both parties is less important here (Faulkner and De Rond 2000).

The main roadblocks within this theoretical context are those that mitigate the effectiveness of complementary relationships, namely opportunistic behavior from a party or a larger resistance to change. As firms are expected to "play the field" in terms of identifying options, a resistance to actually forming an alliance is likely and could quickly break down collaboration.

As shown by these different perspectives, there are many variations of collaborative systems. This research does not wish to generalize for all of them, but rather build a construct based on commonalities in order to understand the connection between factors and benefits. In fact, several authors acknowledge the different types of collaborative systems and offer their own categorization. For example, McGuire (2006) presents four main structures for collaboration; intermittent coordination, temporary task force, permanent or regular coordination and coalitions and network structure. Oregon's watershed councils would fall into McGuire's third category, *permanent or regular coordination*, as it looks at collaborative systems that are made up of individuals, groups, organizations, etc. that come together due to common goals or competing goals that require interaction over the long term.

In addition to McGuire, Agranoff (2006) offers his own classification of networks and categorizes them as informational, developmental, outreach and action networks. Oregon's watershed councils most closely resemble Agranoff's *action* networks as participants make interagency adjustments, "formally adopt collaborative courses of action, and deliver services along with information exchange and enhanced technology capability."

Keeping the complexity and diversity of these systems in mind, the next section compares the various literatures in terms of collaboration factors and benefits in order to build a testable construct for collaborative systems.

Comparative Theoretical Analysis

Differences

When analyzing the various theoretical perspectives relevant to collaboration, some stark differences exist. The most significant come from the categorization within this paper- economic vs. social theory. Theories based in economics relate more to firms and their prioritization of profit, growth, mitigating losses, and lessening risk. Social theories are less straightforward with their goals but are usually relational and include a perceived value added by simply being apart of the system. The theories that are strictly economic usually have shorter-term collaboration and the formation of alliances is a strategic *choice* the firm makes. These usually include some type of exchange that they explicitly define at the onset. Those social, relational theories, however, emphasize trust and relationships to build over a longer time horizon, as collaboration is more an inherent aspect to their system.

Similarities

Though not an exhaustive list, the various theoretical perspectives analyzed above show a significant amount of overlap. Excluding the elements that are not broadly applicable (market power's barrier of competitive market characteristics; for example), this section will identify the common benefits, success factors, and barriers to collaboration.

Benefits

This research identified the following commonly cited benefits of collaboration:
- Finding solutions that allow for mutual benefit among participants
- Improved decision-making
- Improved problem-solving
- Increased ability to resolve/prevent conflicts among participants
- Increased desire to collaborate among participants
- Increased interaction among participants

- Increased "social capital" (improved reputation, improved relationships, improved collaboration skills)
- Increased interdependence among participants
- Increased reliance among participants
- Expanded resource base (information, problem-solving options, knowledge, etc.)
- Broader information/perspective on system issues
- Increased opportunities for efficiency
- Decreased individual risk
- Increased risk sharing among participants
- Increased ability to handle uncertainty
- Increased ability to adapt to changing environment

All theories discuss mutual benefits as the main goal and desired outcome for collaboration. Market power may be profit-driven, resource dependence theory for acquiring specific resources and a sustainable commons, organizational learning for new information, but all need to see the value in the alliance. Secondary benefits, however, vary from theory to theory, and outcomes presented in the previous sections range from improved decision-making (due to new knowledge or different perspective), improved problem solving (especially in agency theory with solving the principal-agent problems), expanded resource base (through new information, financial resource, skills, expertise, etc.) and mitigating risk. In addition, collaboration can help prevent or resolve conflict, increase efficiency (a focus for the economic theories), and help with handling uncertainty and adapting to the changing environment. The last few benefits cited throughout the literature are those aspects that are inherent to successful collaboration but are also desired outcomes, as they create positive reinforcement. These include increased interaction and interdependence among participants, increased desire to collaborate, and increased "social capital" (improved reputation, improved relationships, improved collaboration skills).

Success Factors
This research identified the following commonly cited factors for successful collaboration:
- Identification of shared interest
- Perceived interdependence
- Avoiding power imbalance
- Willingness to share information and resources
- Clear and documented expectations, commitments, and roles
- Evaluation and feedback mechanism
- Effective conflict resolution
- Open, repeated communication

In some capacity, all theories this paper presents highlight the need for collaborating parties to acknowledge their shared interest or mutual need for collaboration. For the alliance to be successful, all parties must see value in it and be committed to the process. Similarly, participants must realize not only what the process needs from them, but also what they require from the process. Perceived interdependence is another widely cited factor, whether it is through the identification of complementary resources, skill sets, or a shared network.

The three theories that center on collaboration as a means to share resources (resource-based view, resource dependence theory, and organizational learning) all highlight the need for parties to be willing to share information and surrender some level of autonomy to do so. This openness ties into game theory's main contribution that open, repeated communication allows parties to gain trust, effectively deal with conflict, build norms and develop positive relationships over longer time horizons. Other than resource-based view and real options theory, all relationships within these various perspectives deal with long-term development.

The next three factors for successful collaboration have to do with the collaborative systems' process. Several theories spanning the economic and social literatures highlight the advantage of establishing clear and documented expectations and roles early on, as well as a shared understanding of the group's structure. This allows for joint commitment and accountability. Agency theory specifically speaks to the collaborative system's need to stay fluid and, when needed, to adapt to a new structure more applicable to the situation. To aid in this endeavor, collaborative systems may implement some sort of evaluation or feedback mechanism. Finally, several of the social theories (public administration being the most evident) highlight the importance of avoiding power imbalances within the group by promoting equality, neutrality, and inclusivity for effective collaboration.

Barriers
This research identified the following commonly cited barriers to successful collaboration:
- Vulnerability to external changes
- Opportunistic behavior
- Complexity of exchanges/high transaction costs
- Differences in risk, risk perception, and risk aversion
- Asymmetry in costs and benefits
- Cultural/organizational threat to control
- Inconsistent membership/high turnover within system

Barriers to successful collaboration mostly concern external challenges or inherent, irreparable differences among collaborating parties. In terms of the external, market power's legal constraints barrier acts as a good representation for any sudden market, legal, or policy change that limits or challenges the collaborative arena. Complexity of exchanges or high transaction costs is another barrier posed specifically to those alliances built on the trading of resources.

In terms of barriers concerning individual entities, opportunistic behavior appears across literatures. Collaboration requires openness, trust, and interdependence; none of which goes along with acting solely in one's self interest. In addition, collaborating parties having a different perception of risk or an asymmetry in collaboration costs and benefits can cause the alliance to break down. Within a system, any inability to relinquish individual control can limit effective engagement. Similarly, inconsistent membership/high turnover within system would cause a turbulent foundation and unsustainable alliances.

Methodology

Survey Design
Taking the information gathered from the theoretical literature, this research identified common success factors, barriers, and benefits to collaboration. By viewing the mitigation or dissolution

of a barrier as a success factor, the result of this comparison is a construct for collaborative systems comprised of factors effecting collaborative performance and possible benefits. In order to test this construct, this research applied it to watershed councils and evaluated these factors through a survey instrument. In terms of survey design, each factor was broken down into a means of evaluation. For some, the factor translated into a perception question (for example, the success factor "identification of a shared interest" became a question asking how effectively participants identified common ground and shared interests in the watershed council). When relevant, this project analyzed some factors through demographic questions on the survey (for example, "high turnover" translates to asking how many coordinators the watershed councils have had in the past ten years). Finally, this research evaluated some factors by using information outside of the survey, or "fact-finding" (information from council websites, any governing documents used by watershed council boards, phone interviews with council coordinators, or observation data gathered at council board meetings).

The table below shows each how this project chose to understand and evaluate each factor as well as how factors translated to survey or fact-finding questions.

Table 1: Survey Design for Testing Collaboration Factors

Factor	Evaluation	Research Method
Identification of shared interest	Shared commitment, buy in, shared understanding	Perception question Fact-finding: Is the system mandated? Is the group objective clearly defined?
Perceived interdependence	Individual depends on group	Perception question
	Group depends on individual	Perception question
Avoiding power imbalance	Equality	Perception question Fact-finding: Are there public meetings? Are they accessible?
	Inclusivity	Demographic question: stakeholder representation Fact-finding: Are there stakeholder requirements?
	Neutrality	Perception question
Willingness to share information and resources	Transparency, surrendering autonomy, collaborative over competitive behavior, commitment to the group	Perception question
Clear expectations, commitments, and roles	Shared understanding of structure and process, accountability	Perception question
Evaluation and feedback mechanism	Adaptability, structural fluidity	Perception question
Effective conflict resolution	Trust, positive relationships, lessening harm from conflicts	Perception question
Open, repeated communication	Trust building, norm building, relationship building	Fact-finding: How often do these members meet? Is there an attendance requirement?

Invulnerability to external changes	Protection from external forces acting against process/goals	Demographic question: Challenges Perception question
Mitigating or lacking of opportunistic behavior	Protection from competitive behavior or free riding	Perception question
Lessening complexity of exchanges/high transaction costs	Simpler process, less costs	Demographic question: Funding sources Perception question
Balance in member risk, risk perception, and risk aversion	Protection from asymmetry of risk harms; differing levels of buy in	Perception question
Balance in member costs and benefits	Protection from asymmetry of costs and benefits harms; differing levels of buy in	Perception question
Mitigation or lack of a cultural/organizational threat to control	Protection from possible resistance to change issues	Perception question
Consistent membership/low turnover within system	Protection from harms of high turnover; lack of momentum, lack of "team" dynamic	Demographic question: Coordinator turnover

The survey also listed the benefits of collaboration (gathered from the literature) along with a prompt for survey respondents to check all that applied to their watershed council. This information was used as a means to evaluate the relevance and influence of collaboration factors. The table below shows how this research consolidated redundant or related benefits from the literature into concise survey options.

Table 2: Survey Design for Collaboration Benefits

All Benefits from Literature Review	**Consolidated List of Benefits for Survey**
Finding solutions that allow for mutual benefit among participants Improved decision-making Improved problem-solving	Improved decision-making and problem-solving to reach solutions that reflect the diverse interests within the watershed council
Increased ability to resolve/prevent conflicts among participants	Effective resolution of watershed conflicts
Increased desire to collaborate among participants Increased interaction among participants Increased "social capital" (improved reputation, improved relationships, improved collaboration skills)	Improved relationships among watershed council board members
Increased interdependence among participants Increased reliance among participants Expanded resource base (information, problem-solving options, knowledge, etc.) Broader information/perspective on system issues	Increased access to resources (new information, problem solving techniques, technology, etc.)
Increased opportunities for efficiency	More efficient structuring and managing of watershed level decisions or actions
Decreased individual risk Increased risk sharing among participants Increased ability to handle uncertainty Increased ability to adapt to changing environment	Increased ability to handle uncertainty and adapt to changing circumstances

Methods of Analysis
This research analyzed the survey's results for the factors in the three ways – by mean, mode, and frequency. Originally, perception questions for the factor analysis were going to ask survey participants how strongly they agreed or disagreed with a statement regarding the functioning of their watershed council. This would have allowed answer choices to translate to a $1-5$ or $1-3$ scale (depending on number of answer choices given). It would have also allowed the factors to be treated as continuous variables (as there are levels between strongly disagreeing and feeling neutral towards something), thereby making analysis in terms of the averages, significant. However, as some of the factors are abstract or highly subjective, this method had the possibility of producing arbitrary values. Instead, the survey defined what a "1," "2" or "3" answer choice would be in light of the factor it was analyzing. For example, instead of a question asking if the respondent strongly disagreed (1), was neutral (2) or strongly agreed (3) with the statement "members rarely withhold information," the survey gives three answer choices: members *regularly* withhold information (1), *sometimes* withhold (2), and *rarely* withhold (3). Though still based on the continuous variable design, these now present as distinct answer choices to respondents. Therefore, this research also analyzed these factors in terms of the mode and the frequency of each response in addition to the averages.

In order for these methods of analysis to apply across factors, the "1, 2, 3" hierarchy needed to be consistent. Therefore, this research rewrote all factors so their "positive" iteration was the (3) answer choice. This means a high score (≈ 3) would represent proficiency with that factor and a low score (≈ 1) suggests a possible challenge. After compiling all factor scores, this research ranked each in terms of the three methods of analysis described above. This dictated an overall factor ranking, which this research categorized in terms of *high*, *medium*, or *low* scoring factors.

Survey Distribution
A link to the survey was sent to each coordinator of an Oregon watershed council that receives OWEB funding along with a project description and instructions to forward it on to their board members. The survey remained active for three weeks. After the survey closed, there were 110 responses recorded. However, of the 110 responses, only 68 were usable; the respondent completed all or most of the survey. This research utilized the 68 responses for all aggregate appropriate analysis. In addition, the four individual watersheds with the best response rate were used for a case study analysis. This was helpful for understanding elements of the survey that were not as relevant on an aggregate level, which will be explained in more detail later in this report. In addition, the use of case studies helps better understand the overall data analysis. In order to protect the identity of these councils, they will be referred to throughout the analysis as Council A, B, C and D. Unless stated otherwise, the case study councils' factor rankings were analyzed solely in terms of averages, as opposed to the multilevel analysis for the aggregate data as described above.

Discussion of Results
This section presents findings for all collaboration factors from the previous survey design chart. Following is the benefit analysis and discussion of the implications of overall findings.

Collaboration Factors

Identification of a Shared Interest

The first factor from the literature the survey tested was the need for collaborative systems to identify shared interest, evaluated by the degree of joint commitment and mutual understanding. This research was particularly interested in analyzing this factor by the perception of board members themselves. The survey therefore asked board members how successfully they felt members had identified common ground and shared interests. As stated previously, perception questions had each answer choice clearly defined and were on a 1 – 3 scale with 3.00 being the highest score. The average score for the shared interest factor within the aggregate data was 2.69, the mode was 3.00, and the chart below shows the frequency of each answer chosen.

Figure 1: Aggregate Frequency Results for Shared Interests

Overall, this factor scored in the middle of the overall factor rankings (therefore it was a *medium scoring factor*). It does not present as a low scoring factor with any method of analysis (lowest average, lowest frequency of the (3) option chosen, or highest frequency of the (1) option chosen), and only is a high scoring factor when analyzing in terms of the lowest frequency of (1) option chosen. As the chart above shows, only one of the 68 respondents chose that their board members have not identified common ground or shared interests. In addition, this was a medium scoring factor for all four of the case studies. Their average scores (shown below) did not differ significantly from the aggregate's mean.

Table 3: Case Study Average Scores for Shared Interest

Council A	Council B	Council C	Council D
2.86	2.67	2.80	2.64

The chart below shows the frequency of each answer chosen.
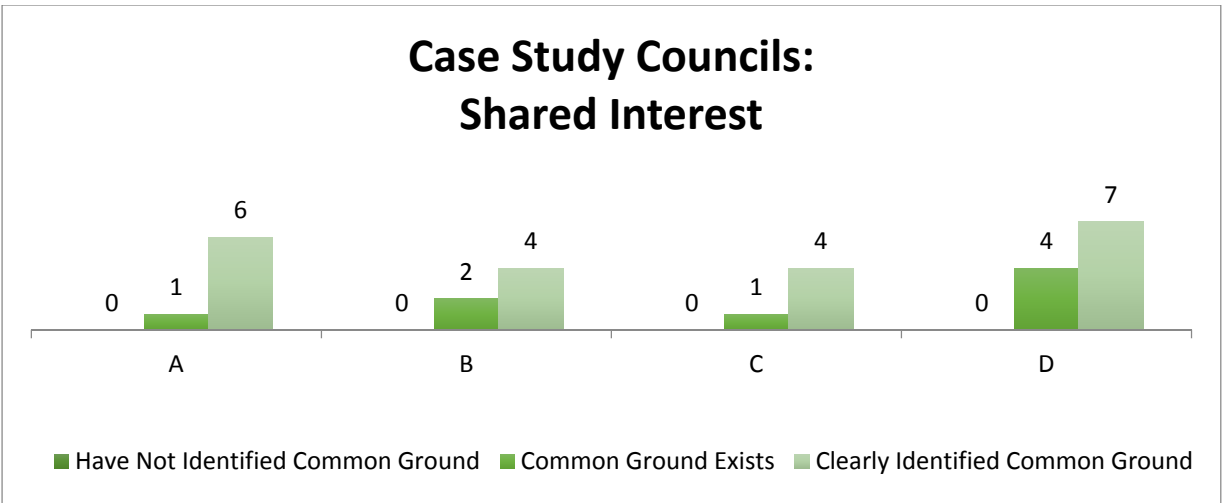
Figure 2: Case Study Frequency Results for Shared Interests

In addition to member perception, governing documents and specific regulations are helpful for understanding the level of shared interests within a collaborative system. To supplement the perception question above, this research established if the collaborative system was mandated or evolved organically. While both organically formed and mandated systems can be equally effective, knowing the formation history is useful context for analyzing this factor.

Per Oregon Revised Statutes (ORS) 541.890 to 541.969: (15), a watershed council is a *voluntary*, local organization, designated by a local government group and convened by a county governing body. Watershed councils are formed to "address the goal of sustaining natural resource and watershed protection, restoration and enhancement within a watershed" [1999 c.1026 §2 (enacted in lieu of 541.350)]. The Oregon Watershed Enhancement Board (OWEB) facilitates the implementation of the grant programs, in cooperation with watershed councils.

