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Analyzing the Impact of Governance Strategies on Trust and Risk in the Salish Sea Transboundary Fishery Context

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ANALYZING THE IMPACT OF GOVERNANCE STRATEGIES ON TRUST AND RISK IN THE SALISH SEA TRANSBOUNDARY FISHERY CONTEXT

A Thesis

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ABSTRACT

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The Salish Sea is the site of a transboundary fishery whose coastal jurisdiction includes British Columbia, Washington State, the two federal governments, and many Indigenous tribes with sovereign rights. Fishery management becomes increasingly complex when transboundary cooperation is needed. Furthermore, while the Salish Sea region has attempted to facilitate better transboundary collaborative governance, these have generally failed to institutionalize the principles of adaptive management. This research seeks to assess current trust and risk perceptions and analyze the effects of control mechanisms used in the transboundary fishery management network. The data consists of a survey measuring collaborative precursors, barriers, and outcomes such as trust, perceived risk, and inter-stakeholder influence. Establishing the relationships between types of management approaches and trust and perceived risk will provide the basis for subsequent research aimed at developing a management toolkit for facilitating collaboration in transboundary natural resource management systems.

DEDICATION

The completion of my master's degree would not have been possible without the love and support of my family and friends. Thank you for listening to me talk in circles and helping me wade through my cluttered thoughts.

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CHAPTER I

INTRODUCTION

Ecosystems-based management (EBM) is becoming an increasingly popular way to govern natural resources, especially those that span political borders and jurisdictions. EBM is a type of resource governance that focuses on building, managing, and maintaining collaborative networks to form a complex adaptive system that can respond to wicked environmental problems and changing ecosystems (Imperial, 1999; Lima et al., 2019). Similarly, co-management has also emerged as a popular alternative to traditional centralized top-down approaches. These management approaches focus on forming relationships between multiple levels of governments, civil society, and local communities and thereby sharing the power, authority, and responsibility of managing a natural resource (Béné et al., 2009; Carlsson & Berkes, 2005; Soliku & Schraml, 2020). The goal of these collaborative management approaches is to build local capacities, share benefits, enhance livelihoods, build legitimacy, and manage conflicts (Berkes, 2009; Gutiérrez et al., 2011; Ho et al., 2016; Ming'ate et al., 2014). Alliances in collaborative networks mean that parties maintain autonomy but are still interdependent causing the relationship to be both cooperative and non-cooperative (Delerue, 2005). As a result, conventional hierarchical control mechanisms are less effective. Instead, network members rely on politics, bargaining, negotiation, compromise, and social exchange mechanisms (Lawrence et al., 2002; Phillips et al., 2000; Powell, 1990).

Non-traditional power-sharing EBM structures provide an effective solution to transboundary environmental issues, but the unique and complex nature of these issues makes sustained management difficult. Since no one organization or government has the necessary resources to create feasible and effective solutions, collaboration among a diverse variety of stakeholders is necessary to manage problems and decisions. Governance in these collaborative transboundary networks encompasses more than formal decisions and includes the communication and interactions of a variety of stakeholders that often takes place within a community, not solely at the governmental level (Alper, 2004; Blatter & Ingram, 2000). It includes formal and informal rules, the exchange of resources, and the development of shared norms and structures that govern its relationships which reflects participants' values, ideologies, constituencies, powers, and egos (Aldrich & Whetten, 1981; Bardach, 1998; Frederickson, 1996; Lynn et al., 2000; Milward & Provan, 2000).

There is a high failure rate for collaborative transboundary networks due to the large amount of time and effort needed to develop the relationships and trust required in these partnerships (Bardach, 1998; Wondolleck & Yaffee, 2000). Additionally, governments have a particularly arduous time addressing transboundary issues due to the difficulty of combining management, politics, and science with political, administrative, and cultural differences among participating countries (Cash & Moser, 2000; Bastrup-Birk & Wildemeersch, 2011; Burch, 2010; Harries & Penning-Rowsell, 2011; Munton, 2006). The unique nature of collaborative transboundary networks increases certain risks, therefore, enhancing the importance of control mechanisms and trust-building when trying to understand collaborative performance. Although extensive research has been conducted to understand and better the management of natural resource networks, (see Brondizio et al., 2009; Edelenbos & Eshuis, 2012; Lima et al., 2019;

Rosen & Olsson, 2013; Song et al., 2019; Edelenbos & van Meerkerk, 2015) there are still gaps in the literature regarding what is required for effective transboundary collaboration.

The Salish Sea fishery network presents a key case study for transboundary fishery governance with efforts starting in 1909 with the Transboundary Water Treaty (Wondolleck & Yaffee, 2000). This long, and oftentimes tumultuous, history of inter-jurisdictional governance efforts provides an optimal context for analyzing the relationships between key actors and the mechanisms they use to strengthen and adapt to emerging complex problems. An elaborate network of actors has been cultivated in the Salish Sea region that is continually evolving and shifting to "renegotiate processes for communication, address issues of shared concern and mediation of potential as well as actual conflicts" (Norman & Bakker, 2015). The effective management of this network requires additional research to better understand the control mechanisms that build trust, an important precursor to collaboration, and reduce risk, a key barrier to collaboration.

In the interest of addressing this problem and better understanding the successes and failures of transboundary natural resource management, the aim of this research is to analyze the role of various control mechanisms on risk and trust. The questions asked:

- What are the current trust and risk perceptions among stakeholders in the transboundary fishery governance of the Salish Sea?
- To what extent do control mechanisms impact dimensions of perceived risk in stakeholder relationships?
- To what extent do control mechanisms impact dimensions of trust in stakeholder relationships?

CHAPTER II

THEORETICAL BACKGROUND

2.1 Case Study - The Salish Sea Fishery

The Salish Sea marine ecosystem consists of the Puget Sound, Strait of Georgia, and Strait of Juan de Fuca which includes the major cities of Seattle, Vancouver, Tacoma, Everett, Victoria, Nanaimo, Bellingham, and Olympia (Freelan, 2016) . The area is one of the largest inland seas in the world with the watershed encompassing over 42,000 square miles as well as being one of the most ecologically diverse marine ecosystems in North America (U.S. EPA and Environment Canada, 2008) . The surrounding population relies heavily on the watershed for food, shipping, transportation, and recreation. The multiple metropolitan areas surrounding the watershed are rapidly growing with a projected population of 9.4 million by 2025 making it one of the fastest-growing areas on the continent (Environment Canada, 2002; U.S. EPA and Environment Canada, 2008) . An enormous amount of additional stress will be placed on the already highly exploited watershed making effective management a necessity. Compared to other Canadian-US transboundary efforts in the Great Lakes and the Gulf of Maine, the Salish Sea is less developed with less formalized institutional structures (Hodge & West, 1998) . However, a wide variety of state, provincial, and federal partnerships, non-governmental organizations, and regional working groups have shown they are committed to implementing sustainable scenarios

for the Salish Sea indicating the possibility for international environmental progress (Alper, 2004).

Transboundary water governance efforts between the West Coast of the United States and Canada began with the 1909 Boundary Waters Treaty that formed the International Joint Commission, a governing body that took a mainly observer role in activities in the Salish Sea (Alper, 2004). Most of the 20th century was spent attempting to negotiate water use rights between the two nations with the 1937 Sockeye Salmon Convention and the Pacific Salmon Treaty of 1985 (Shepard & Argue, 2005). In the 1990s, transboundary management efforts increased significantly in the Salish Sea, specifically with the formation of the British Columbia-Washington Environmental Cooperation Council (ECC) in 1992 as the first binational provincial-state organization (Jolly, 1998). The ECC provided a space for regional and state/provincial government officials to create initiatives, share information, and formally establish task forces, workgroups, and committees. The ECC created the Puget Sound Georgia Basin International Task Force in 1994 and the Georgia Basin Ecosystem Initiative (GBEI) in 1998, both with the goal of bringing together a wide variety of stakeholders to address environmental issues in the shared marine environment (Alper, 2004; Wondolleck & Yaffee, 2017). The ECC was successful in providing regular interaction and cooperation among a wide variety of stakeholders and encouraged an ecosystem-based approach to transboundary water governance (Alper, 1996). However, the inability to create an enforceable management plan reduced funding, and staff turnover caused the ECC to take a several-year hiatus from 2007 to 2014 when they were re-formed under new leadership (Norman & Bakker, 2015). Subsequent transboundary governance attempts in the Salish Sea fishery have struggled to overcome difficulties associated with transboundary work.