Although it is a voluntary collaborative system and not a mandated one, the local government designation does set a general shared interest, or reason for formation, for the watershed councils. To supplement this information, the survey asked members if they considered the council to be officially designated or recognized by a local government, to which 95% of respondents answered yes. The case study analysis corroborated the assumption that these groups have a general understanding of their shared interests and a similar governance structure. All four councils clearly state the objective of their organization on the website (listed as "mission" or "purpose"), as well as have governing documents (bylaws, operating procedures, and/or strategic or action plans).

Perceived Interdependence
This factor analyzes how interdependent a collaborative system is. Interdependence, as previously noted, refers to a group's ability to recognize and form complementary relationships regarding skills and/or resources. Several theories showed how "higher stakes" and more interdependence can lead to better collaboration as it heightens incentive. This work evaluated interdependence with two survey questions, one asking about an individual's dependence on the group and the other on an individual's perspective that the group is dependent on them.

The average score for individual's dependence on the group from the aggregate data was 2.68, the mode was 3.00, and the chart below shows the frequency of each answer chosen.
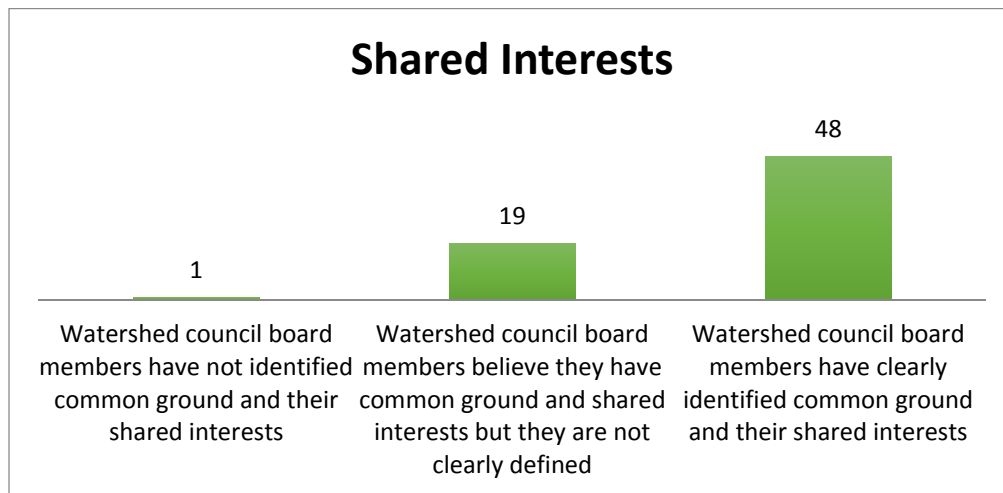

Figure 3: Aggregate Frequency Results for Individual Dependence on a Group

Overall, this seems to be a medium scoring factor. Interestingly, it falls in both the high and low scoring categories depending on the method of analysis. Survey results only establish it as a high scoring factor when analyzing in terms of the lowest frequency of (1) option, because as the chart shows, no one chose the (1) option. As a low scoring factor, is *just* makes the top five list in terms of the lowest frequency of (3) and the lowest average methods. However, in both instances, there is a significant difference between the numerical value for the fourth place factor and this one.

The case study council averages (shown below) help to understand this seemingly complex and indistinct factor. Individual dependence on a group was not a high or low scoring factor for Councils A or D, but it was the number one high scoring factor for Councils B and C. For these councils, all respondents chose the (3) option, giving it a perfect score. Interestingly, the boards of Councils B and C are significantly smaller than A and D. This may suggest that in smaller groups, individuals have greater dependence on the collaborative system.

Table 4: Case Study Average Scores for Individual Dependence on a Group

Council A	Council B	Council C	Council D
2.57	3.00	3.00	2.40
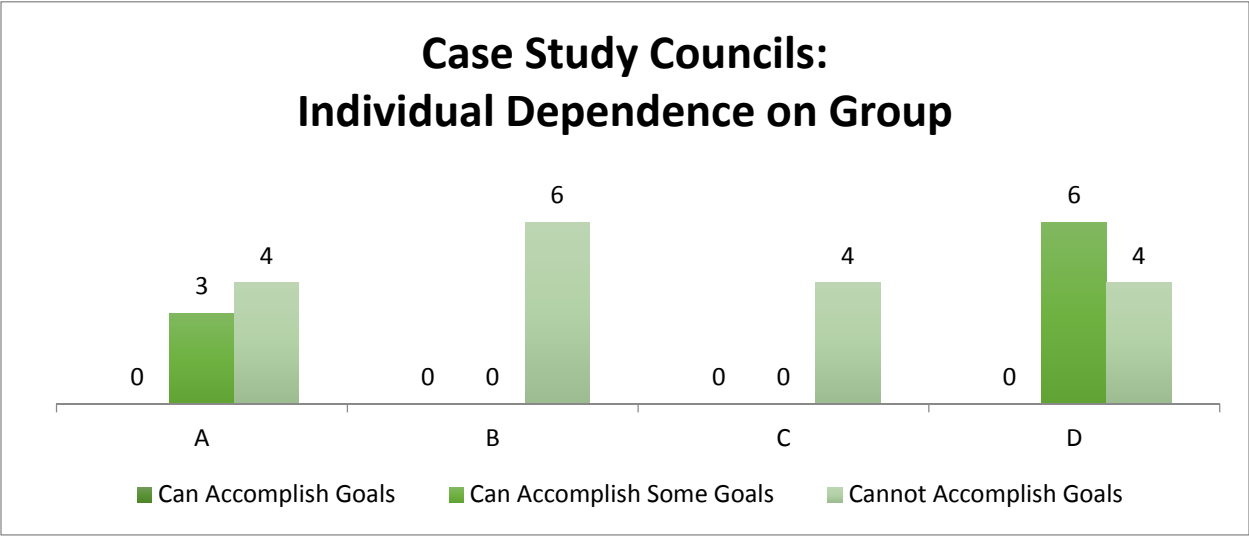
Figure 4: Case Study Frequency Results for Individual Dependence on a Group

For the second factor within this category, group dependence on an individual, the average score from the aggregate data was 1.74, the mode was 2.00, and the chart below shows the frequency of each answer chosen.
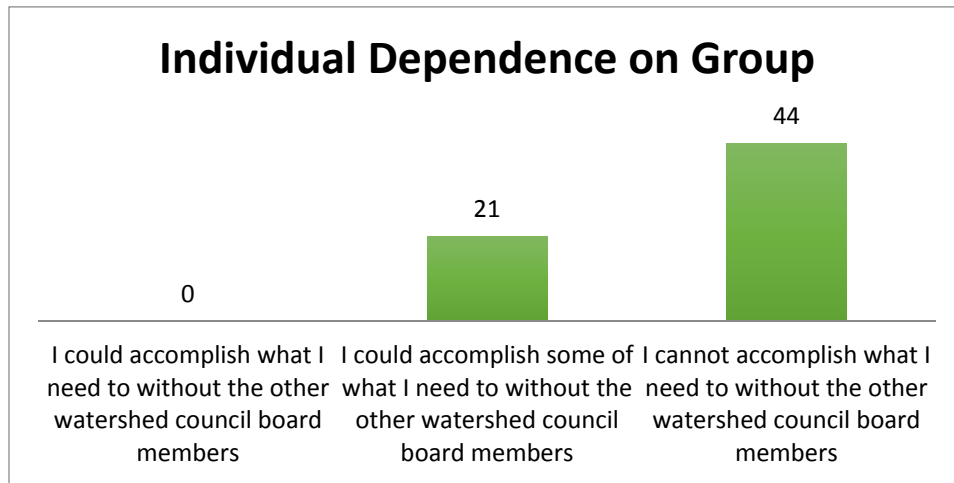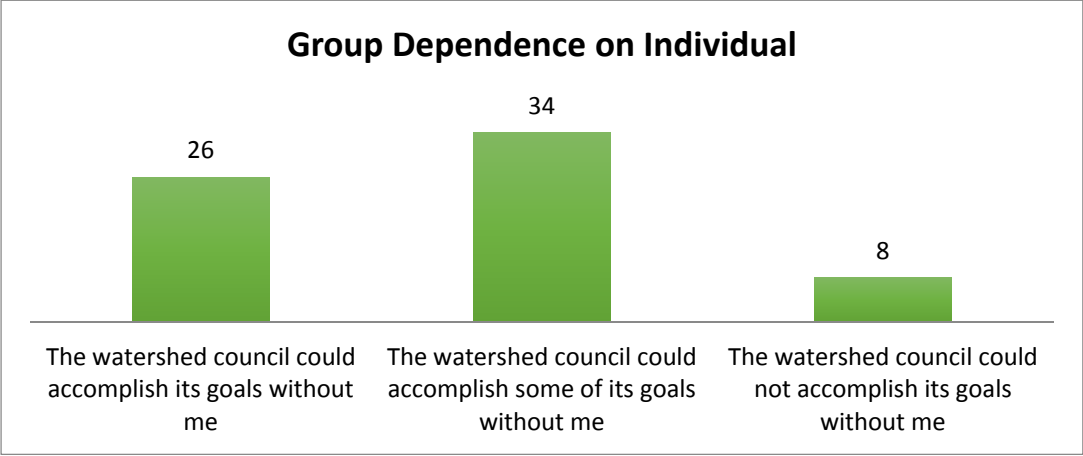

Figure 5: Aggregate Frequency Results for Group Dependence on an Individual

Whether analyzed in terms of the lowest average score, lowest frequency of (3), or the highest frequency of (1), an individual feeling the group was dependent on them was the lowest scoring factor across the aggregate data. In addition, Council's A, B, and D all had it as their lowest scoring factor, and Council C had it as their second lowest. Despite it being a barrier, Council D did score slightly higher on this factor compared to any of the other councils and the aggregate data.

Table 5: Case Study Average Scores for Group Dependence on an Individual

Council A	Council B	Council C	Council D
1.43	1.17	1.20	1.91

Case Study Councils:
Group Dependence on Individual

	A	B	C	D
Can Accomplish Goals	4	5	4	3
Can Accomplish Some Goals	2	1	1	6
Cannot Accomplish Goals	0	0	0	2

- Can Accomplish Goals
- Can Accomplish Some Goals
- Cannot Accomplish Goals

Figure 6: Case Study Frequency Results for Group Dependence on an Individual

This factor scored significantly lower than any other did in this study. Though there was insufficient data to make any statistically sound inferences, this research did conduct additional analysis in order to understand this factor in relation to others and to possible benefits. In terms of the lowest frequency of (3) method, the value for group dependence on an individual was eight. This means there were eight individuals who felt their council would be unable to accomplish its goals without them. The second lowest scoring factor according to this method had 25 respondents choose the (3) option, thereby highlighting how low a value of eight respondents is in terms of the larger study. After filtering results for these eight respondents only, analysis showed some other noteworthy deviations from the aggregate data. For example, all eight of the respondents also chose (3) for a factor this report presents later called "threat to control." This means that the eight respondents that view themselves as essential to the council achieving its goals are also unanimously *not concerned* that council actions/decisions could limit their organization's ability to act in its own interests. In terms of benefits, all eight of these respondents believe the existence and functioning of their watershed council resulted in improved relationships among board members. This is significantly more than that aggregates average of 75% choosing this benefit. In addition, the weighted averages for two other benefits (*more efficient structuring and managing of watershed-level decisions or actions* and *increased ability to handle uncertainty and adapt to changing circumstances*) were also significantly higher than the aggregate data. The table below summarizes the differences among benefits.

Table 6: Comparison of Aggregate and Subgroup (8) Benefits

Benefit	% of Respondents from Subgroup (8 total)	% Respondents from Aggregate (68 total)
Relationships	100.00%	75.00%
Structuring	62.50%	47.06%
Adaptation	62.50%	45.59%

As will be presented in more detail later, the weighted average of all benefits for the aggregate data was 68%. This subgroup's weighted average of all benefits was significantly higher at 83%.

Based on this analysis, results show members experiencing more benefits to collaboration when they feel individually valued.

Avoiding Power Imbalances

This research utilized equality, neutrality, and inclusivity to understand how well a collaborative system avoids detrimental power imbalances. To assess equality, the survey asked a perception question. The average score for equality from the aggregate data was 2.85, the mode was 3.00, and the chart below shows the frequency of each answer chosen.
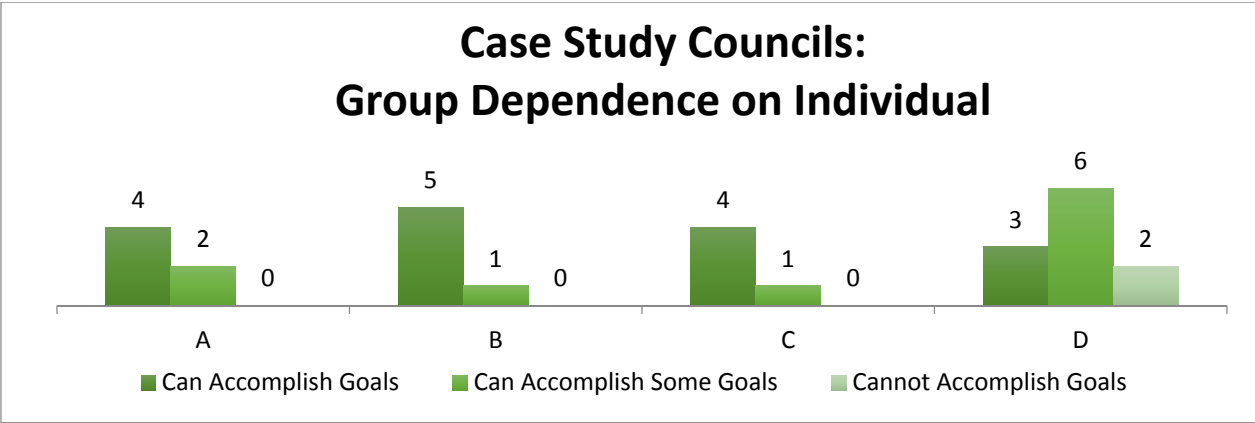
Equality

0	10	58
I do not agree that I have equal and balanced opportunities to influence the decisions of the watershed council	I moderately agree that I have equal and balanced opportunities to influence the decisions of the watershed council	I agree that I have equal and balanced opportunities to influence the decisions of the watershed council

Figure 7: Aggregate Frequency Results for Equality

Whether analyzed in terms of the highest average score, the highest frequency of (3), or the lowest frequency of (1), equality was a high scoring factor across the aggregate data. Interestingly, only Council D had equality score high. For Councils A and C, equality not scoring high was due to several other factors receiving perfect scores. Only Council B actually had a relatively lower score for equality (2.67). Councils A, C, and D had all survey respondents choose (3) except for one who chose (2). Council B had two respondents choose (2), as reflected in their lower average. Nevertheless, this concept seems to be widely understood by watershed councils.

Table 7: Case Study Average Scores for Equality

Council A	Council B	Council C	Council D
2.86	2.67	2.80	2.91

24

Case Study Councils:
Equality
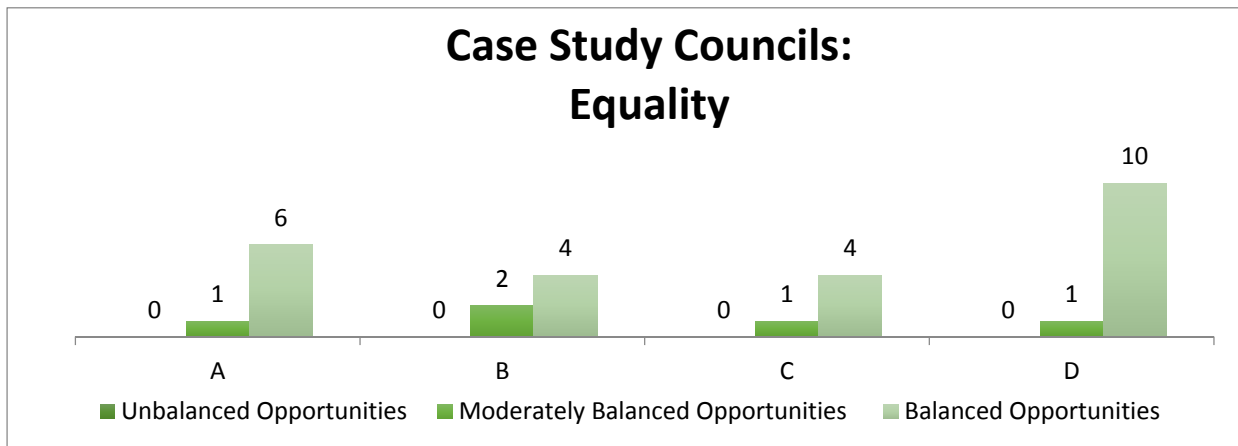
Figure 8: Case Study Frequency Results for Equality

In addition, this research evaluated equality in terms of board meeting accessibility. Councils A, B, C, & D all have their meetings open to the public. All schedule their meetings for a weeknight, once a month, during the evening (6 or 7 PM) to allow interested parties to come after regular work hours. Council B moves their board meetings to a different location around the watershed each month in order to incentivize members from different areas to attend. All case study councils advertise their meetings in various ways (website, local newspaper, newsletter, etc.). However, in phone interviews, all four coordinators expressed difficulty in engaging the public and stated they want to draw more members to board meetings on a monthly basis. Overall, it seems all case study councils are working to create equality regarding public engagement but wish to improve.