A major barrier to effective collaboration in the Salish Sea region has been differing governmental structures between the United States and Canada. The differing relationships and power dynamics between the federal government and the states/provinces have been particularly difficult to navigate. Washington State and the EPA have a much more defined and positive relationship compared to British Columbia's relationship with Fisheries and Ocean Canada leading to conflict across and within nations (Wondellock, 2017). Another barrier is the varying levels of commitment among stakeholders to the goals of transboundary work causing there to be a tendency to manage environmental issues politically instead of solving them (Alley, 1998; Wondellock, 2017). This has led efforts to be focused on how to best work together instead of prioritizing the natural resource.

Historically transboundary water governance has focused primarily on formal nation-to-nation governance mechanisms but over the past 30 years, the Canada-US regime has been a rescaling (Furlong, 2010; McCaffrey, 2006; Norman & Bakker, 2015). Transboundary work between Canada and the United States continues to be mainly focused on formal governmental mechanisms but there appears to be an evolution toward community-based activities and ecosystem-based management. This new management approach aims to foster shared beliefs and collective identity, thereby further increasing cooperation (Alper, 2004). However, the diversification of regional and subnational transboundary governance does not automatically lead to greater decision-making capacity, and many of these transboundary initiatives have been unable to sustain cooperation, having failed to reach their management objectives (Norman & Bakker, 2015).

The difficulties in the Salish Sea transboundary network in developing sustained collaborative fishery governance can be analyzed through the policy network's ability to build trust and reduce risk. The development of trust is integral in sustaining collaborative policy

networks due to its ability to increase the network's capacity to collaborate with different actors and implement sustainable solution (Edelenbos & van Meerkerk, 2015). Reducing risk is also a necessary component of sustaining collaboration because the benefits of entering a collaborative governance network must be greater than the perceived risk for collaboration to occur (Supper et al., 2015). A more in-depth understanding of how to build trust and mitigate risk is needed to sustain and adapt current management efforts in the Salish Sea. In what follows, I define control, trust, and risk, and the ways these concepts impact effective collaboration.

2.2 Control, Risk, and Trust - Definitions

Risk management has become a central focus of alliance literature in the environmental sector and beyond. Alliances' high failure rate is attributed to perceived risk, making the risk management capability of an alliance a key factor in its success (Anderson et al., 2014; Schreiner et al., 2009). Two types of alliance risks, both relational and performance were identified by Das and Teng (1996, 2001) with a third type of risk, regulatory risk, being identified by Anderson et al. (2014). Perceived relational risk is the perception of not having adequate cooperation due to the potential for opportunistic behavior (Das & Teng, 2001). Perceived performance risk is the perception that an alliance's objectives will not be achieved despite adequate cooperation (Das & Teng, 2001). This risk type is defined as the perception that an alliance will cause sanctions to be placed on the organization (Anderson et al., 2014). Risk is the subjective assessment and perception of both individuals and stakeholders on possible outcomes, meaning groups may have different risk estimates of the same situation (Das & Teng, 2001). Trust can be seen as the main antecedent of collaboration and a key factor in enhancing the performance of collaborative policy networks (Agranoff, 2007; Edelenbos & van Meerkerk, 2015; Fulmer & Gelfand, 2012; Ostrom, 2003; Ostrom, 2010; Paul et al., 2016; Pretty, 2003; Tsai & Ghoshal, 1998; Wicks et

al.,1999). Studies have highlighted trust as an important driver of natural resource management, specifically water governance networks, due to its ability to stimulate coordination, collective action, and cooperation mechanisms (Adger, 2003; Edelenbos & van Meerkerk, 2015; Ostrom & Ahn, 2003; Vaske et al., 2007). Trust has also been found to increase mutual learning and lower conflict making the diffusion of trust one of the most critical tasks of boundary-spanning network management (Agrano & McGuire, 2001; Coleman & Stern, 2018; Song et al., 2019).

Trust theory has attempted to not only define trust but to break it down into different dimensions to help better guide management decisions. Stern & Coleman (2015) have developed the most robust analysis of the different dimensions of trust. Alternative trust distinctions exist in the literature such as those discussed by Edelenbos & van Meerkerk (2015). However, Stern & Coleman (2015) have written extensively on the antecedents and consequences of differing trust types thereby providing a loose framework for managers and researchers that goes beyond other trust distinctions. In their topology Stern & Coleman (2015) identify four different types of trust: dispositional trust, rational trust, affinitive trust, and procedural trust.

Dispositional trust is defined as a general predisposition to trust or not that changes slowly over time (Stern & Coleman, 2015). Smith et al (2013) found that high levels of dispositional trust may not be common in many natural resource management networks due to the individuals that are most likely to participate in them. Smith et al (2013) explained this counterintuitive finding by stating that people with a general trust in the resource management network are more likely to opt out of the opportunity to participate in the network. A certain amount of distrust or dissent in resource planning efforts is needed to motivate an individual into becoming involved. Rational trust is based on a more economic perspective and focuses on the costs and benefits of the current action based on past performances (Coleman, 1990; Hardin, 2002; Jennings, 1998; Möllering, 2006; Stern, 2008). Affinitive trust focuses on the relationship

between the trustor and the trustee and can be enhanced through feelings of social connectedness, positive shared experiences, and perceived shared identities and values (Braithwaite, 1998; Cvetkovich & Winter, 2003; Stern, 2008). Affinitive trust has been identified as particularly important for conflict resolution in natural resource management due to its ability to contribute to shared problem definitions, mutual understandings of interests, and concern for other stakeholders (Balint et al., 2011; Fisher et al., 1991; Weber & Khademian, 2008). Procedural trust is based on the perceived fairness of procedures and formal control systems in collaborative natural resource management (Tyler 1990). Procedures are viewed as being able to effectively reduce risk, equally distribute benefits and increase transparency allowing participants to place more trust in the compliance of others (Gezelius 2002; Levi and Stoker 2000; Stern 2008; Stern 2010; Suchman 1995; Sunshine and Tyler 2003).

All dimensions of trust are important in natural resource management and can foster differing characteristics of effective collaboration. In the context of transboundary fishery management, Song et al. (2019) found that affinitive trust is crucial for mutual learning and adaptation while procedural trust appeared to have a significant role in achieving goal consensus and conflict reduction. Rational trust appeared to be important for both goal consensus and mutual learning. They also supported current theories that in shallower working relationships, rational trust will be dominant while long-term deeper relationships will have higher affinitive trust (Dietz & Den Hartog, 2006; Lewicki et al., 2006; Pirson & Malhotra, 2011). Song et al. (2019) also analyzed the possible buffering effects of different dimensions of trust. They found that procedural trust appeared to have a buffering effect on conflict reduction when relationships were underdeveloped. Lima et al. (2019) similarly supported Stern and Baird's (2015) concept of the buffering effect of different dimensions of trust, showing that while procedural trust was low in the Gulf of Mexico fishery network, there were high levels of rational and affinitive trust.

Lima et al. (2019) also found that rational trust appeared to have a buffering effect against poorly developed relationships and was able to foster mutual learning and adaptation despite low interaction levels. Although much is known about the effects of trust, little research has explored what management decisions increase different dimensions of trust and how they interact and evolve.

Control mechanisms in collaborative networks can be defined as processes that intend to affect the behavior of people and make elements of the network more predictable through the establishment of standards both formally and informally (Leifer & Mills, 1996; Sohn, 1994,). Control mechanisms are particularly important in transboundary natural resource management because there is a reduction in formal hierarchies between member organizations, even when there is a power differential that exists outside of the collaborative organization (Huxham, 1996). The lack of formal hierarchy means typical directives are not effective and managers must rely on a larger variety of control mechanisms. Research indicates that there is a strong association between the deployment of network control mechanisms and perceived network performance (Agranoff & McGuire, 2001; Cristofoli & Maccio, 2018; Klijn et al., 2010; Meier & O'Toole, 2007; Van Meerkerk et al., 2015).

Most of the literature around control divides it into two categories: formal measure-based control and informal value-based control (Das & Teng, 2001; Eisenhardt, 1985). Das & Teng (2001) separated formal control further into behavior and output control. Behavioral control creates policies, procedures, reporting structure, and training that standardize behavior and role specialization of organization members (Geringer & Hebert, 1989; Heide, 1994; Littler & Leverick, 1995). Output control focuses on measuring outcomes and relies on objective setting, planning, and budgeting to determine what is being measured and how (Geringer and Hebert

1989). Informal control was renamed by Das and Teng (2001) to social control, which relies on the establishment of norms, values, and culture to encourage desirable behavior and outcome.

Previous research has found that even when formal rules are congruent, a difference in norms, values, knowledge, experience, autonomy, and abilities can limit effective collaboration, making social control particularly important in improving outcomes of collaborative networks (Chisholm, 1995; Wondolleck & Yaffee, 2000). Social control builds relationships between a wide variety of stakeholders, which in turn creates a common understanding and legitimizes the ways of thinking and behaviors necessary for cooperation in transboundary environmental governance (Alper, 2004; Cundill & Rodela, 2012; Daniels & Walker, 1996; Young, 1991; Zbicz, 1999). It also allows for social learning among member organizations causing the internalization of norms, thereby increasing an organization's willingness to participate in coordinated action (Bastrup-Birk & Wildemeersch, 2011, Bouwen & Taillieu, 2004). However, social control alone is not enough. Without formal control, these informal agreements and shared social norms will be beholden to the specific context and relationships they were founded in causing them to be lost to staff turnover and changing political landscapes (Imperial, 2005; Lawrence et al., 2002; Leana & Van Buren, 1999). Formal control can diffuse these norms, rules, practices, and procedures beyond individuals. The dynamic between control, risk, and trust is a pivotal foundation for the development and management of collaborative networks. To effectively enhance the cooperation in policy networks like the Salish Sea fishery the identification and analysis of these interactions are needed.

2.3 Control, Risk, and Trust - Relationships

Trust and risk have a negative or inverse relationship where an increase in trust leads to a decrease in risk (Das & Teng, 2001). Trust has been found to reduce the perceived likelihood of opportunistic behavior and enhance feelings that others will act to protect the common good and

facilitate cooperation (Delerue, 2005; John, 1984; Nooteboom, 1996). Therefore, to overcome risk-averse behavior and reduce risk perception many managers turn to building trust. Not only is trust important for reducing collaborative risk perception, but Stern & Coleman (2015) found that affinitive trust may be required for initial risk-taking in the formation of collaborative networks. However, developing trust to mitigate risk is challenging due to the unequal distribution of different types of risk and vulnerability (Balint et al., 2011; Margerum, 2011). Trust and high-risk perception have been found to co-exist indicating that the development of trust alone cannot always effectively reduce risk (Delerue, 2005).

In this operationalization of trust and risk, these concepts are distinct, and risk cannot simply be viewed as the inverse of trust. There is a key difference in the human perception of trust and risk. Therefore the inverse scoring of one does not accurately reflect the other. Prospect theory states that under uncertainty, losses loom larger than gains (Kahneman & Tversky, 1979). Risk perception or the perception of future loss, will impact the choices and behavior of those in the alliance more than trust perception, which can be seen as the perception of future gain. Alliances weigh their perceived trust and risk differently causing them to be distinct concepts whose relationship should be further explored.

Control mechanisms are also a common risk mitigation approach taken by collaborative network managers. Findings by Hsieh et al. (2010) suggest that networks with greater levels of perceived relational and performance risk will adopt greater post-formation control mechanisms. Das & Teng (2001) hypothesized that behavioral control mitigates relational risk by regulating the conduct of partners to prevent major surprises and therefore reduce relational risk. Output control reduces performance risk by directing the attention of managers to performance measures (Das & Teng, 2001). Social control was thought to be able to mitigate both relational and performance risks. Social control forms shared values and deters opportunistic behavior,

mitigating relational risk while also encouraging the development of achievable alliance goals and reducing performance risk. However, research has also shown that high levels of standardized procedures through formal control mechanisms can cause disenchantment with project goals, increased conflict, and reduced motivation (Adler & Borys, 1996; Gouldner, 1954; Landau & Stoudt, 1979; Merton, 1940; Wilson, 1989). Anderson et al. (2013) argue that a diverse selection of control mechanisms is needed in alliances to effectively mitigate an equally diverse set of risks.

The impact of control mechanisms on trust is less straightforward than their impact on risk. There is disagreement in the literature on the relationship between trust and control, leading to three distinct theories. The first theory believes that more control is seen as a sign of distrust, and the more control an actor can implement, the less they rely on trust (Goshal & Moran, 1996; Sundaramurthy & Lewis, 2003). It has also been theorized that an increase in control mechanisms would lead to a decrease in trust (Gambetta, 1988; Zand, 1972). Similarly, others believe the concepts are mutually exclusive and replace one another over time (Gulati, 1995; Dekker, 2008; Dekker & Van den Abbeele, 2010). Conversely, the second theory states that there can be a positive reinforcing relationship between these concepts, particularly between social control and trust (Das & Teng, 2001; Frankema & Costa, 2005). Control mechanisms are seen as being able to increase trust through clear objectives and rules that create a record of those that perform well (Goold and Campbell 1987; Sitkin 1995). Procedural trust can be enhanced by control mechanisms through the development of procedures, transparency in decision-making, and the equitable distribution of risks and benefits, which helps to create an environment for trust to form (Gezelius, 2002; Levi & Stoker, 2000; Stern, 2008; Stern, 2010; Suchman, 1995; Sunshine & Tyler, 2003). Informal control mechanisms that improve relationships and reduce

risk have also been found to enhance trust among network members (Bhattacharya et al., 1998; Imperial 2005; Sheppard & Sherman, 1998; Temby et al., 2017).

The third theory is that trust and control have a complex relationship that is mainly context-dependent. Edelenbos and Eshuis (2012) found that formal control does not always undermine trust, and informal control does not always increase trust. Instead, the coevolution of trust and control is dependent on the initial situation in which the relationship unfolds. The paper states that relationships between trust and control are a dynamic, erratic, and fluctuating form of coevolution that can be either interferential coevolution, where they are replacements for one another, or symbiotic coevolution, where they are complements. Different types of trust and control can serve as substitutes for one another in some contexts while reinforcing in others (Hickey et al., 2021). Previous research has failed to look at the impact of a wide variety of control mechanisms on the multiple dimensions of trust and instead, has viewed trust as an alternative to formal control mechanisms missing their potential reinforcing relationship.

Control and trust determine the perceived risk of an alliance by "reducing the perceived probability and impact of undesired outcomes" with no third determinate of the same importance (Das & Teng, 2001). This makes the studying of trust, control, and risk a key factor in bettering the management of collaborative natural resource governance. Hickey et al. (2021) showed that the operationalization of integrated trust-control-risk frameworks "can increase conceptual clarity for how, when, and why network managers might seek to develop different forms of trust through diverse management control systems in ways that further multi-actor collaborative network performance." Although there is no best way to organize collaborative networks, a deeper understanding of the potential impact of control mechanisms on trust and risk, and therefore, governance ecology is still needed to help practitioners develop more effective network governance (Imperial, 2005; Imperial & Hennessey, 2000). While there is a growing

amount of trust literature on the ability of certain trust dimensions to improve collaboration and goal consensus (see Lima et al., 2019; Song et al., 2019; Stern, 2018; Stern & Coleman, 2015; Temby et al., 2015), few have operationalized the different dimensions of trust, risk, and control to quantifiably examine the dynamic relationship between these factors and their impact on collaborative outcomes. Figure 1 summarizes the integrated trust, risk and control framework developed by Hickey et al. (2022).