This research assessed neutrality solely with a survey perception question. For this factor, the average score from the aggregate data was 2.96, the mode was 3.00, and the chart below shows the frequency of each answer chosen.
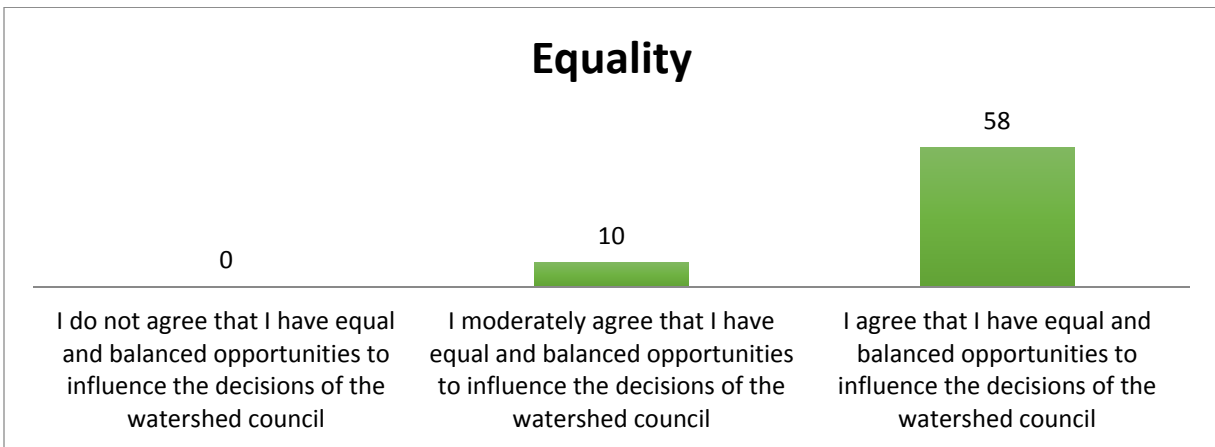

Neutrality

Figure 9: Aggregate Frequency Results for Neutrality

When analyzed in terms of the highest average score and the highest frequency of (3), neutrality was the highest scoring factor across aggregate data. It ties for the second highest when using the

lowest frequency of (1) method. In addition, neutrality scored high for all four case study councils. Overall, watershed councils seem to establish neutrality within their boards easily.

Table 8: Case Study Average Scores for Neutrality
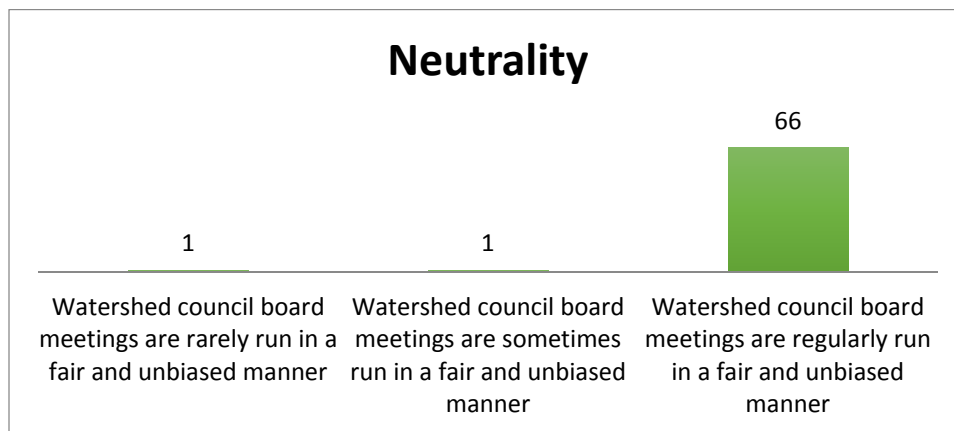
Council A	Council B	Council C	Council D
3.00	3.00	3.00	3.00
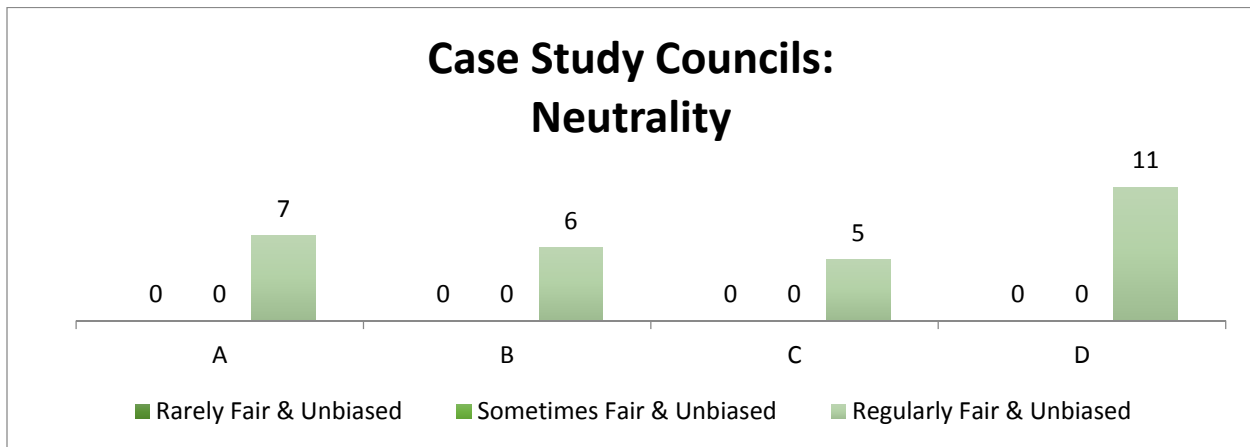
Figure 10: Case Study Frequency Results for Neutrality

This research evaluated inclusivity, the final element in this category, through a stakeholder analysis.

Phone interviews with watershed council coordinators highlighted a difference among the two smaller case study councils (B and C) and the larger ones (A and D). According to coordinators, both B and C board members came together under a unified goal to protect and enhance the watershed, and they are not necessarily participating to represent a specific interest group. Board members from Councils A and D also share this goal, but generally do represent different interest groups and therefore are joining the collaborative system to offer different perspectives. Coordinators from all case study councils indicated guidelines defining stakeholder representation either in their bylaws or from various funding sources. In addition, ORS 541.910 (2) states a watershed council should represent "a balance of interested and affected persons within the watershed" in addition to a high level of citizen involvement. These representatives are not limited to the board alone, however. Committees can represent these interests as well. Several case study councils mentioned agriculture and industry representation through committee participation.

In addition to phone interviews, the survey asked board members to identify which interests they felt are represented by their board. The results from the aggregate data are below. The write in section for the "other" category mostly consisted of citizens at large, stakeholders from the academic community (students and educators), and representatives from utilities.

Figure 11: Aggregate Frequency Results for Stakeholder Groups

As the above chart shows, board members perceive private landowners, local government representatives and experts from the academic or professional communities to be present on boards. In general, Indian tribes and other nonprofits had the lowest perceived representation.

Though knowing the most identified interests present on boards is useful, this category is better understood on a watershed council level. This research evaluated watershed level representation in two ways. The first was by identifying the percentage of respondents who identified each amount of stakeholders represented by a single board. The chart below lists the number of stakeholder options (excluding "other") from the survey along the X-axis (1 – 8). The percentage represents how many individual respondents identified the corresponding amount of stakeholder groups on their board. The largest was 32.35 percent; meaning about a third of respondents identified six out of the total eight stakeholder groups on their board.
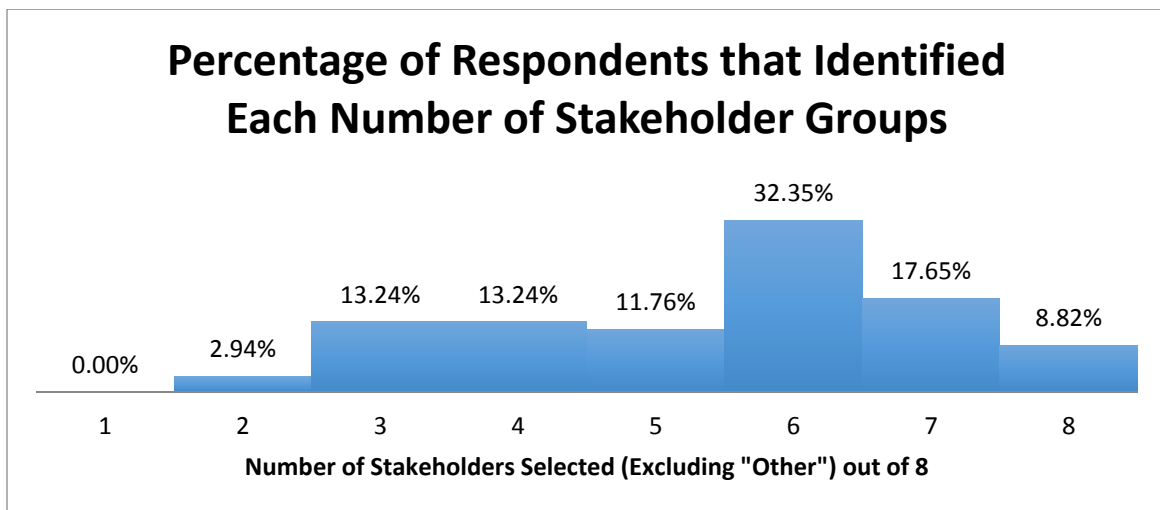
Figure 12: Aggregate Percentages Identifying Each Number of Stakeholder Groups

The second way this research evaluated watershed level stakeholder representation was through the case study analysis. The following charts show the frequency of each stakeholder option chosen from the survey for Councils A, B, C, and D.

Council A- Frequency of Stakeholder Perception

Stakeholder	Frequency
Other	2
Conservation	3
Nonprofits	4
Experts	5
Industry	6
Tribes	7
State/Fed Agencies	7
Local/Regional Govt	7
Landowners	7
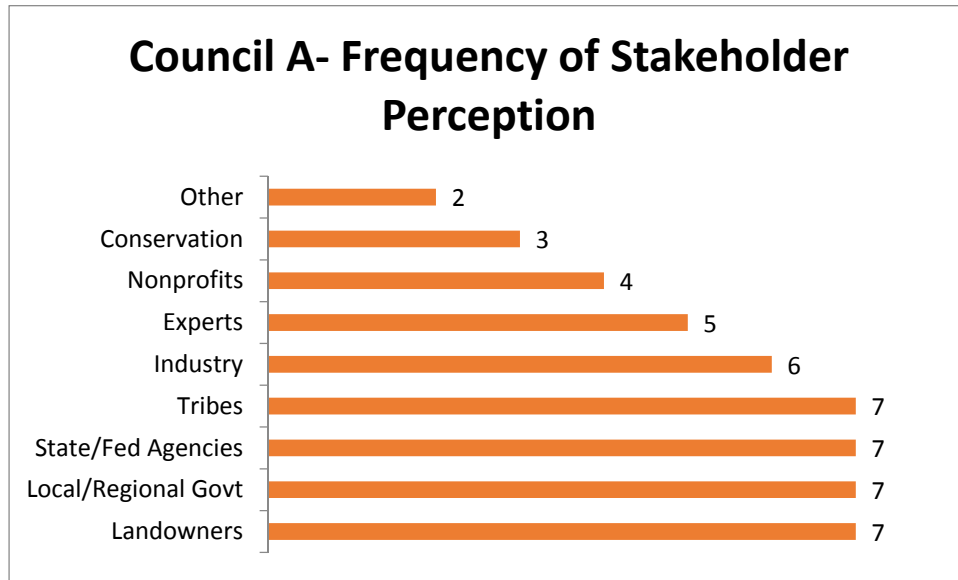
Figure 13: Council A Stakeholder Groups

All respondents (7 total) from Council A identified tribes, state and federal agencies, local and regional government, and private landowners on their board. The majority of respondents (four or more) also identified industry, academic or professional experts, and nonprofits as represented. Only three respondents feel a representative from the conservation community is on their board and two used the "other" section to add citizens at large.

Council B- Frequency of Stakeholder Perception

Stakeholder	Frequency
Other	0
Tribes	0
Conservation	1
Nonprofits	2
Industry	2
Experts	4
Local/Regional Govt	4
State/Fed Agencies	6
Landowners	6
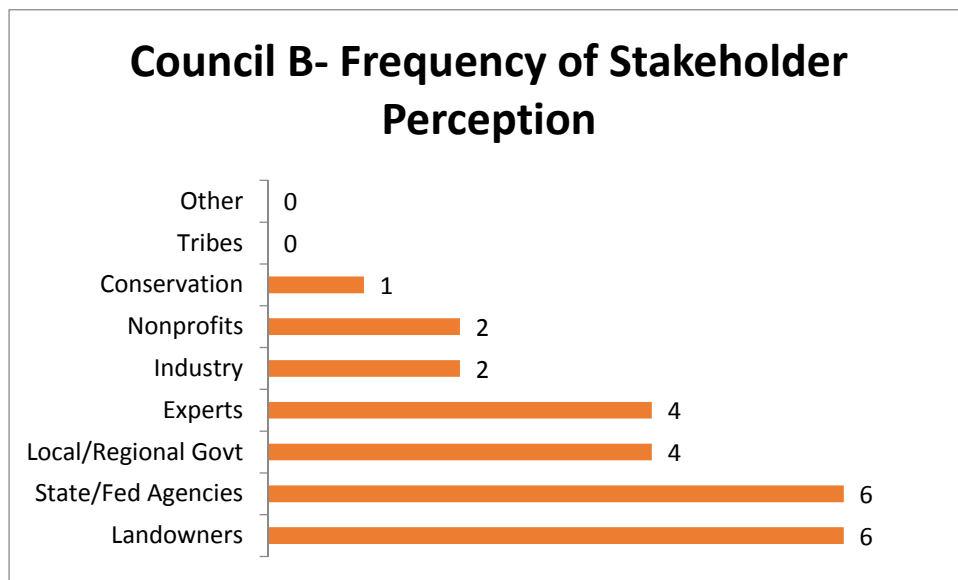
Figure 14: Council B Stakeholder Groups

All respondents (6 total) from Council B identified private landowners and state and federal agencies on their board. The majority of respondents (three or more) also feel local and regional government and academic or professional experts are present. Only two respondents feel representatives from industry and other nonprofits are represented. One respondent identified a conservation representative. No one feels Tribes are represented and no one used the "other" section.
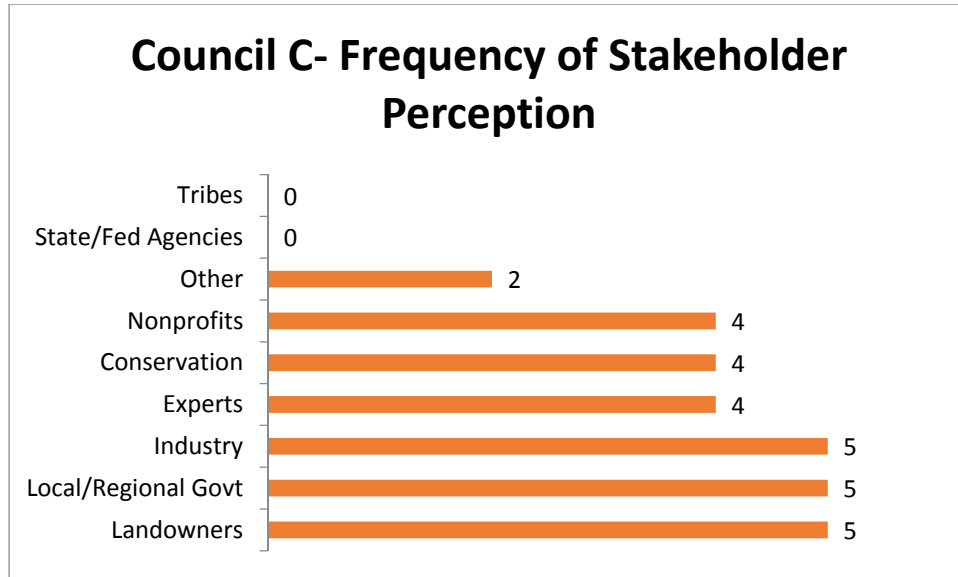
Figure 15: Council C Stakeholder Groups

All respondents (5 total) from Council C identified private landowners, local and regional government, industry on their board. The majority of respondents (3 or more) also identified academic or professional experts, conservationists, and other nonprofits. Two respondents used the "other" write in section to add members from the education community (students). No one from Council C believes State and Federal agencies or Tribes have board representation.