Through the analysis of the theoretical background and integrated framework, this paper posits six hypotheses that reflect the dynamic interactions between trust, risk, and control mechanisms in transboundary fishery governance.

1. Social control will enhance affinitive trust and output and behavior control will undermine affinitive trust.
2. Social control will enhance rational trust and output and behavior control will undermine rational trust.
3. Behavior control, output control, and social control will enhance procedural trust.
4. Behavior control, social control, and affinitive trust between organizations will reduce perceived relational risk
5. Output control, social control, and rational trust between organizations will reduce perceived performance risk
6. Behavior control and procedural trust will reduce perceived regulatory risk

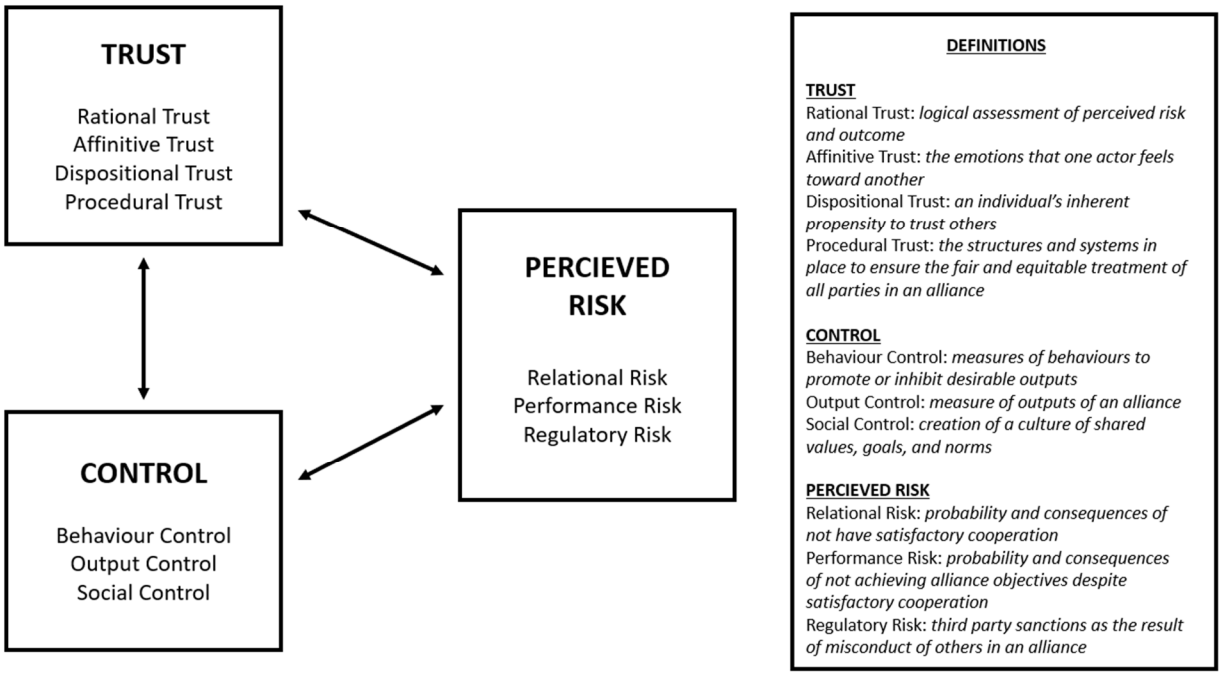


Figure 1 Architecture of Collaboration Framework: The Architecture of Collaboration framework developed by Hickey et al (submitted 2022) showing the relationships between trust, control, and perceived risk in natural resource management. Adapted from Das and Teng (2001), Anderson et al. (2014), and Stern and Coleman (2015).

CHAPTER III

METHODOLOGY

In order to answer the research questions, a quantitative survey instrument was developed. Respondents were asked to select the organization they communicate with the most from each stakeholder category with the option to select none. For each of the selected organizations, the respondent was asked a series of follow-up questions on a five-point Likert scale (ranging from strongly disagree to strongly agree) for trust, risk, and influence. This resulted in a dataset with a dyadic respondent-target structure that increases the available information on low respondent stakeholder groups and helps to address the general decline in survey response rates that can be observed in recent decades (Stedman et al., 2019). A series of non-dyadic questions were also asked for certain measured concepts that encompassed more than one-to-one relationships.

3.1 Scale Approach

Trust, risk, and influence were considered latent constructs represented by Likert-scale items forming observed variables that served as proxy representations of trust, risk, and collaboration. Control mechanisms were also considered latent constructs that were represented as either present or absent in the relationship between two organizations. Variables could then be used for comparison among respondent groups and to test for effects both as dependent and independent variables.

The quantitative survey is novel in several ways. First, it looks at both trust and risk whereas previous work has either focused solely on trust (see Song et al., 2019) or solely on risk (see Zhang & Li, 2015; Zhang & Qian, 2017). It also measures all four dimensions of trust and three different dimensions of risk. This goes beyond the simplistic uni-dimensional measurements and differentiates between types of trust and risk to analyze their varying impact on collaboration. Second, the operationalization of various control mechanisms provides the opportunity to analyze the impact control has on trust and risk and the complex ecology of these relationships. This approach views trust and risk as both dependent and independent variables compared to previous work that has mainly viewed trust and risk as independent variables to collaboration and cooperation (see Song et al., 2019; Temby et al., 2015). Multi-dimensional trust and multi-dimensional risk are dependent variables to control mechanisms and independent variables to influence. Finally, this approach focuses on network context as well as relations between pairs of entities. It sees how paired relationships interact and connect with each other to form an overall network pattern which provides the opportunity to target multiple stakeholder groups all acting within a governance structure.

3.2 Survey Development

The survey design was originally adopted based on Das and Teng's (2001) framework and Stern and Coleman's (2015) trust topology. The 4 dyadic trust questions have been adapted from Song et al. (2019) (see Table 1). Song et al. (2019) used multiple studies of NRM governance networks to validate three questions for each of the four types of trust (Cronbach's Alpha for affinitive trust, procedural trust, rational trust, and the full scale were 0.742, 0.634, 0.687, and 0.799 respectively). One affirmative and one rational trust question were removed from Song et al. (2019) trust questions to shorten the dyadic part of the survey. The removed questions were determined by analysis of the confirmatory factor analysis output.

The 3 relational risk questions and the 3 performance risk questions have been adapted from Zhang & Li (2015) and Zhang & Qian (2017) (see Table 1). The relational risk and performance risk questions were validated by Zhang & Li (2015) using confirmatory factor analysis (composite reliability scores for relational risk and performance risk were .958 and .952, respectively). The two regulatory risk questions have been adapted from Zhang & Qian (2017) and Katznelson (2020) (see Table 1). The 3 influence questions were adapted from Jinnah (2014) and operationalized by Lima et al. (2019). They focus on the 3 types of influence; change in flow and availability of information, behavioral change, and change in norms (see Table 1). The influence questions were used as a proxy variable for collaboration which can be seen as a dependent variable to trust and risk dimensions. Survey questions were approved by the Canadian Research Ethics Board and the United States Institutional Review Board.