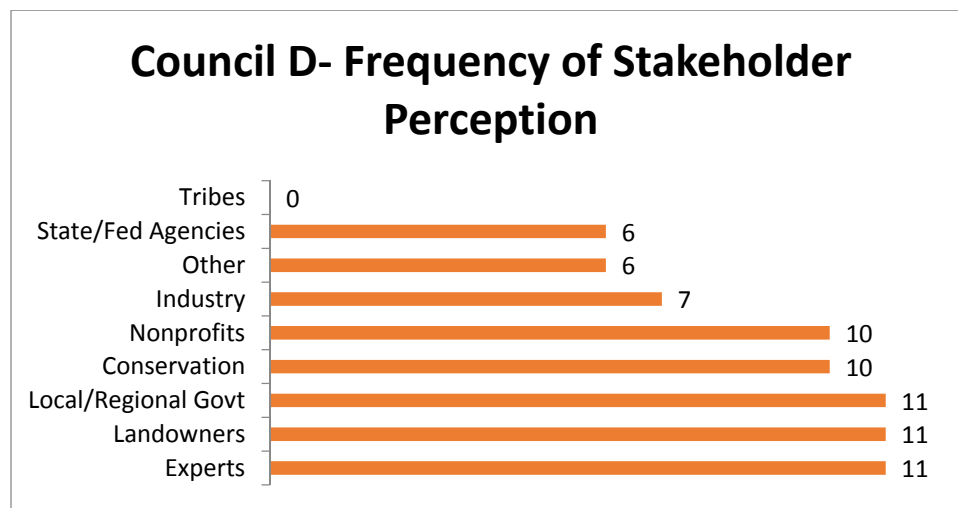*Figure 16: Council D Stakeholder Groups*

All respondents (11 total) from Council D identified academic or professional experts, private landowners, and local and regional government on their board. The majority of respondents (6 or more) also identified conservationists, other nonprofits, industry, and state and federal agencies on their board. Six respondents also used the "other" write in section to add citizens at large and education representatives. No one from Council D believes Tribes have board representation.

Willingness to Share Information
This factor is indicative of the level of transparency within a collaborative system as well as its exhibition of collaborative over competitive behavior. It shows an ability to surrender autonomy and maintain commitment to the group. For willingness to share information, the average score from the aggregate data was 2.87, the mode was 3.00, and the chart below shows the frequency of each answer chosen.

Figure 17: Aggregate Frequency Results for Willingness to Share Information

Whether analyzed in terms of the highest average score, the highest frequency of (3), or the lowest frequency of (1), willingness to share information is one of the highest scoring factors across the aggregate data. Councils A and C had all survey respondents choose (3) for this question. All members from Council B also chose (3) except one respondent who chose (1). This was the only respondent from the entire aggregate data to choose that members regularly withhold important information. This same respondent was also the only member from Council B to choose the lowest option in later categories (invulnerability to external changes and mitigating opportunistic behavior). This could indicate a disenfranchised voice within the council or it may simply be due to a difference of opinion. For Council D, seven respondents chose (3) and four chose (2), thereby lowering the average in this category and highlighting a possible division within the group.

Table 9: Case Study Average Scores for Willingness to Share Information

Council A	Council B	Council C	Council D
3.00	2.67	3.00	2.64
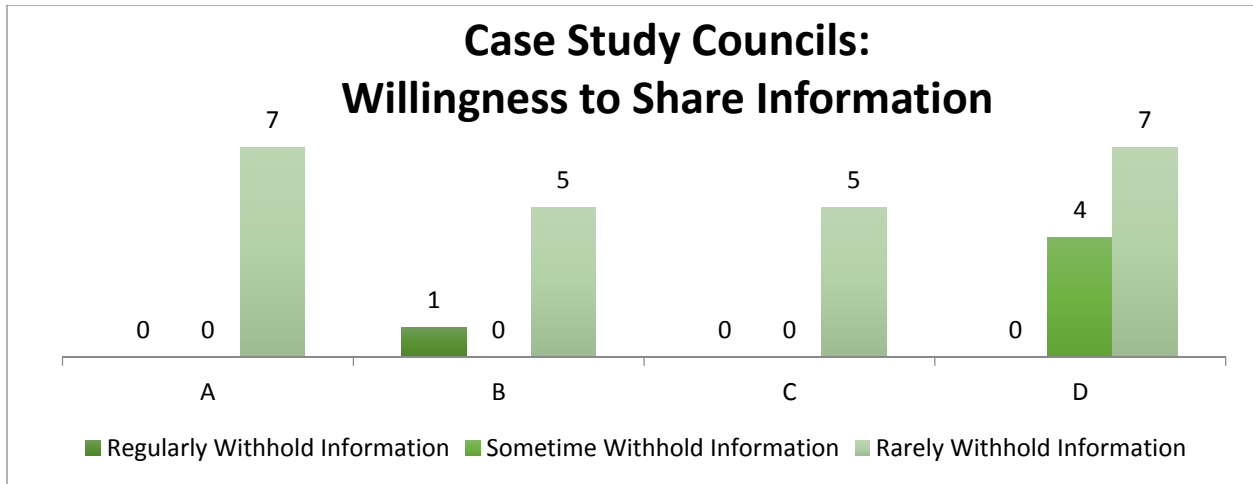
Figure 18: Case Study Frequency Results for Willingness to Share Information

Feedback Mechanism

This factor investigates the structural fluidity of a watershed council; how likely it is to continually evaluate and adapt its structure and processes as needed. This research utilized a survey question to gain member perception on the presence of a feedback mechanism. The average score from the aggregate data was 2.26, the mode was 2.00, and the chart below shows the frequency of each answer chosen.
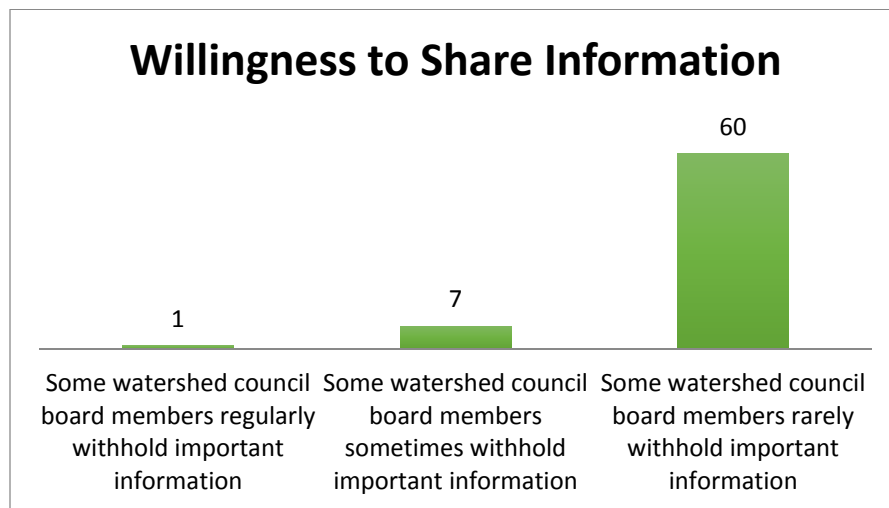

Figure 19: Aggregate Frequency Results for Feedback Mechanism

Whether analyzed in terms of the lowest average score, the lowest frequency of (3), or the highest frequency of (1), having a feedback mechanism is a low scoring factor across the aggregate data. As the above chart shows, the majority of respondents believe that the process for how watershed council board members work together is only *sometimes* evaluated and adjusted, and 13 percent believe it to happen *rarely*. Results from the case study analysis are similar, as all four councils have this factor score relatively low. As the frequency chart below shows, all case study councils show the majority of respondents choosing the (2) option, except for Council D that shows a tie with (2) and (3). It is also worth noting that respondents from

Council A, B, and D answered relatively inconsistently within their board. There seems to be a lacking of a regular feedback mechanism, in addition to a lack of consensus around this topic. The implementation and utilization of a feedback mechanism is therefore a possible opportunity for increasing watershed council success.

Table 10: Case Study Average Scores for Feedback Mechanism

Council A	Council B	Council C	Council D
2.43	2.00	2.00	2.09
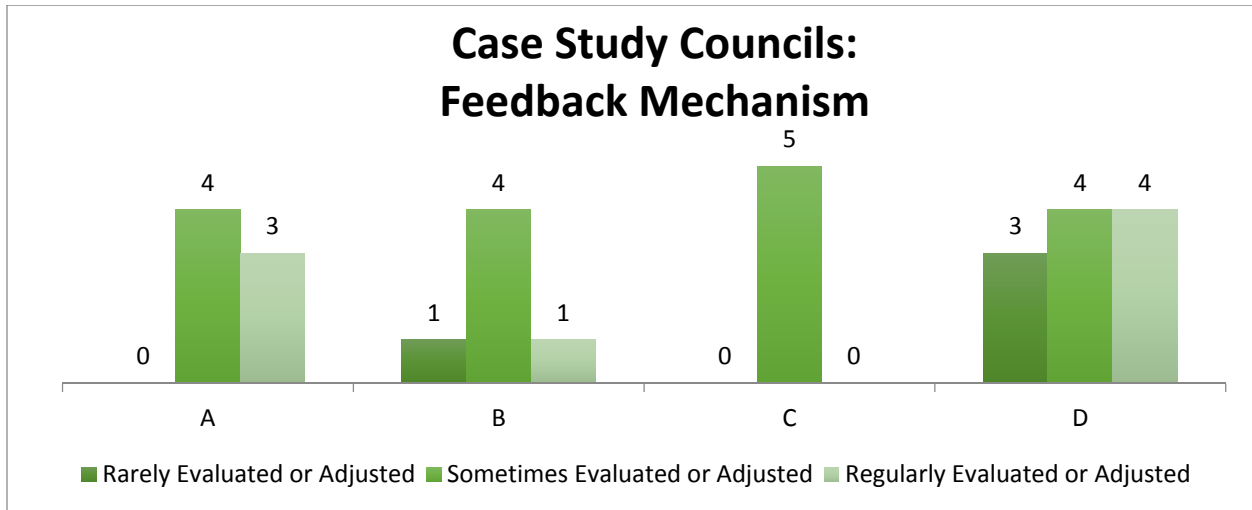
Figure 20: Case Study Frequency Results for Feedback Mechanism

Effective Conflict Resolution
With any group of individuals coming together with different backgrounds and interests, conflict to some degree is inevitable; *how* they deal with conflict, however, can greatly influence the effectiveness of a group. This research used the effective conflict resolution factor to understand the level of trust within a collaborative system and its ability to prohibit past disagreements from hindering council activities. The average score from the aggregate data was 2.72, the mode was 3.00, and the chart below shows the frequency of each answer chosen.
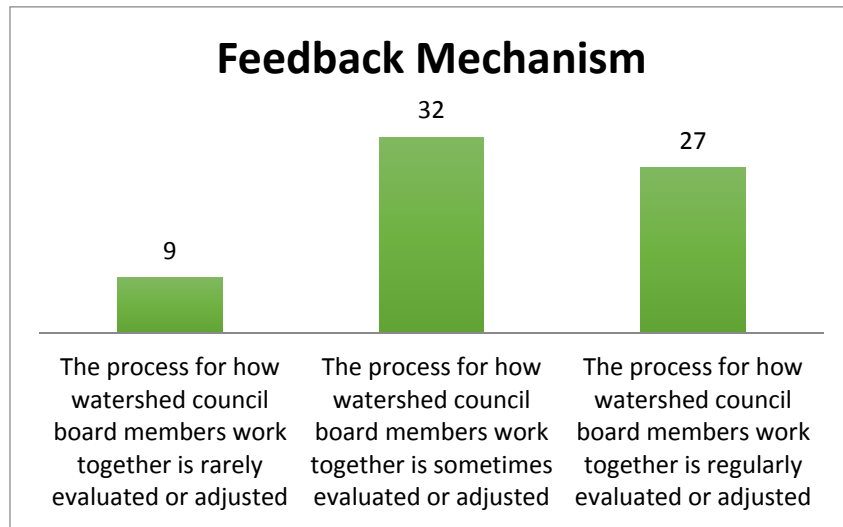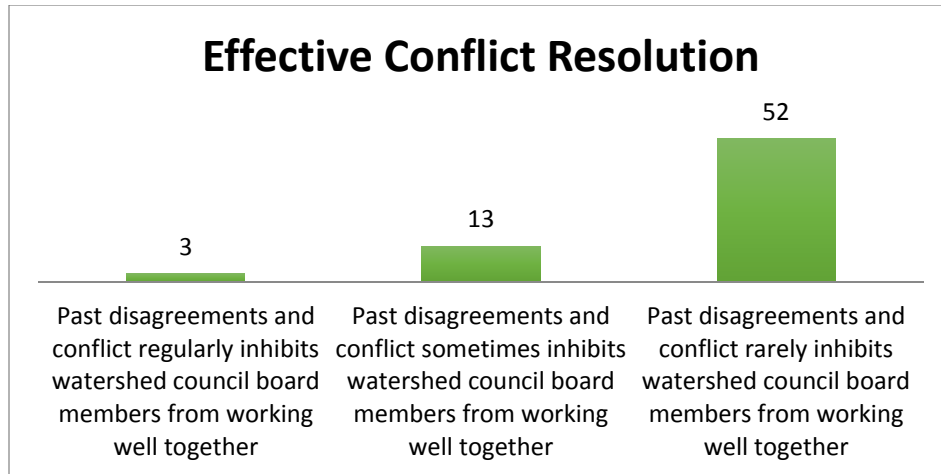
Figure 21: Aggregate Frequency Results for Effective Conflict Resolution

Overall, this factor seems to lie right in the middle of the high and low score categories. It does present as a high scoring factor with any method of analysis, and only makes the list as a low scoring factor when analyzing in terms of the highest frequency of (1). None of the case study councils had it score low, and only Council A had effective conflict resolution score high. Interestingly, Council A had 100 percent of respondents chose (3) that past disagreements *rarely* inhibit the watershed council board members from working together. Based on information gleaned from phone interviews, this may be due to the historical conflict among board members for this group. Judging by this survey, this group has found a way to effectively manage conflict and reduce it over the years, which may in part explain their overall success.

Table 11: Case Study Average Scores for Effective Conflict Resolution

Council A	Council B	Council C	Council D
3.00	2.50	2.60	2.55
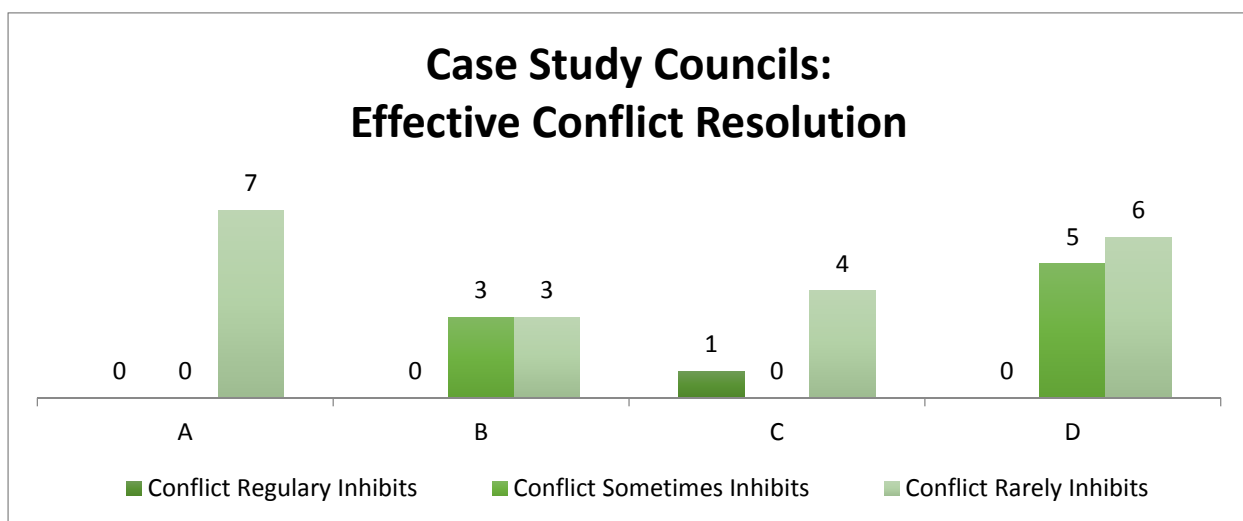
Figure 22: Case Study Frequency Results for Effective Conflict Resolution

Clear Expectations

In addition to having a shared interest in coming together to collaborate, clear expectations of the structure, process, and individual roles are also necessary for successful collaboration. These aid partnerships and enhance accountability. This research evaluated this factor with a survey question to establish member perception. The average score from the aggregate data was 2.86, the mode was 3.00, and the chart below shows the frequency of each answer chosen.
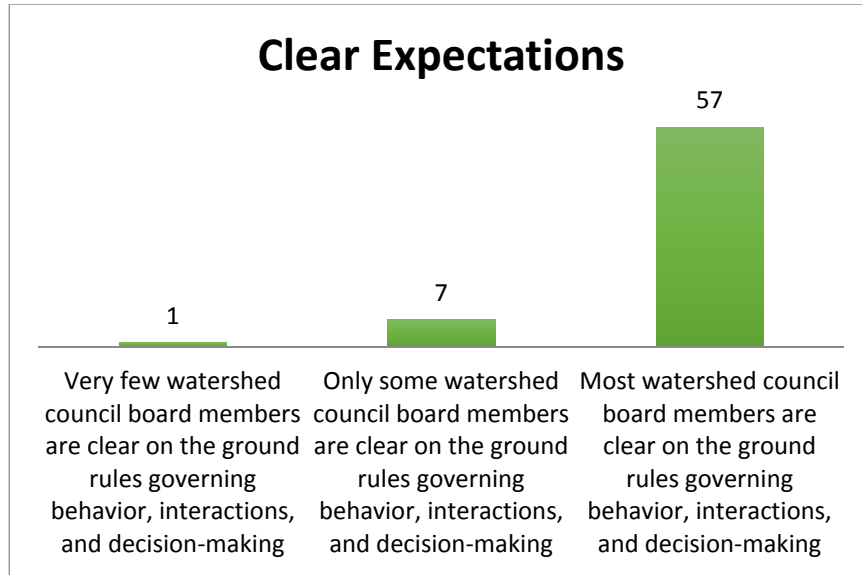
Figure 23: Aggregate Frequency Results for Clear Expectations

Whether analyzed in terms of the highest average score, the highest frequency of (3), or the lowest frequency of (1), establishing clear expectations was a high scoring factor across the aggregate data. It also scored high for all four case study watershed councils. Overall, it seems watershed councils effectively execute this aspect of collaboration.

Table 12: Case Study Average Scores for Clear Expectations

Council A	Council B	Council C	Council D
3.00	2.83	3.00	2.90
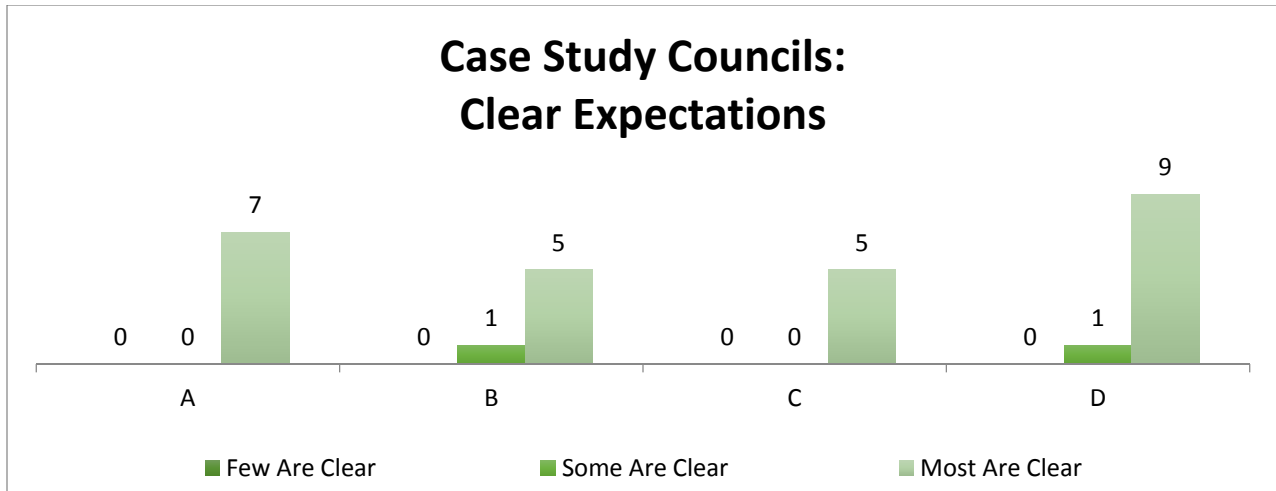
Figure 24: Case Study Frequency Results for Clear Expectations

Invulnerability to External Changes
This factor identifies the watershed council's susceptibility to external changes or pressures. These could include changes in policy, sudden loss of funding, danger to the watershed as a whole, etc. This research evaluated this factor by first establishing the top challenges for watershed councils. The survey asked about the greatest challenges the council faces in accomplishing its programmatic objectives. It then provided answer choices and prompted respondents to select three, in order to analyze which challenges were the most pressing.

From the aggregate data, 86 percent of respondents identified funding as a main challenge. This was significantly higher than any other challenge listed. The following table shows the percentage of respondents that chose each option as a top three challenge, and the subsequent chart shows the frequency of each option chosen. The "other" write in section either reiterated other categories or focused on challenges regarding "bureaucratic red tape" and "changing rules from funding sources."

Table 13: Aggregate Perception Results for Top Three Challenges

Top Three Challenge	% of Total Respondents
Funding	86.76%
Community Engagement	38.24%
Administrative Capacity	32.35%
Securing Grants	27.94%
Volunteer Availability	27.94%
Other	17.65%
Lack of Political Support	14.71%
Access to Technical Experts	11.76%
Lack of a Strategic Plan	10.29%
High Turnover	7.35%
Lack of Consensus	4.41%

Frequency of Respondents Choosing Top Three Challenges

Challenge	Number of Respondents
Lack of Consensus	3
High Turnover	5
Lack of a Strategic Plan	7
Access to Technical Experts	8
Lack of Political Support	10
Other	12
Volunteer Availability	19
Securing Grants	19
Administrative Capacity	22
Community Engagement	26
Funding	59

Number of Respondents (68 Total)

Figure 25: Aggregate Frequency Results for Top Three Challenges

In addition, the survey asked a perception question regarding the extent to which external changes are obstacles for the board. The average score from the aggregate data was 2.26, the mode was 2.00, and the chart below shows the frequency of each answer chosen.

Invulnerability to External Changes

Category	Frequency
Legal constraints, new policies, or other changes outside of the council's control are regularly obstacles for the council to achieve its goals	7
Legal constraints, new policies, or other changes outside of the council's control are sometimes obstacles for the council to achieve its goals	36
Legal constraints, new policies, or other changes outside of the council's control are rarely obstacles for the council to achieve its goals	25

Figure 26: Aggregate Frequency Results for Invulnerability to External Changes

Whether analyzed in terms of the lowest average score, the lowest frequency of (3), or the highest frequency of (1), invulnerability to external changes was a low scoring factor across the aggregate data. Average scores for this factor were also low for Councils A, B, and C.

36

Table 14: Case Study Average Scores for Invulnerability to External Changes

Council A	Council B	Council C	Council D
2.43	2.00	2.00	2.45
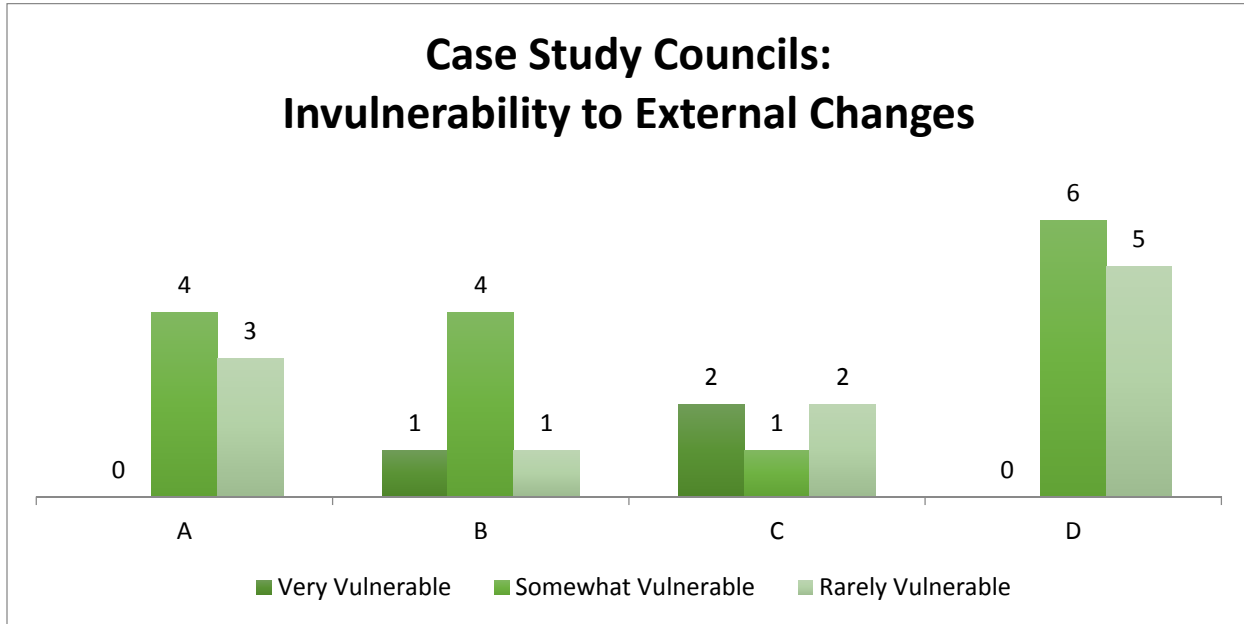
Figure 27: Case Study Frequency Results for Invulnerability to External Changes

As external changes are inevitable, the development of a mechanism or some way to manage them is therefore a possible opportunity for increasing watershed council success. The main challenge for watershed councils is around funding, thereby prioritizing some way to lessen vulnerability around changes in the financial arena. Later in this report, this research analyzes a different factor called *lessening complexity of exchange*. Results from this show not only a strong dependence on OWEB for watershed council funding, but also a difficulty around leveraging resources within the collaborative system. In addition, following the factor analysis this research will discuss the results of the 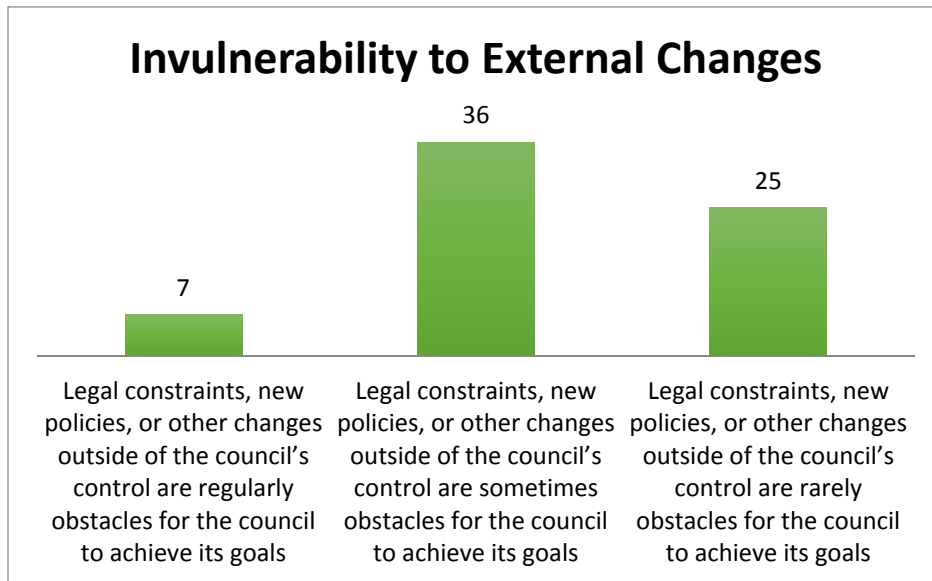collaboration benefits part of the survey. However, it is worth noting here that the *ability to handle uncertainty* was the benefit least experienced across aggregate data, with only 45% of respondents choosing that option. Though there is not enough data to say for certain, there seems to be a connection with the main challenge being funding, a dependence on OWEB, the presence of these of low scoring factors and the lack of a particular benefit.

Mitigating Opportunistic Behavior
Members acting in their self-interest at the expense of the council, or passively free riding without contributing to the council are examples of opportunistic behavior that could be detrimental to overall success. This factor was evaluated with a survey perception question. The average score from the aggregate data was 2.88, the mode was 3.00, and the chart below shows the frequency of each answer chosen.

Figure 28: Aggregate Frequency Results for Mitigating Opportunistic Behavior

Whether analyzed in terms of the highest average score, the highest frequency of (3), or the lowest frequency of (1), the lack or successful mitigation of opportunistic behavior is one of the highest scoring factors across the aggregate data. Results from the case study show this as a high scoring factor for all councils as well.

Table 15: Case Study Average Scores for Mitigating Opportunistic Behavior

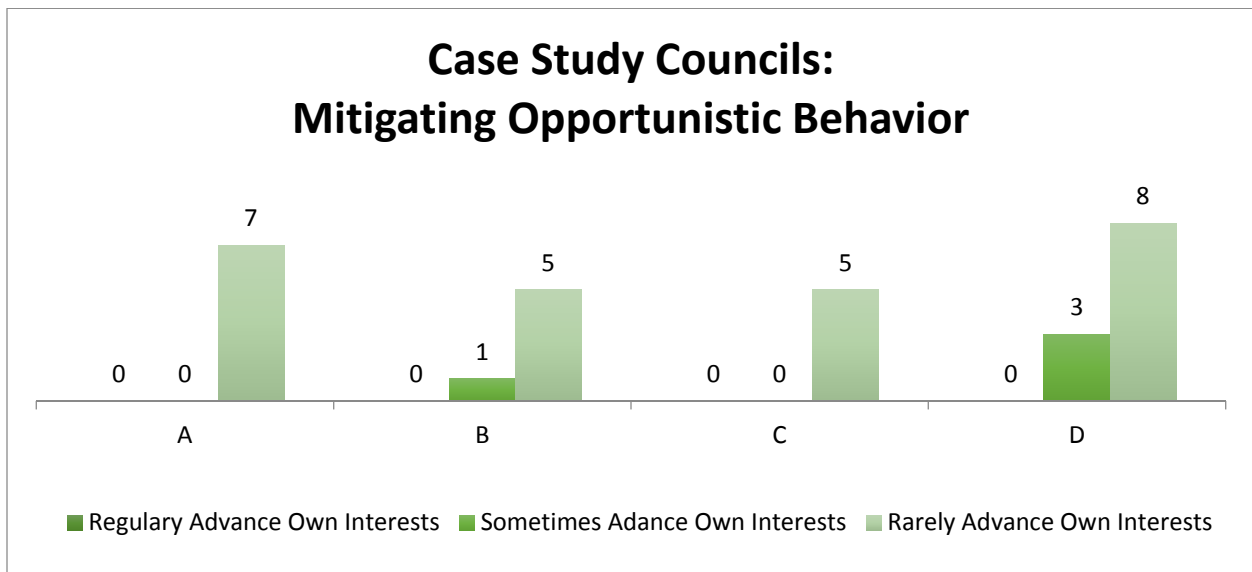| Council A	Council B	Council C	Council D
3.00	2.83	3.00	2.73

Figure 29: Case Study Frequency Results for Mitigating Opportunistic Behavior

Lessening Complexity of Exchanges
With funding cited ubiquitously as the main challenge for watershed councils, the ability to harness resources from the collaborative system becomes essential for overall watershed success. The extent to which this is a challenge or the complexity around these exchanges is therefore an important factor for councils. This factor was first evaluated by asking council members to estimate the percentage of funding that comes from various sources in order to determine a general picture of boards' capacity for attaining needed resources from different parties.

As mentioned earlier, the survey results show a clear reliance on OWEB for funding. The write in sections for "other" were primarily private donations, grants/funding from local government, and from utilities.

Table 16: Aggregate Perception Results of Funding Sources

Funding Source	Average Percentage Perception
OWEB	55.62%
Federal Grants	16.03%
Foundation Support	9.03%
Other	19.32%

This was consistent with the case study watershed councils. Though percentage estimates varied across all four councils, there is a clear dependence on OWEB funding. Only Council A's funding situation differed significantly from the aggregate averages. The average perception of OWEB funding as a percent of overall funding for Council A was at least half of what is represented in aggregate data (27% vs. 55.6%). Funding from "other" sources was more than double that of aggregate data (56% versus 19%) and the write in section mostly listed private donations. Upon further analysis, this research found Council A's watershed to have mixed land use and its board to have active partnerships with other environmental groups, both contributing factors to their ability to leverage non-OWEB resources.

Next, this research asked a question in order to glean members' perspective on the complexity around resource exchange. The average score from the aggregate data was 2.46, the mode was 3.00, and the chart below shows the frequency of each answer chosen.

Lessening Complexity of Exchanges

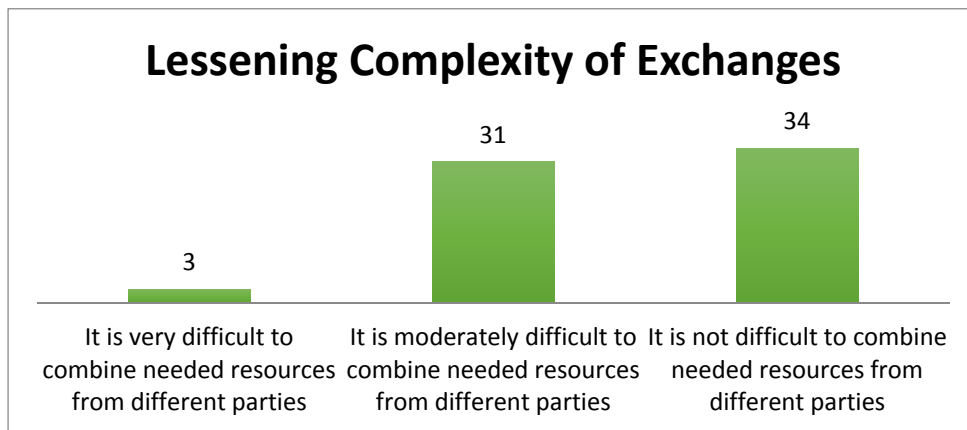|	It is very difficult to combine needed resources from different parties	It is moderately difficult to combine needed resources from different parties	It is not difficult to combine needed resources from different parties
	3	31	34

Figure 30: Aggregate Frequency Results for Lessening Complexity of Exchanges

Whether analyzed in terms of the lowest average score, the lowest frequency of (3), or the highest frequency of (1), complexity of exchange is one of the lowest scoring factors across the aggregate data. However, based on the placement and scores for each analysis method, it seems to be a lower priority than other low scoring factors previously mentioned. Only results from Councils A and D show low scores. However, Council A's average for this factor is actually higher than Council B and C's, and all three had the same number of respondents choose the (2) option; that it is *moderately* difficult to combine resources. Therefore, this factor scoring low for Council A seems to be less about the difficulty around resources, and more due to Council A's scores for other factors being relatively high. In fact, Council A had the highest average factor scores when compared to the other case study councils. Therefore, only Council D seems to have a true difficulty with this factor.