Table 1: Dyadic Survey Questions

Variable Type	**Variable Name**	**Survey Question**	**Key Reference**
Affinitive Trust 1	AFFIA	Because we have been working with this organization for so long, all kinds of procedures have become self-evident.	Song et al. (2019)
Affinitive Trust 2	AFFIB	In our relationship with the people in this organization, informal agreements have the same significance as formal contracts.	
Rational Trust 1	RATIA	This organization can be relied upon to perform its objectives.	
Rational Trust 2	RATIB	In our relationship with this organization, both sides treat each other in a consistent and predictable manner.	
Relational Risk 1	RELAA	We think that the people in this organization may break promises.	Zhang & Li (2015)
Relational Risk 2	RELAB	We think that the relationship with this organization will deteriorate in the foreseeable future.	
Relational Risk 3	RELAC	We think that the people in this organization will take advantage of us when the opportunity arises.	
Performance Risk 1	PERFA	We think that the performance of this project is likely to decline in the foreseeable future.	

Table 1 cont.

Performance Risk 2	PERFB	We think that our objectives in the project with this organization will not be achieved	Zhang & Li (2015)
Performance Risk 3	PERFC	We think that this organization has no ability to offer us support when faced with difficulties in the management of this fishery	
Regulatory Risk 1	REGUA	We feel that in opposing this organization we would be negatively affected in the future	Zhang & Qian (2017)
Regulatory Risk 2	REGUB	The actions of this organization may expose my organization to additional regulations if relevant rules are not followed.	Katznelson (2020)
Influence 1:	INFLA	Working with people from this organization, or documentation from it, has enhanced my knowledge of fishery science or management	Jinnah (2014)
Influence 2	INFLB	Working with people from this organization has led me to make professional choices or decisions that I would not have otherwise made.	
Influence 3	INFLC	Working with people at this organization has led me to rethink my approach to the management of fisheries and/or harvesting and conservation practices.	

The respondent was then asked to select the control mechanisms they partake in with two organizations randomly selected from those they communicate with the most regularly. The respondent was given 9 different control mechanisms to select from and had the opportunity to elaborate on the activity below their selection. The 9 control mechanisms (3 for each control type) were adapted from Das & Teng (2001) (see Table 2).

Table 2 Control Mechanisms Survey Questions: Control mechanisms listed on survey and their corresponding control type based on Das & Teng (2001).

Control Type	**Acronym**	**Control Mechanism**
Behavior Control	PP	The creation of shared policies and procedures that outline appropriate behavior (eg. Memoranda of understandings)
	RS	The collaborative creation of a reporting structure that outlines supervisory and monitoring roles
	ST	The staffing and training of members to ensure appropriate behavior during collaboration

Table 2 cont.

Output Control	OS	The objective setting between organizations (eg. creation of performance measures for organization members)
	PB	Collaborative planning and budgeting to provide appropriate resources to achieve goals
	JIC	Joint information collection (eg. monitoring of fish stocks and sharing data between organizations)
Social Control	PDM	Joint participation in decision-making process (eg. discussions between organizations to determine shared goals and plans)
	RCN	Attending community events, ceremonies, and networking events
	EMI	Informal communication and meetings (eg. work Happy Hour)

Finally, respondents answered 6 non-dyadic dispositional distrust and procedural trust questions (see Table 3, see Appendix A for the full survey). Dispositional distrust was operationalized as non-dyadic because it is a personality trait rather than a relational attribute (Song et al., 2019) while procedural trust is about the network system as a whole and does not apply to single relationships (Stern & Coleman, 2015).

Table 3 Non-dyadic Survey Questions: dispositional and procedural trust survey questions based on Song et al. (2019).

Trust Type	**Variable Name**	**Question**
Dispositional Trust 1	DISPA	You can't be too careful dealing with people.
Dispositional Trust 2	DISPB	People are almost always interested only in their own welfare.
Dispositional Trust 3	DISPC	Most people would try to take advantage of you if they got the chance.
Procedural Trust 1	PROCA	In the fishery management of this region the strongest side is expected not to pursue its interest at all costs.
Procedural Trust 2	PROCB	When managing fish in this region it is expected that any unfair dealings will be avoided or rectified by existing regulatory, legal, or reputational measures.
Procedural Trust 3	PROCC	When managing fish in this region people are expected not to make demands that can seriously damage the interests of others.

3.3 Data collection

The first step was identifying relevant organizations that make up the transboundary fishery network of the Salish Sea. Initially, 102 groups and organizations were identified that fit into 8 jurisdictional categories: regional/binational organizations, state/provincial organizations, U.S. federal organizations, Canadian federal organizations, Indigenous tribes, non-governmental organizations, business/trade groups, and research institutions. Respondents had the option to write additional relevant organizations, therefore, expanding the final list to include 136 organizations (see Appendix B for the full list).

The survey was conducted using an open-source online tool (Qualtrics) between November 2021 and February 2022. The survey broadly focused on individuals working on fish and fisheries-related issues in the Salish Sea who were affiliated with one or more of the

identified relevant stakeholder groups. The names, email addresses, and organizational affiliations of key individuals were identified from publicly available reports and online documentation. Potential respondents were contacted via email to introduce the study and provide a web-based URL to the survey. In total, 1,715 email addresses were compiled to form a non-randomized convenience sample which resulted in 142 responses and created 662 dyads. All survey responses were anonymous with no names or identifying information beyond professional affiliation.

3.4 Limitations and Assumptions

The collection of survey data through purpose sampling has the potential to introduce bias in the results and reduce validity. To improve internal validity several steps were taken. Pre-tested questions used in previous research were adapted for trust, risk, and influence questions in the survey to increase construct validity. To avoid false survey entries participants were not allowed multiple entries from the same IP address and only responses from relevant organizations were included. Finally, pre-testing of the survey instrument was used to reduce potential bias.

The use of a non-randomized convivence sample limited the ability of the survey to generalize and introduced selection bias. To combat this, the survey engaged with a diverse range of participants across multiple stakeholder categories to increase internal validity and provide a trustworthy basis for interpretation. It is important to note that there were no responses received from Indigenous tribes. Due to the dyadic nature of the survey, data was generated for low response groups based on responses from participants in other stakeholder categories. However, this paper acknowledges that the survey reflects the perspectives of network actors who chose to participate and therefore may not reflect the beliefs of all network participants.

A major assumption in the research is the separation of organizations into stakeholder categories. Eight stakeholder categories were created to reduce the length of the dyadic part of the survey. Regional and binational organizations as well as state and provincial organizations were combined to limit the number of stakeholder categories. These groups were chosen to be combined due to their functional similarities. However, by aggregating these groups it assumes that no major differences exist between the perceptions and relationships of state and provincial governments and between regional and binational organizations. Although aggregating categories reduces survey length, it may generalize important distinctions between groups.

Another major limitation of survey data is non-response bias where those who respond to the survey may have different beliefs than non-respondents. This research checked for non-response bias by conducting a two tailed t-test on data to determine if there were differences between early and late responses in the survey sample (Korkeila et al., 2001). Dispositional distrust values were used for the t-test since this attribute changes slowly overtime and is considered a constant variable in the regression analyses. The results of the t-test showed no significant difference between early and late responses for dispositional distrust (p-value = .1186), indicating that timing did not significantly affect survey data.

CHAPTER IV

RESULTS

The following survey data analysis is presented in four sequential steps. First, is the self-reported communication among respondents from Salish Sea fishery organizations. The responses were quantified and visualized to show the general shape of the policy network and spatial patterns of communication. Second, the validation of the survey instrument, particularly the risk and control mechanism questions, will be discussed. Third, an analysis of the overall trust and risk perceptions of the Salish Sea governance network is presented. The final step analyzes the impact of control mechanisms on trust and risk through five hierarchical analyses and one linear regression analysis.

4.1 Communication among Network Members

Of the 142 survey respondents, 662 collaboration dyads were created. Most of the dyads were created by respondents working for the U.S. Federal Government (209 or 31.6%) . No respondents identified as working for an Indigenous tribe, but 93 (14.0%) collaboration dyads were created by other respondents who worked with Indigenous tribes. State and Provincial government organizations were selected the most (16.9%) by respondents as organizations they frequently collaborate with. Business and Trade Organizations were selected the least (6.0%) by respondents.