Table 17: Case Study Average Scores for Lessening Complexity of Exchanges

Council A	Council B	Council C	Council D
2.43	2.33	2.20	2.09
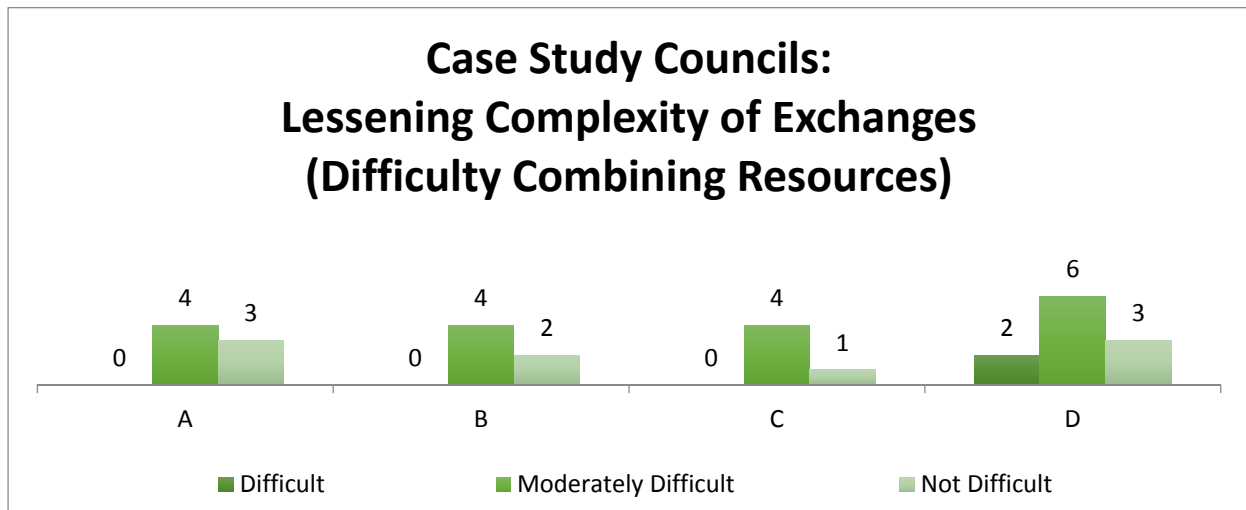
Figure 31: Case Study Frequency Results for Lessening Complexity of Exchanges

Lack or Mitigation of a Threat to Control
With different stakeholders coming together, they bring their various backgrounds, histories and interests. A threat to surrendering autonomy or control, or an overall resistance to change is therefore an important aspect of understanding collaborative systems. This research evaluated this factor with a perception question. The average score from the aggregate data was 2.69, the mode was 3.00, and the chart below shows the frequency of each answer chosen.

Lack or Mitigation of a Threat to Control

- I am concerned that council actions/decisions could limit my organization's ability to act in its own interests: 4
- I am only moderately concerned that council actions/decisions could limit my organization's ability to act in its own interests: 13
- I am not concerned that council actions/decisions could limit my organization's ability to act in its own interests: 50

Figure 32: Aggregate Frequency Results for Lack or Mitigation of a Threat to Control

On the aggregate level, survey results do not show this as a high scoring factor, regardless of the analysis method. It is a low scoring factor, however, but only when analyzed by the highest frequency (1). As the chart above shows, only four respondents chose this option. In addition, none of the four case study watershed councils shows this as a low scoring factor. Interestingly, Council B actually has it score high. This is particularly telling for Council B, as they seem to be the most socially cohesive group according to the survey; members from this council answered questions relatively more consistently than Council A, C or D. Overall, this does not seem like a main concern for watershed councils.

Table 18: Case Study Average Scores for Lack or Mitigation of a Threat to Control

Council A	Council B	Council C	Council D
2.86	2.83	2.60	2.64

Case Study Councils:
Lack or Mitigation of a Threat to Control

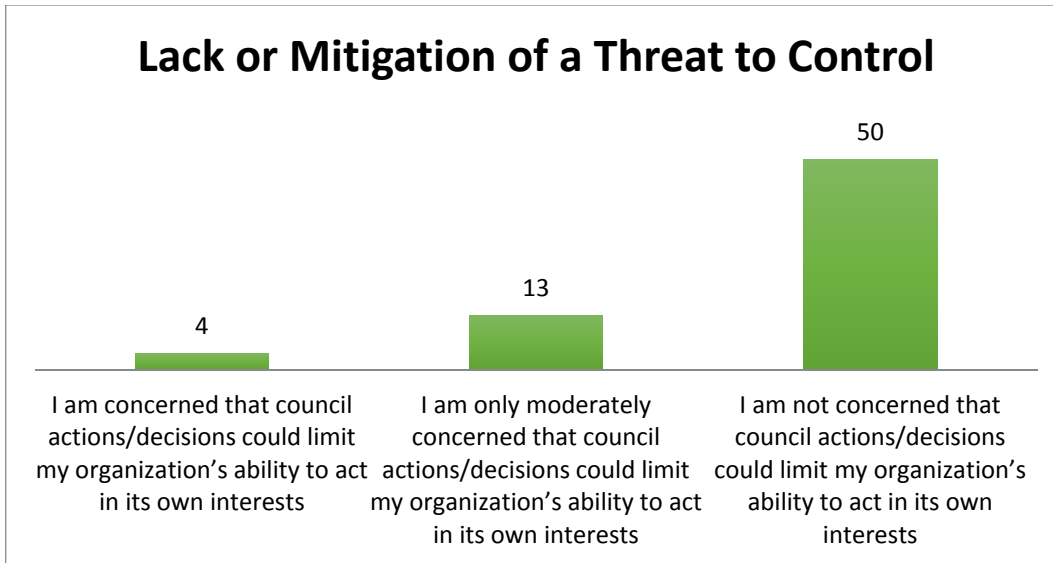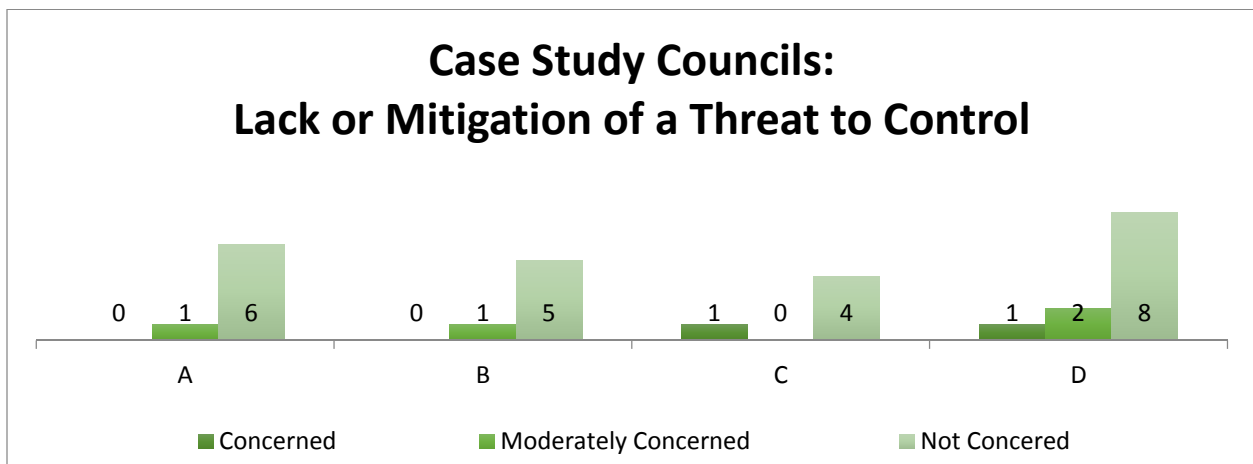|	A	B	C	D
Concerned	0	0	1	1
Moderately Concerned	1	1	0	2
Not Concered	6	5	4	8

Figure 33: Case Study Frequency Results for Lack or Mitigation of a Threat to Control

Open, Repeated Communication
In order for members to build and establish norms, open and repeated communication is a necessary aspect of collaboration. This research analyzed the extent to which councils facilitated this type of discussion through meeting requirements as presented in governance documents, as well as through coordinator interviews.

All four case study watershed councils hold board meetings once a month, pursuant to their bylaws. All meetings have clear agendas allowing time for member updates or some level of group discussion, in addition to any presentations scheduled. During phone interviews, coordinators from all four council expressed their perception of board members as highly participatory. In addition, all four case study councils acknowledged the need for regular membership, and discussed their process for approaching board members with poor attendance. Some processes were very straightforward (members can lose their seat if they miss four meetings a year or per board vote), whereas others are loose (boards should discuss any concerns regarding member attendance and, if deemed necessary, bring it to the attention of the relevant stakeholder group).

Consistent Membership/Low Turnover
As the coordinator position oversees the functioning of the board and provides organizational support, high turnover of this position could leave a board vulnerable. Therefore, in order to evaluate boards in terms of turnover, the survey asked board members about the amount of different coordinators the council employed over the past ten years. They were given the answer choices 1 – 2 (corresponding to "low turnover), 3 – 4 ("moderate"), and more than four ("high"). The results below show the number or respondents that chose each option.
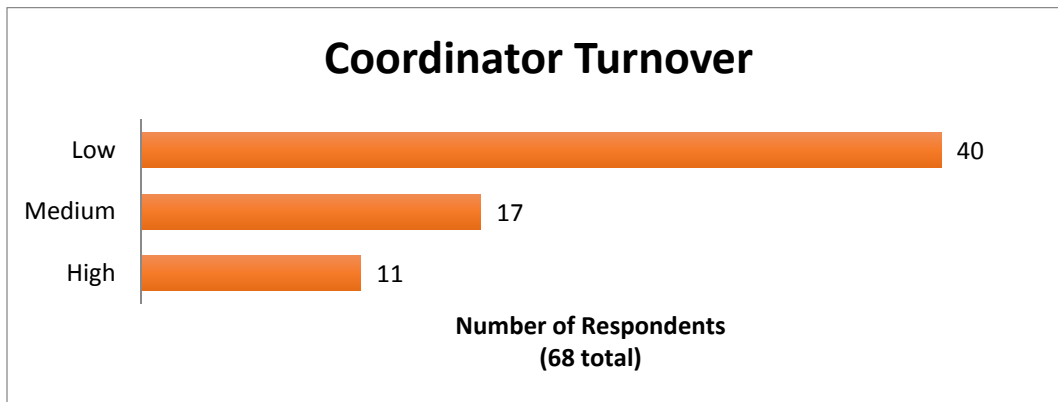

Figure 34: Aggregate Frequency Results for Consistent Membership/Low Turnover

As this factor is more relevant on a watershed level, this research extended analysis to the case study watershed councils.
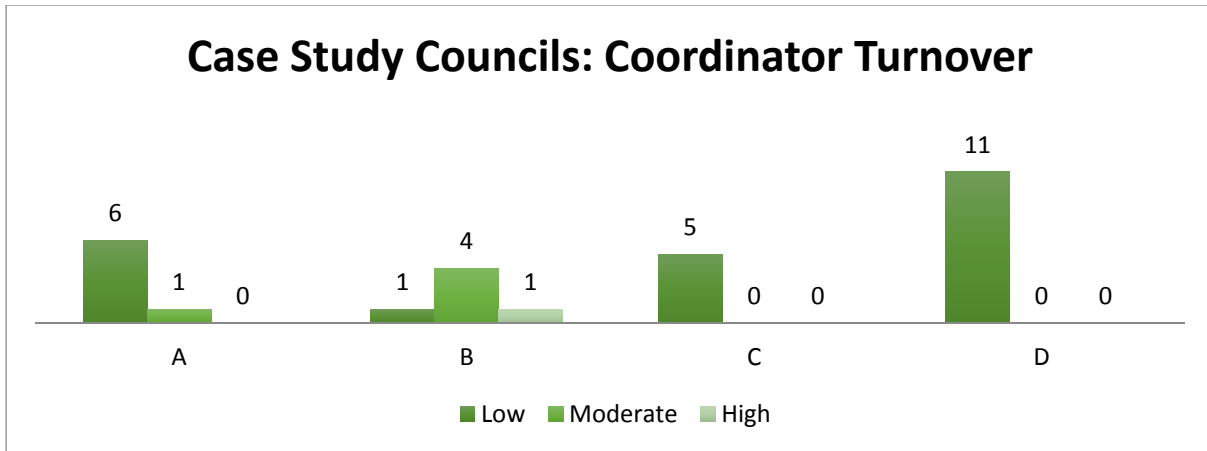
Figure 35: Case Study Frequency Results for Consistent Membership/Low Turnover

The chart above shows low turnover for Councils A, C, and D. Only Council B has moderate turnover. Council B's write in sections from the survey reflected an overall appreciation for the current coordinator, and an acknowledgment he or she has worked hard to resolve issues Council B previously had.

The method of evaluation for the following two factors of collaboration differ from any previously presented. Here, this research was less interested in the answers to the survey questions, and more so in the consistency of how the members within a single board answered. Therefore, these are best understood on the watershed level.

Balance in Member Risk Perception
This factor establishes how similarly or dissimilarly the board members within a watershed council view the health of the physical watershed. As council objectives are ultimately to improve the watershed, it is advantageous for members of the collaborative system to be on the same page regarding risks. For assessing risk perception, all members were asked to describe how healthy the physical watershed they represent is (not healthy, moderately healthy, or healthy). These translate to the "1, 2, 3" scale as well. By first finding the average, this study established the sum of the absolute values representing the difference between each specific board member's response and the average. That way, the summation would show an overall deviation from the mean. Judging on the response rate, a relative scale was developed in order to group responses as inconsistent, moderately consistent, or consistent (1, 2, 3 respectively). By keeping the results quantified on the 1 – 3 scale, this research could assess these along with the other factors. The table below shows each group's score for this factor.

Table 19: Aggregate and Case Study Results for Balance in Member Risk Perception

Group	Score
Aggregate	3
Council D	3
Council A	2
Council B	2
Council C	2

43
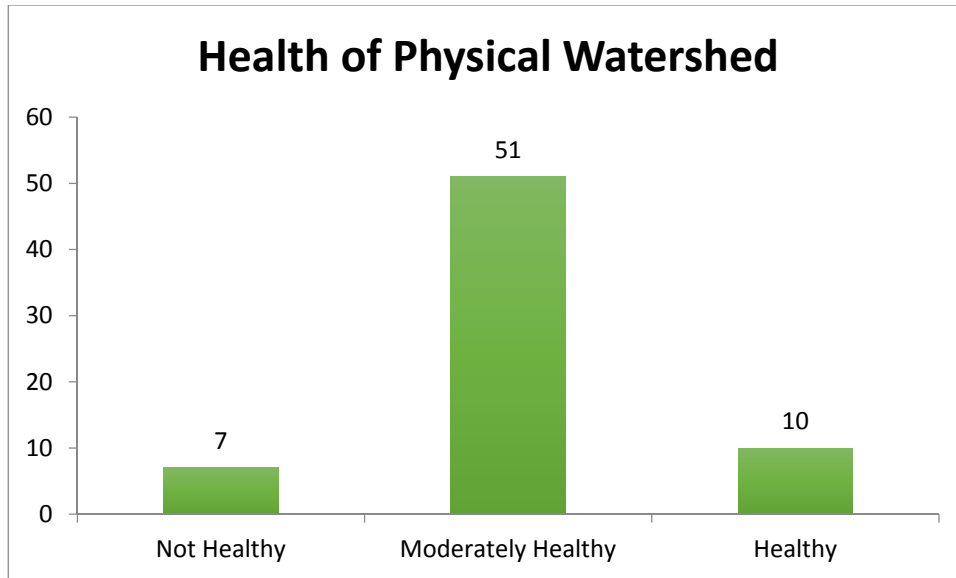
Figure 36: Aggregate Frequency Results for Balance in Member Risk Perception
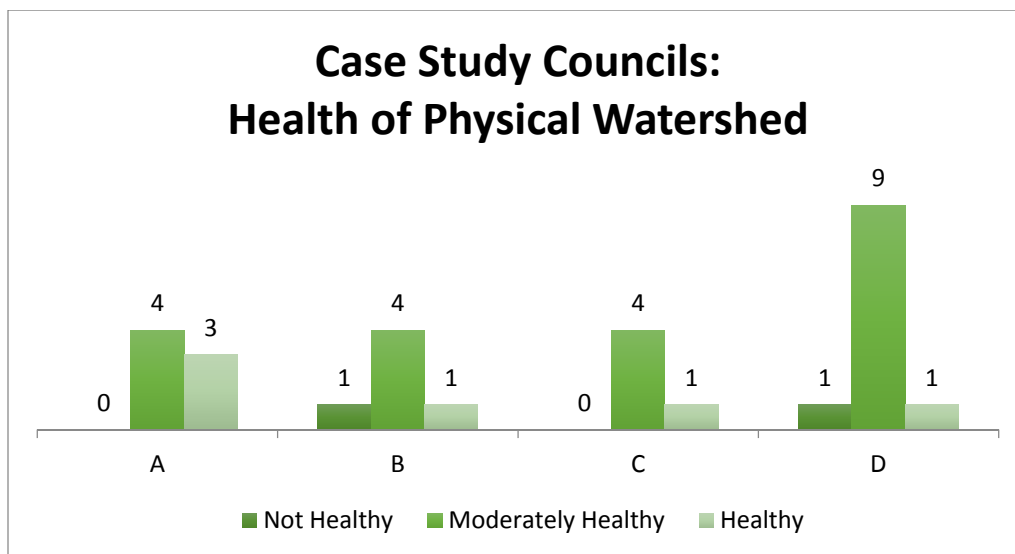
Figure 37: Case Study Frequency Results for Balance in Member Risk Perception

The aggregate results for this factor show a consistency around the identification of watersheds as "moderately healthy." In addition, Council D was consistent with 9 out of 11 respondents also choosing the (2) option. Respondents from Council A were evenly split between the (2) and (3) options, giving it a moderately consistent ranking. Both Councils B and C have so few members and respondents that any deviation from the mean greatly influences their consistency score. Both show a moderate consistency as well.