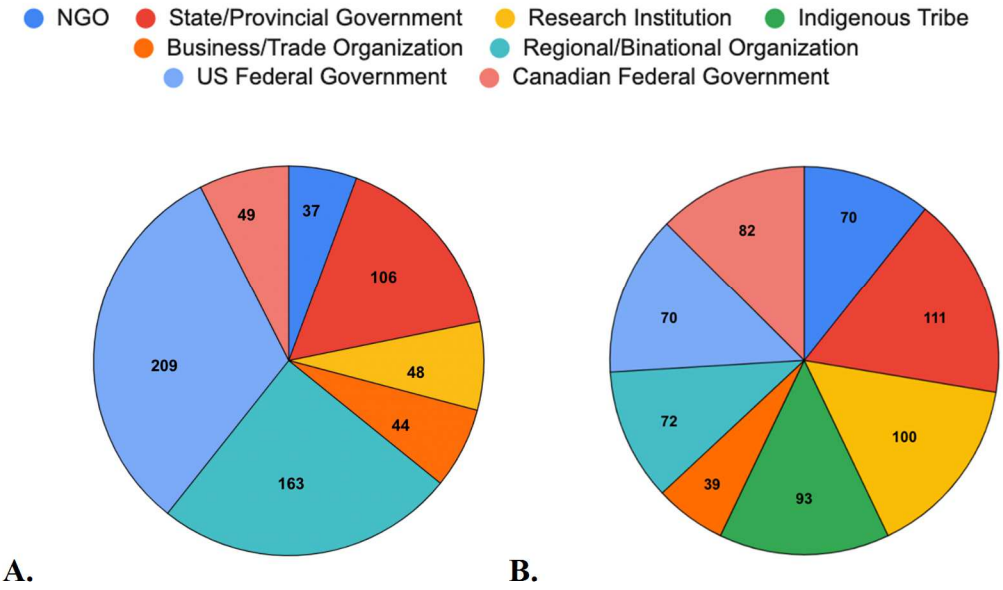


Figure 2 Survey Response Organization Distribution: Chart A shows the distribution of collaboration dyads from organizational categories. Chart B shows the distribution of collaboration dyads to different organizational categories.

To help analyze the distribution of collaboration, both the agency that the respondent was affiliated with and those they collaborated with were noted, creating a 7 × 8 matrix used to create a collaboration network for the Salish Sea (Fig. 3). The edges between the nodes are directional with arrows pointing toward the organizational category the respondent collaborates with. The thicker and larger the arrow, the greater the number of dyads between nodes. The distance between nodes also indicates the frequency of collaboration, such that nodes located closer together imply a higher frequency of collaboration (calculated using Yifan Hu algorithm). The strongest collaborative ties are between the US Federal Government and Research Institutions, with 17.2 percent of all reported collaboration. It is also important to note the strong ties between the US Federal government, and the State/Provincial government, as well as the strong collaborative tie between the State/Provincial governments and Binational/Regional organizations. This is in line with the management practices of the area since the regulation of

fisheries takes place mostly at the State/Provincial level. However, the United States Federal Government can be seen as acting as a hub or facilitator of collaboration with the Canadian Government and Binational/Regional organizations. The results of the survey show strong collaborative ties across multiple levels of government in the transboundary fishery network of the Salish Sea.

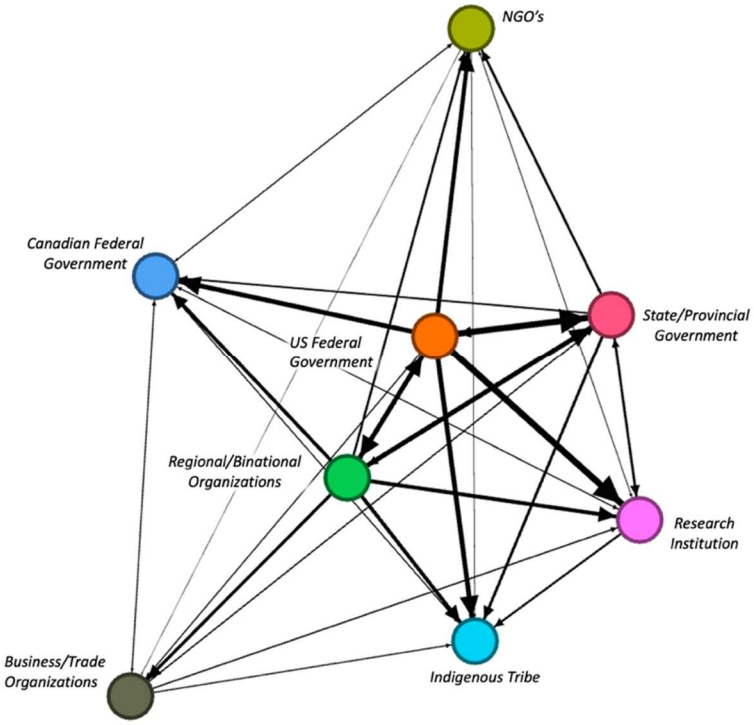


Figure 3 Collaboration Network Map: A map of communications between eight identified organization types created using Gephi 0.9.2 software. Arrows point to the organization type selected by the respondent as a frequent collaborator. Line thickness indicates relative participant selection of the organizations within each agency type that they communicate with most frequently. The distance between nodes also indicates the frequency of collaboration such that nodes located closer together imply a higher frequency of collaboration (Yifan Hu algorithm).

4.2 Scale Validation

Before analyzing the risk and control mechanisms data, it was necessary to verify the theory used to structure the 9-item control mechanism scale and the 8-item risk scale. The three-dimensional trust scale has been previously validated by Song et al. (2019). Structural equational modeling (SEM) was used for confirmatory factor analysis and to estimate

measurement errors in the observed variables. Variance-covariance matrixes were put into the model (9×9 for control mechanisms and 8×8 for risk) and converted to structural equations. The SEM coefficients depict how much the observed variables will change when the latent variable changes by one standard deviation. One loading of the observed variable was constrained for each latent construct and covariances between the risk dimensions and control dimensions were also calculated. This places very few restrictions on the data while still being able to estimate the parameters of interest (Song et al., 2019).

The SEM showed that to limit correlation between factors, one control mechanism from each control category needed to be removed. The staffing and training variable was removed from behavior control and the planning and budgeting variable was removed from output control because these concepts were highly correlated. Participatory decision-making was also removed from social control since it was highly correlated with other control mechanisms. The new SEM output shows that the 6 observed variables loaded onto 3 latent constructs with an acceptable level of correlation between latent constructs (Fig. 4). Cronbach's alpha was calculated to verify internal consistency and provide insight into the overall scale properties. The coefficient for each dimension of control (behavior, output, and social) also had alpha values: 0.718, 0.571, and 0.478, respectively. Conventionally alpha values above 0.6 are considered robust. Since output and social control had alpha values lower than 0.6 an exploratory factor analysis (EFA) was used to confirm the reliability of the scale. The results of the EFA shows that all items are indicting one factor and thereby support that, as a single construct, the scale is robust. This research posits that inter-organizational control is a second-order construct of three first-order factors (behavior, output, and social control) which are positively and significantly correlated. The SEM results support this interpretation and show that the control mechanism scale composed of the proposed sets of three-dimensional items is sufficiently reliable and internally consistent.