Balance in Costs and Benefits
Similar to the risk perception question, balance in costs and benefits evaluates how similar or dissimilar the stakes are for different members. If some members have a lot to lose while others do not, it could affect overall buy in and cooperation for the collaborative system. The same

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process was used here in order to assess how consistent the costs and benefits are within a single watershed council board. The survey asked all members to identify the extent to which their own interests or operations would suffer if the council was ineffective or took no action. The survey gave the answer choices that personal interests or operations would severely suffer (1), somewhat suffer (2), or not suffer (3). After evaluating the responses in terms of consistency, the table below shows each group's score for this factor.

Table 20: Aggregate and Case Study Results for Balance in Costs and Benefits

Group	Score
Aggregate	2
Council A	2
Council B	2
Council D	2
Council C	1

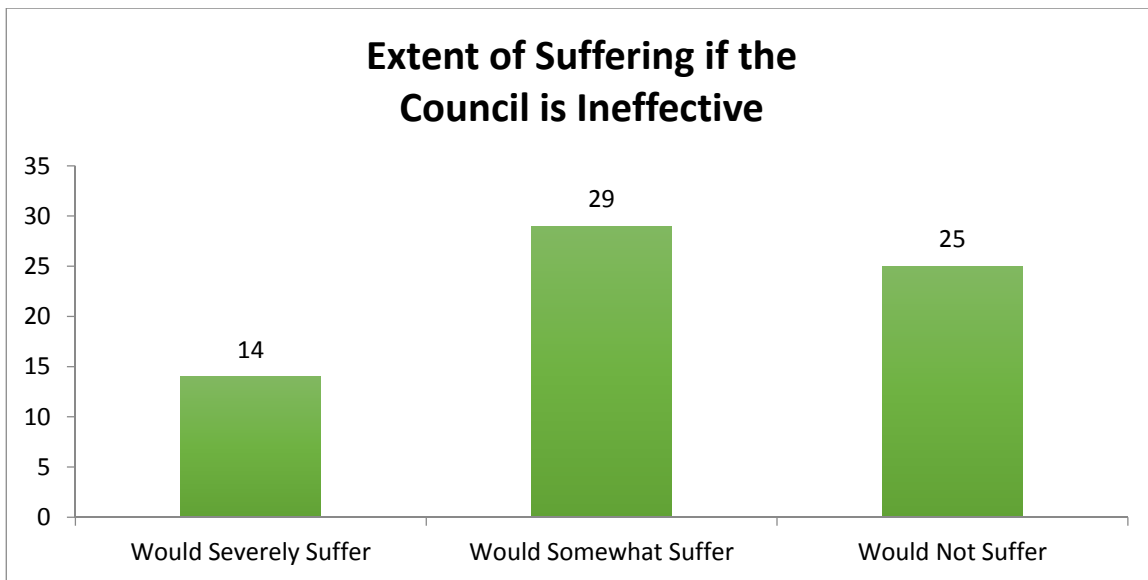*Figure 38: Aggregate Frequency Results for Balance in Costs and Benefits*
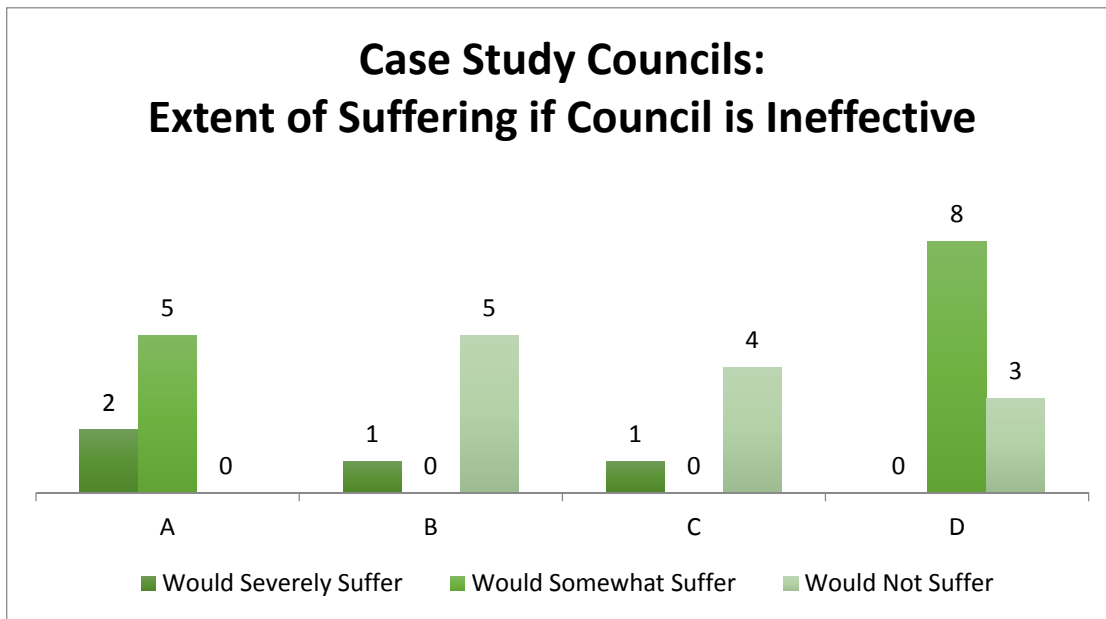
Figure 39: Case Study Frequency Results for Balance in Costs and Benefits

The aggregate results for this factor show a moderate consistency around member costs and benefits. The majority of respondents are almost evenly split between feeling their personal interests would somewhat suffer or not suffer. Councils A, B, and D were also moderately consistent, with the majority of respondents from A and D feeling their interests would somewhat suffer and respondents from B feeling their interests would not suffer. Only Council C scored as inconsistent for this factor. Again, between Council C having a small number of members and respondents, any deviation from the mean is significant. Here it is especially so since four respondents felt their interests would not suffer while one felt their interests would severely suffer. This split within a small group could lead to other difficulties for the council, particularly involving any decisions around council actions that worry the one member that has a lot to lose.

Benefits
Aggregate Analysis
The benefits of collaboration taken and consolidated from the literature were used as a tool to measure overall collaborative system success. The survey provided the list of benefits and asked respondents to choose all outcomes that have resulted from the functioning of their watershed council. The percent of respondents that chose each option is in the table below, and the number of respondents choosing each option is in the subsequent chart. The "other" write in section primarily listed better collaboration around projects, enhanced watershed restoration, and improved community outreach/engagement.

Table 21: Aggregate Results for Benefits Experienced

Possible Collaboration Benefit	Percentage of Respondents
Improved decision-making and problem-solving to reach solutions that reflect the diverse interests within the watershed council	94.12%
Improved relationships among watershed council board members	79.41%
Increased access to resources (new information, problem-solving techniques, technology, etc.)	75.00%
More efficient structuring and managing of watershed-level decisions or actions	69.12%
Effective resolution of watershed conflicts	47.06%
Increased ability to handle uncertainty and adapt to changing circumstances	45.59%
Other	19.12%

The majority of respondents believe the functioning of their watershed council has led to improved decision-making, improved relationships, increased access to resources, and more efficient structuring. Only 47% experienced effective resolution of conflicts and only 45% see an increased ability to handle uncertainty.
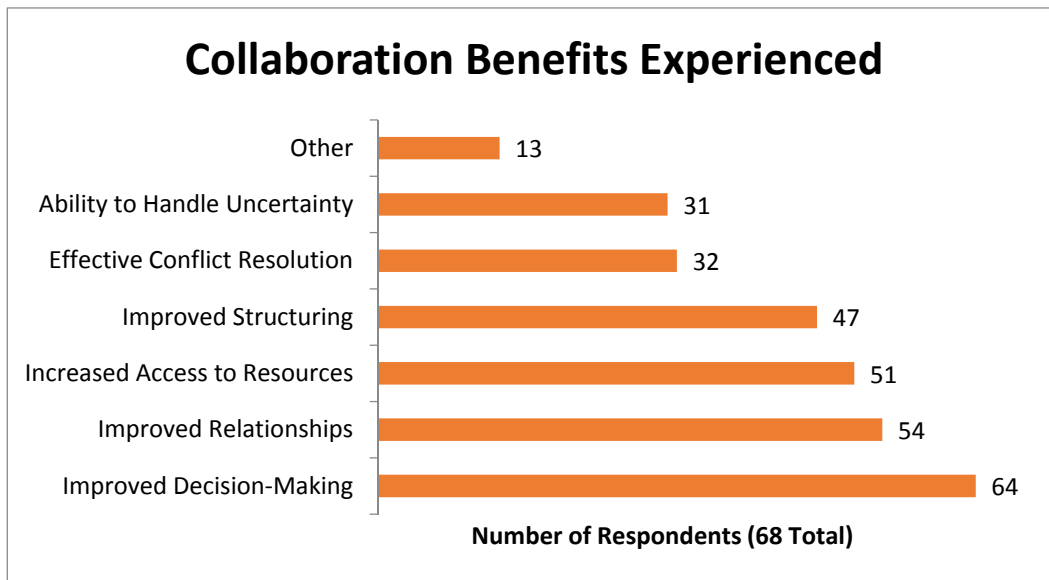
Figure 40: Aggregate Frequency Results for Benefits Experienced

Similar to the stakeholder representation information, this research also evaluated if the majority of respondents experienced a certain number of benefits. The chart below shows the number of benefit categories, excluding the "other," along the X-axis (1 – 6). The Y-axis shows the percent of respondents that said to have experienced each number of benefit categories.
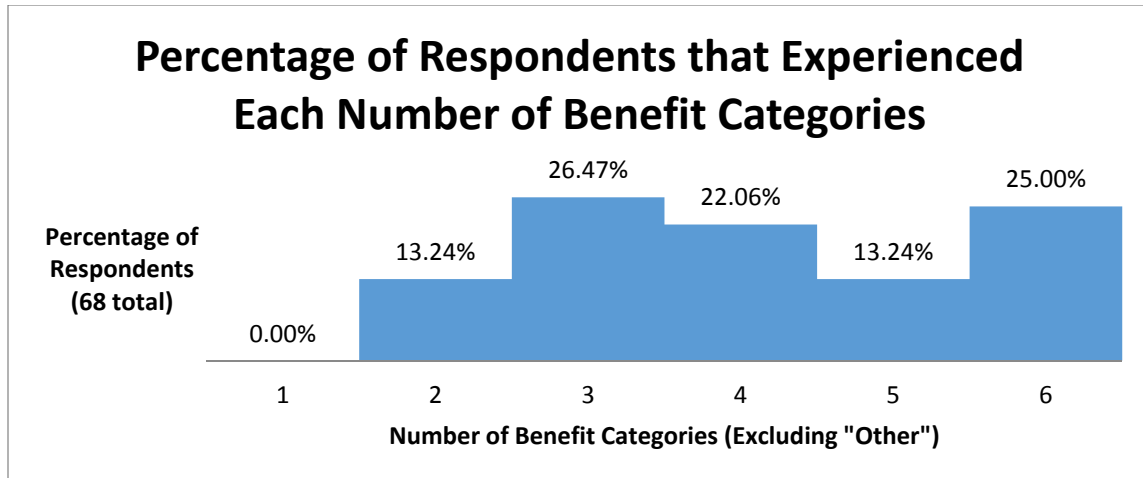
Figure 41: Aggregate Percentages Identifying Each Number of Benefit Categories

As the above chart shows, twenty-five percent of respondents feel they have experienced all benefits of collaboration. The majority (62%) believe to have experienced four or less. This shows that watershed councils are experiencing benefits of collaboration overall, but there are varying levels in terms of *which* benefits and *how many* among councils.

Case Study Analysis
The case study results also highlight the variation in terms of collaboration benefits. First, this research calculated the average percent of members from each case study that said their council experienced each benefit. Then, it averaged those figures to create a total weighted average of benefits received by Councils A, B, C, and D. As the table below shows, there is significant variation among the councils. In terms of weighted average, Council A believes to be receiving the most amount of benefits (69.05%). Council B's weighted average comes to 61.11%, followed closely by Council D at 60.61%. Council C shows significantly less benefits experienced with 53%.

Table 22: Case Study Results for Benefits Analysis

Benefits (W/O "Other")	A	B	D	C
Improved Decision-Making	85.71%	100.00%	81.82%	80.00%
Effective Conflict Resolution	42.86%	16.67%	27.27%	0.00%
Improved Relationships	85.71%	83.33%	100.00%	40.00%
Increased Access to Resources	100.00%	50.00%	90.91%	40.00%
Improved Structuring	57.14%	66.67%	36.36%	80.00%
Ability to Handle Uncertainty	42.86%	50.00%	27.27%	80.00%
AVERAGE	**69.05%**	**61.11%**	**60.61%**	**53.33%**

Establishing why some councils receive some benefits of collaboration and others do not aligns with this research's first objective regarding the relationship between collaboration factors and collaboration benefits.

Analysis

Objective 1: *Develop a construct for collaborative systems and test it through application to the boards of Oregon's watershed councils.*

According to the theory presented earlier in this report, there are several factors effecting collaborative performance. After developing a construct for collaborative systems, this research conducted a factor analysis, resulting in average factor scores in terms of the aggregate data as well as for the case study councils. As several factors are more relevant on the watershed level, this research analyzed the factor-benefit relationship by using data from the four case studies. The table below shows the average scores for each factor for Councils A – D. The final row shows the average of all the scores together. Council A has the highest overall factor score average at 2.59. Next is Council D with 2.52, Council B at 2.43 and finally Council C with 2.41.

Table 23: Case Study Average Factor Scores

FACTORS	A	D	B	C
Identification of shared interest	2.857	2.636	2.667	2.800
Perceived interdependence: Individual dependence on the group	2.571	2.400	3.000	3.000
Perceived interdependence: Group dependence on an individual	1.429	1.909	1.167	1.200
Avoiding power imbalance: Neutrality	3.000	3.000	3.000	3.000
Avoiding power imbalance: Equality	2.857	2.909	2.667	2.800
Willingness to share information and resources	3.000	2.636	2.667	3.000
Evaluation and feedback mechanism	2.429	2.091	2.000	2.000
Effective conflict resolution	3.000	2.545	2.500	2.600
Clear expectations, commitments, and roles	3.000	2.900	2.833	3.000
Invulnerability to external changes	2.429	2.455	2.000	2.000
Mitigating or lacking of opportunistic behavior	3.000	2.727	2.833	3.000
Lessening complexity of exchanges/high transaction costs	2.429	2.091	2.333	2.200
Balance in member risk, risk perception, and risk aversion	2.000	3.000	2.000	2.000
Balance in member costs and benefits	2.000	2.000	2.000	1.000

Mitigation or lack of a cultural/organizational threat to control	2.857	2.636	2.833	2.600
AVERAGE	2.590	2.529	2.433	2.413

In order to evaluate if there is a relationship between these collaboration factors and possible benefits, this research first used a scatter plot to test a linear relationship. The graph below shows average factor scores along the X-axis and the average benefit percentages along the Y-axis. The four points on the graph represent the four case study watershed councils. Though limited data prohibits applying this finding across all watershed councils, this research did establish a clear positive linear relationship from the data available.
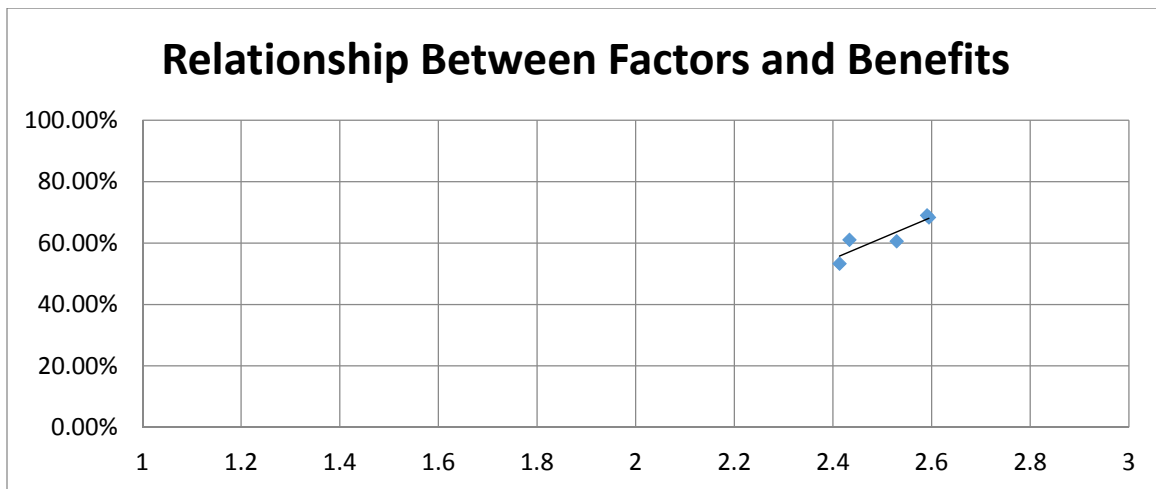

Figure 42: Linear Analysis for Factors and Benefits

This research tested the positive relationship further through a regression analysis. The constant was set at zero for this analysis for two reasons. The first is that all factors were rewritten to follow the 1 – 3 scale, thereby getting closer to their positive iteration as the score increases. As a one represents the "negative" iteration of this factor, the ability for a factor to have both a positive or negative effect is already in the model. Secondly, if the constant could be less than zero, the absence of factors would lead to a negative percentage of benefits, which does not make sense within this model.

The results of the regression are below. The R Square value was high with a value of 0.995421676. The standard error was 0.047876565.

Table 24: Regression Analysis Results for Factors and Benefits

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0	N/A	N/A	N/A	N/A	N/A
X Variable	0.24527419	0.00960375	25.5394129	0.00013165	0.21471076	0.27583761

The regression analysis results also show a positive relationship between the factors and benefits. The coefficient for the "X Variable" (representing the average overall factor scores) is .2452, though there was not sufficient data to test the validity of this figure. Nevertheless, the regression

analysis did show a low enough p-value to be statistically significant. Therefore, based on the data available, this research found that better performance with collaboration factors could increase the collaboration benefits experienced, thereby corroborating the theoretical literature.

Objective 2: *Identify where watershed councils are proficient and where there are opportunities for enhancing board collaborative performance.*

Since this research identified a positive relationship between the factors and benefits, the various methods for ranking factor scores become useful in identifying where watershed councils are proficient and where there are opportunities for enhancing the board performance. The next section will highlight the high and low scoring factors for these collaborative systems.

Table 25: High Scoring Factors

Analysis Method	Factor	Value
By Mean	Neutrality	2.96
	Mitigating Opportunistic Behavior	2.88
	Willingness to Share Information	2.87
	Clear Expectations	2.86
	Equality	2.85
Highest frequency of (3)	Neutrality	66
	Mitigating Opportunistic Behavior	60
	Willingness to Share Information	60
	Equality	58
	Clear Expectations	57
Lowest frequency of (1)	Individual Dependence on Group	0
	Equality	0
	Mitigating Opportunistic Behavior	0
	Shared Interest	1
	Clear Expectations	1
	Willingness to Share Information	1
	Neutrality	1

As the above chart shows, regardless of analysis method, creating a neutral forum, mitigating opportunistic behavior, having an overall willingness to share information, setting clear expectations, and institutionalizing a system of equality are all high scoring factors across the aggregate data. In general, watershed councils seem to understand the advantage of these aspects of collaboration and have successfully executed them with various structures and processes.

Structure can be particularly helpful with creating equality, neutrality and setting clear expectations within collaborative system. These are all aspects where good governance can positively influence how members of the system feel. Neutrality, for example, had 66 out of 68 respondents choose the (3) option; that board meetings are run in a fair and unbiased manner. All four case study councils had perfect scores for this factor as well. The case study councils also all had bylaws governing the meetings, which members are able to amend through a formal process.

They all create meeting agendas to outline the purpose of each meeting, and all include some mechanism for group discussion or individual input from all members at meetings. In general, these three factors seem very straightforward in terms of the literature, as well as from watershed council board member survey responses.

Good governance alone, however, cannot handle willingness to share information or mitigating opportunistic behavior. Performance in these two factors is also reliant on the members themselves (how they view each other and how they work together). Interestingly, the frequency analysis results from the four case study councils (pictured below) show almost identical results for these two questions. In terms of the aggregate data, the average factor scores are only different by .01 and 60 respondents chose the (3) option for both factors. Intuitively, it makes sense that the absence of opportunistic behavior would aid in enhancing a willingness to share information, and visa versa. Judging by the data available, these two factors seem to go hand in hand
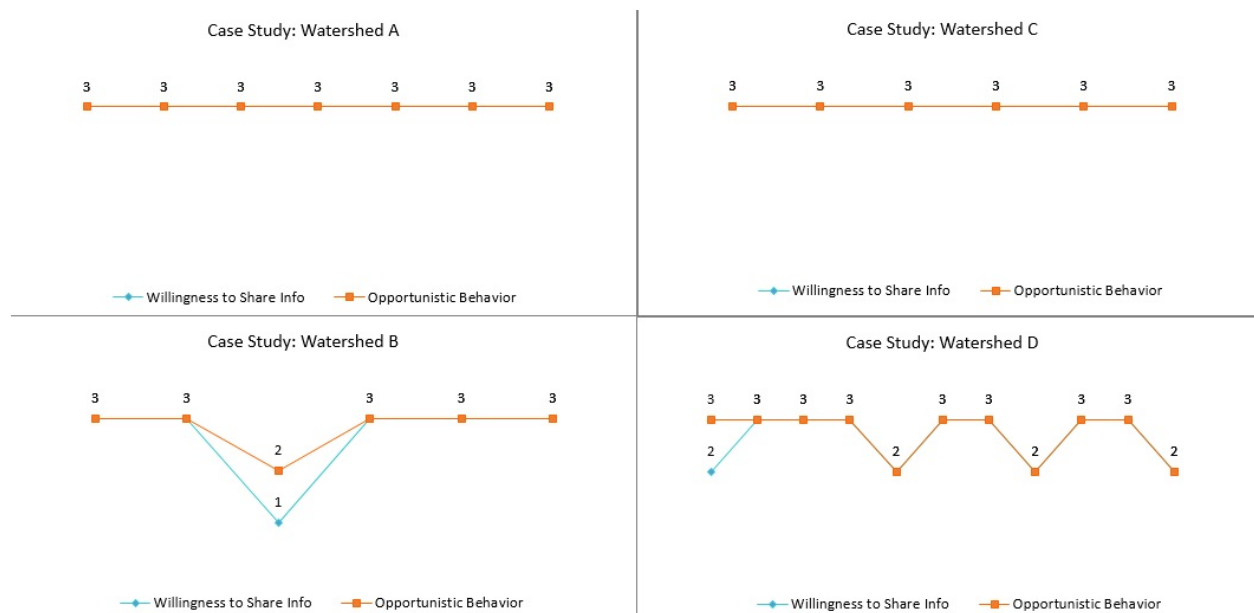
Figure 43: Comparative Case Study Frequency Results for Willingness to Share Information and Mitigating Opportunistic Behavior

In terms of the lowest frequency of (1) method, two additional factors fall into the high scoring category as both of them only had one respondent out of the 68 total choose the (1) option. These are establishing a shared interest among members as well as cultivating an individual dependence on group. As previously stated, further analysis showed both of these factors to actually fall in the middle of factor ranking. This may be due to ambiguity around the subject matter, or inconsistent results due to the context-specific nature of these factors. For example, results from the case study analysis for individual dependence on the group showed a split among small and large councils, with smaller councils scoring higher on average. Clearly establishing the shared interest seems to be an area where watershed councils can improve, but results do not show it is as a priority.

Table 26: Low Scoring Factors

Analysis Method	Factor	Value
By Mean	Group Dependence on Individual	1.74
	Invulnerability to External Changes	2.26
	Feedback Mechanism	2.26
	Lessening Complexity of Exchanges	2.46
	Individual Dependence on Group	2.68
Lowest frequency of (3)	Group Dependence on Individual	8
	Invulnerability to External Changes	25
	Feedback Mechanism	27
	Lessening Complexity of Exchanges	34
	Individual Dependence on Group	44
Highest frequency of (1)	Group Dependence on Individual	26
	Feedback Mechanism	9
	Invulnerability to External Changes	7
	Lack or Mitigation of a Threat to Control	4
	Lessening Complexity of Exchanges	3
	Effective Conflict Resolution	3

Despite the method of analysis, having a group dependence on an individual, invulnerability to external changes, having a feedback mechanism, and lessening complexity of exchanges were low scoring factors across the aggregate data. As previously mentioned, making individuals feel essential to the process is the main barrier in terms of the survey results as this factor scored significantly lower than any other factor. As the research answered objective one by bundling all collaboration factors together and there is not enough data to conduct regression analysis on individual factors, it is difficult to evaluate the extent to which any factor effects benefits on its own. However, by looking at the small subgroup of survey respondents that chose the (3) option (eight total) this research was able to compare results and better understand this individual factor relationship. The eight individuals who felt their council would be unable to accomplish its goals without them showed an average benefit percentage of 83%, a stark difference from the aggregate's 68%. Not only is this particular factor an opportunity to increase council success as the factor score is so low, it also seems to have an influence on overall benefit maximization.

As previously mentioned, there seems to be a connection between two other top barriers, invulnerability to external changes and lessening complexity of exchanges. According to member perception, the main challenge for watershed councils is around funding, most councils are heavily dependent on OWEB funding, and many struggle to leverage resources from within their collaborative system. Council A presents a set of unique circumstances that may be of interest to other watershed councils. Council A is significantly less reliant on OWEB funding and scores highest on the lessening complexity of exchanges factor compared to other case study councils. Council A uses its mixed land use to form partnerships with other groups and gain access to new resource streams. This highlights a general opportunity for watershed councils to

strategize a way to lessen vulnerability around any monetary or funding changes, possibly through funding diversification.

The feedback mechanism factor is more straightforward than these other low scoring factors for watershed councils. The majority of respondents from the aggregate data and the case study councils feel the board's process is only *sometimes* evaluated and adjusted. As previously mentioned, there was also an overall inconsistency around this factor, showing a possible lack of transparency regarding a formal feedback mechanism. As this research shows an increase in factor scores correlating with an increase in collaboration benefits, creating a clear, regular feedback mechanism may be a great opportunity to enhance board collaborative performance.

Further Research

This project has identified several avenues for continuing analysis of collaborative systems. Firstly, the process can be continued by reaching out to more Oregon watershed councils and increasing the overall sample size. It may be advantageous to take a different approach; perhaps reaching out to board members directly as opposed to going through coordinators. A future project could repeat the same methodology used here with a larger sample size. This would provide more validity to the relationship assessment between the factors and benefits. Furthermore, with more data, a future project could utilize regression analysis to test correlations between individual factors and specific benefits (the small sample size here required all factors to be averaged together, and all benefits together, in order to have meaningful analysis). For example, since fostering a group dependence on individual members was the lowest scoring factor across various data groupings and analysis methods, a greater sample size and factor-level regression analysis could show the influence of this factor on each collaboration benefit. If applied to all factors and benefits, results could aid watershed councils in focusing their efforts around the specific outcomes they wish to achieve.

In addition to repeating this process, a future project could build upon this research by surveying members on various watershed council committees. Many watershed council boards have recently shifted to working more on governance and administrative tasks, and committees handle projects regarding watershed restoration or enhancement. The various stakeholders needed to identify and successfully implement such projects usually comprise these committees and therefore would provide an interesting addition to this work.

Another recent development that may be of interest is watershed council mergers. In order to expand capacity, increase access to resources, among other reasons, there have been several mergers in recent years and several proposed mergers currently. A future project could conduct similar analysis on the watershed councils before and after a merger to see how the process changed collaborative functioning. In addition, watershed councils could use this survey during the merger deliberation process as a means to identify individual watershed council strengths and weaknesses. This could help in the formation of complementary relationships and skillsets through the proposed partnership.

Finally, since literature regarding collaborative systems in general inspired the construct's content, the survey is applicable to any collaborative systems, not just watershed councils. A newly formed collaborative system may be of particular interest. A future project could compare results from a new system with watershed councils, a longstanding system, to see how similar or dissimilar factors and benefits rank.

Conclusion

The results of the regression analysis showed a positive relationship between the factors and benefits. Therefore, based on this preliminary research, better performance with the collaboration factors presented could increase the collaboration benefits experienced, thereby corroborating the theoretical literature. In light of these findings, identifying factors where the watershed councils are proficient and where there is an opportunity for improvement can aid in enhancing overall board collaborative performance.

The high scoring factors where watershed councils exhibited proficiency were establishing a neutral forum, institutionalizing a system of equality, setting clear expectations, mitigating opportunistic behavior and creating an atmosphere where members are willing to share information. The first three (neutrality, equality, and clear expectations) were more straightforward in the analysis. In addition, boards effectively established these, at least in part, through their governance structures (bylaws, operating procedures, regular meetings, etc.). The latter two success factors (willingness to share information and mitigating opportunistic behavior) were more complex and boards cannot address them by good governance alone. Performance in these two factors is partially reliant on the interactions and connections among members. This analysis showed a strong relationship between these factors as the frequency analysis results from the four case study councils showed almost identical responses and the average factor scores from aggregate data were only different by .01.

The medium scoring factors were establishing a shared interest, fostering individuals' dependence on the group, effectively resolving conflict, and mitigating members' threat to control. Establishing a shared interest was straightforward in the analysis as a medium factor as scores from the aggregate data and case study council data all showed it in the middle of factor rankings. For the other three factors (individual dependence on the group, effective conflict resolution, and lack or mitigation of a threat to control), the analysis found these to be context specific with varying results by watershed. For individual dependence on the group, the larger councils (A and D) showed medium scores, but it was the highest scoring factor for the two smaller councils (B and C). This suggests a possible greater dependence on the group for members from small collaborative systems. For effective conflict resolution, none of the case study councils showed this as a low scoring factor, and only Council A had conflict resolution as a high scoring factor. As Council A has a history of conflict, these results may reflect a recent shift to effective conflict management and a possible reason for Council A's overall success. Finally, lack or mitigation of a threat to control did not score low for any of the four case study watershed councils and only Council B had it as a high scoring factor. Further analysis showed Council B to be relatively more cohesive group (members responded consistently), possibly explaining this outcome.

The low scoring factors for watershed councils in this analysis were group dependence on an individual, evaluation or feedback mechanism, invulnerability to external changes, and lessening complexity of exchanges. The first two (group dependence on an individual and feedback mechanism) stand on their own in terms of analysis. The latter two (invulnerability to external changes and lessening complex exchanges) seem to be related and therefore present an opportunity for boards to enhance collaborative performance in both areas.

A difficulty to foster group dependence on individual members was the lowest scoring factor for watershed councils. In addition to the significantly lower scores across the aggregate data, Councils A, B, and D all had it as their lowest averaged scores and Council C had it as their second lowest. Further analysis showed the only individuals from the aggregate data who felt their council would be unable to accomplish its goals without them (eight total) also believe to be experiencing significantly more benefits than the aggregate data average (83% vs. 68%). Therefore, this research suggests making individual members feel valued and needed is a significant opportunity for watershed councils to improve their overall board collaborative performance.

The lack of a regular feedback mechanism was apparent across the aggregate data as well as within all four case study councils. As results on the board level were relatively inconsistent among members, this analysis also suggests a lack of consensus or transparency around this factor. Therefore, clear implementation and utilization of a feedback mechanism is a possible opportunity for improving board collaborative performance.

Finally, this research identified a connection between two of the top barriers, invulnerability to external changes and lessening complexity of exchanges. According to member perception, the main challenge for watershed councils was around funding, most watershed councils are heavily dependent on OWEB funding, and many struggle to leverage resources from within their collaborative system. This highlights a need for watershed councils to strategize a way to lessen vulnerability specifically around any monetary or funding changes, possibly with funding diversification. The benefits analysis supported the finding that watershed councils are vulnerable to external changes since the ability to handle uncertainty was the benefit *least* experienced across aggregate data.

This research contributed to the collaboration literature by developing and testing a construct for collaborative systems comprised of commonly cited factors across varied academic disciples. Through application to Oregon's watershed councils, this research acquired preliminary data in order to identify the positive relationship between factors and benefits. In addition, it identified opportunities for enhancing watershed council collaborative performance by ranking these factor scores. Further research is needed to expand the application of these findings, as well as to test these factors in other collaborative systems.

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