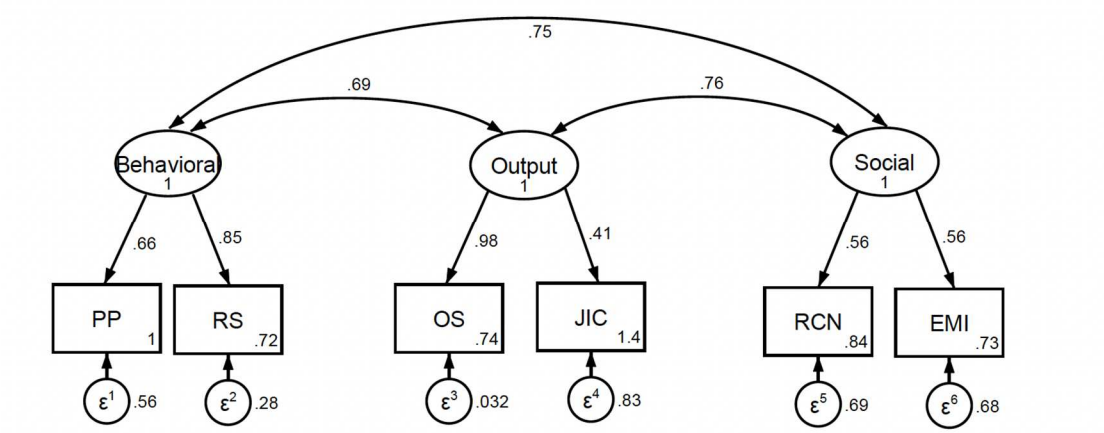


Figure 4 Control Scale Validation: Structural equation model showing standardized parameter estimates for control mechanisms scale.

The SEM for the risk scale also showed that one latent needed to be dropped from relational and performance risk to reduce the covariance between factors. For relational risk, only RELAA and RELAC were loaded and for performance risk, only PERFA and PERFB were used. The new SEM shows that the 6 observed variables properly load onto the 3 latent constructs with an acceptable level of covariance between latent constructs (Fig. 5). Cronbach's alpha was calculated to verify internal consistency and provide insight into the overall scale properties. The coefficient for each dimension of risk (relational, performance, and regulatory) also had alpha values of 0.783, 0.526, and 0.302, respectively. Since performance and regulatory risk had alpha values lower than 0.6 an exploratory factor analysis (EFA) was used to confirm the reliability of the scale. The results of the EFA shows that items are indicting one factor and thereby support that as a single construct, the scale is robust. This research posits that inter-organizational risk is a second-order construct of three first-order factors (relational, performance, and regulatory risk), which are positively and significantly correlated. The SEM results support this interpretation and show that the risk scale composed of the proposed sets of three-dimensional items is sufficiently reliable and internally consistent.

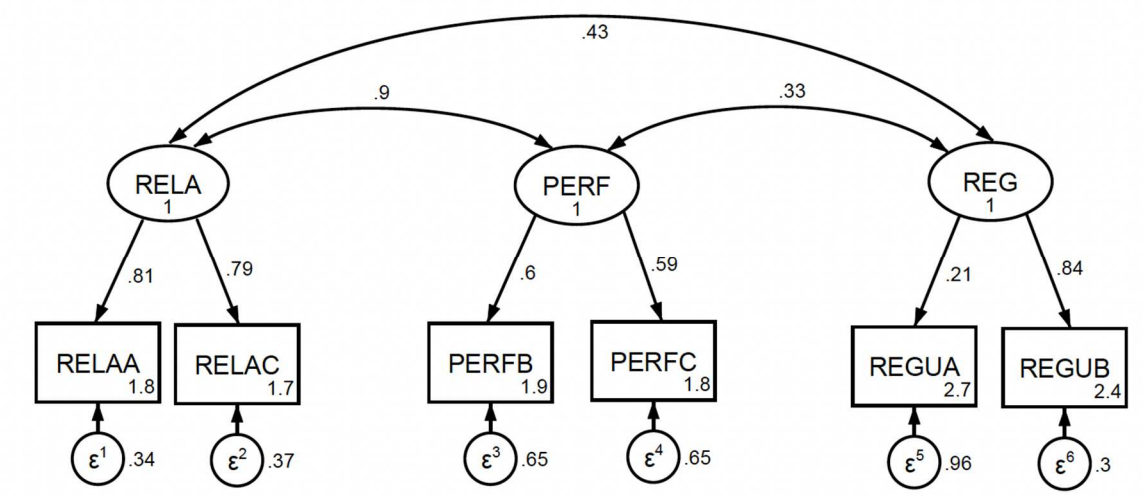


Figure 5 Risk Scale Validation: Structural equation model showing standardized parameter estimates for risk scale.

4.3 Current Trust and Risk Perceptions

The following procedures were applied to the Likert-scale scores of the 10 trust questions and 6 risk questions to display and assess the current rational trust, affinitive trust, procedural trust, relational risk, dispositional distrust, performance risk, and regulatory risk perceptions in the Salish Sea governance network. The trust scores for the 2 rational trust, 2 affinitive trust, and 3 procedural trust questions were average to create a singular respondent trust score for rational, affinitive, and procedural trust. For rational and affinitive trust, the scores were grouped by target agency and home agency. The rational and affinitive trust scores for each home-target agency combination were averaged to create one trust score for each grouping. For non-dyadic procedural trust and dispositional distrust, the trust scores were grouped by home organization alone and then averaged to produce trust scores for each home organization group. Figures 6 and 7 summarize the distribution of different dimensions of trust across the Salish Sea governance network. Rational trust appears to be the most prevalent trust type with procedural trust having the lowest reported scores. Affinitive trust appears to be moderate and dispositional distrust is low in the network.

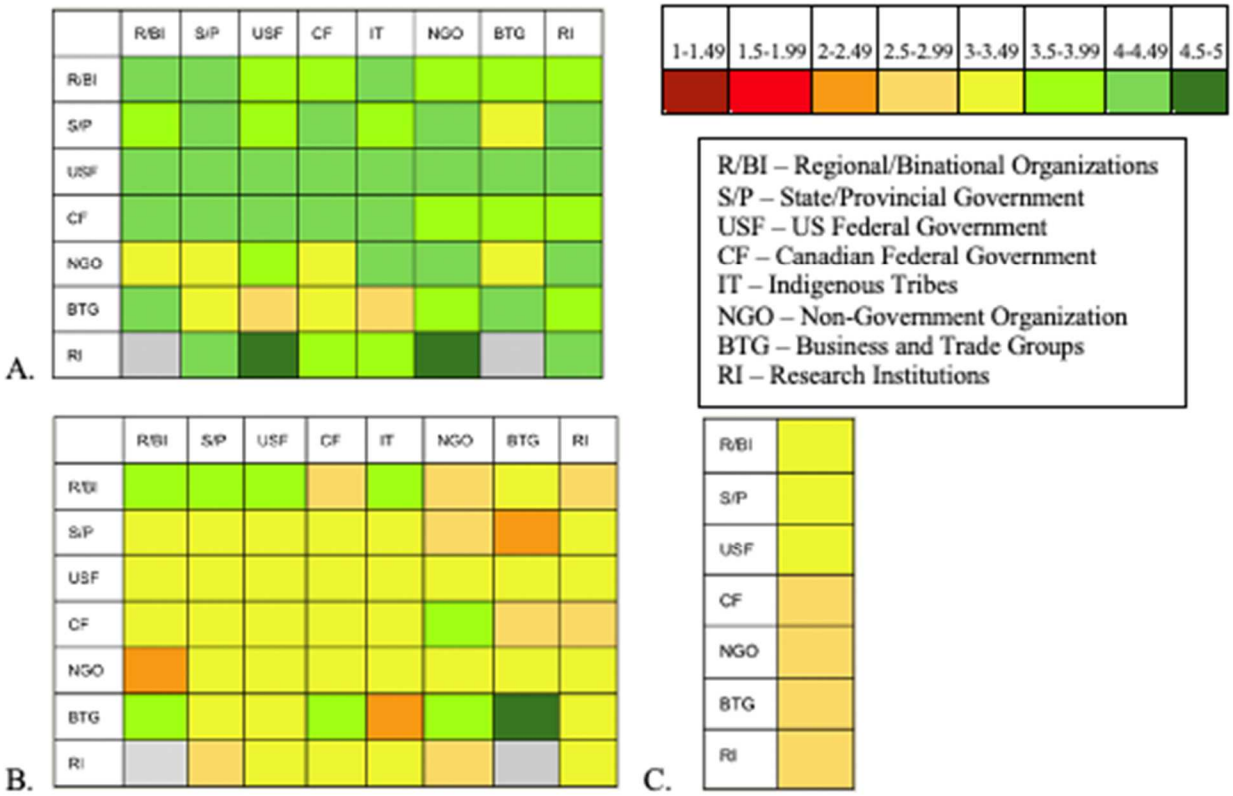


Figure 6 Current Trust Perceptions: The average rating of a) rational (n = 651) b) affinitive (n = 658) and c) procedural trust (n = 526) dimensions toward target agency groups reported by survey respondents. The left column indicates the respondent's home organization, and the top row indicates the agency group that they are targeting. Color codes indicate the averaged value of survey responses. Green coding indicates high trust scores, while red coding indicates low trust scores, existing on a scale from 1 to 5.

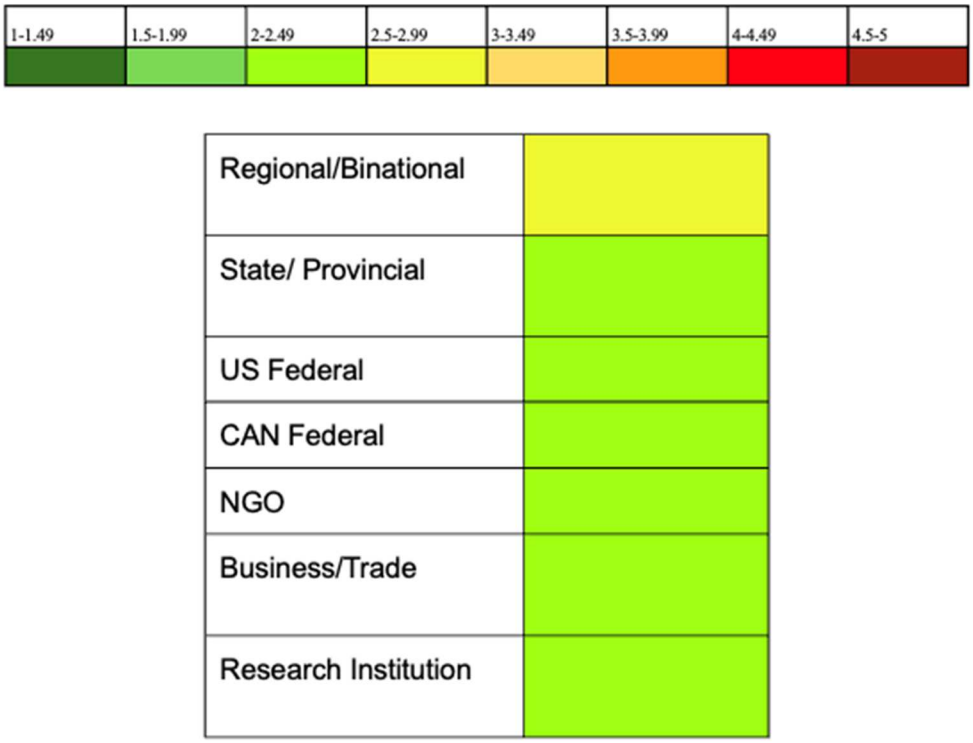


Figure 7 Current Dispositional Distrust Perceptions: The average rating of dispositional distrust (n = 662) toward target agency groups reported by survey respondents. The left column indicates the respondents home organization. Color codes indicate the averaged value of survey responses. Green coding indicates low distrust scores while red coding indicates high distrust scores, existing on a scale from 1 to 5.

The risk scores for the 2 relational risk, 2 performance risk, and 2 regulatory risk questions were averaged for each response to create singular respondent risk scores for relational, performance, and regulatory risk. Risk scores were organized by target agency and home agency. The risk scores for each home-target agency combination were averaged to create one relational, performance, and regulatory risk score for each grouping. Figure 8 summarizes the distribution of different dimensions of risk across the Salish Sea governance network. Relational risk values were the lowest amongst participants with performance risk also being low. Regulatory risk was the highest perceived risk in the network with moderate scores.

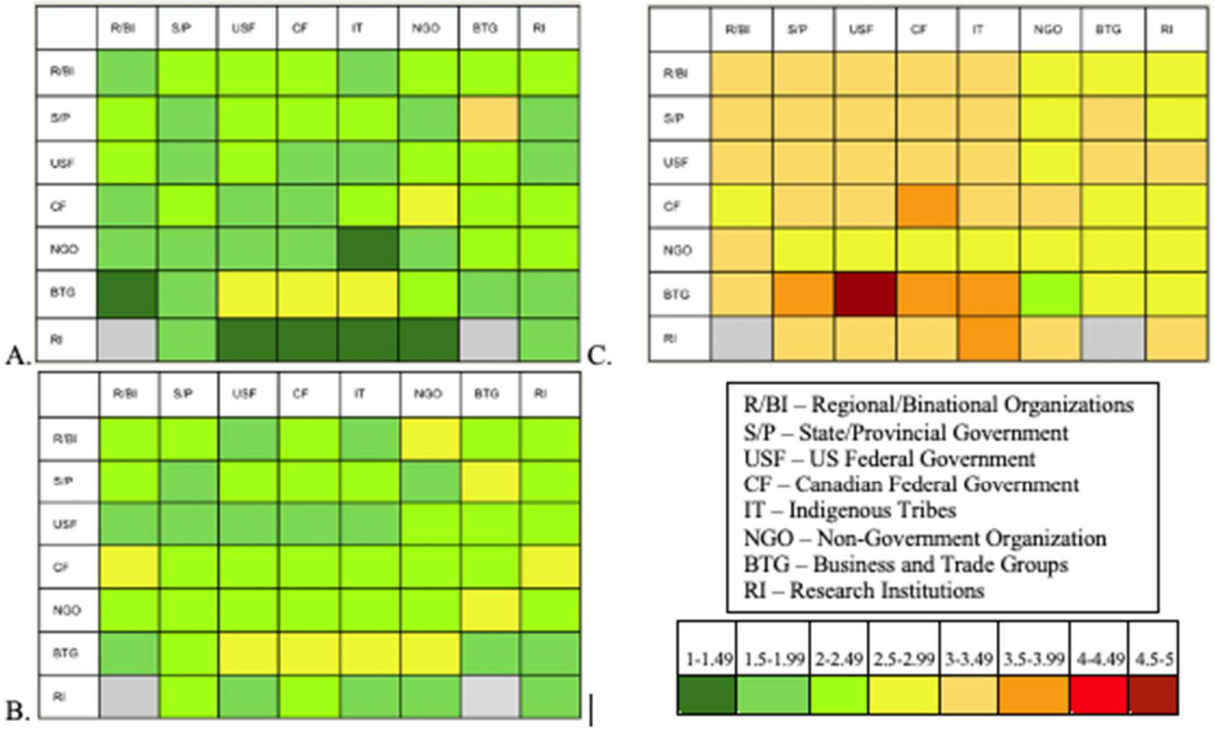


Figure 8 Current Risk Perceptions: The average rating of a) relational (n = 643) b) performance (n = 612) and c) regulatory risk (n = 603) dimensions toward target agency groups reported by survey respondents. The left column indicates the respondent's home organization, and the top row indicates the agency group that they are targeting. Color codes indicate the averaged value of survey responses. Green coding indicates low risk scores, while red coding indicates high risk scores, existing on a scale from 1 to 5.

4.4 Impact of control mechanisms on trust and risk

4.4.1 Model Description

The final, and most substantial, step in the analysis looks at the predictive effect of control mechanisms on the respondent's trust and risk perception. Specifically, the six dependent variables were affinitive, procedural, and rational trust as well as performance, relational, and regulatory risk. Five distinct hierarchical regression models were created (one for each dyadic dependent variable) to determine 1) the impact of control mechanisms on affinitive trust; 2) The impact of control mechanisms of rational trust; 3) The impact of control mechanisms and

relevant trust dimensions on relational risk; 4) The impact of control mechanisms and relevant trust dimensions on performance risk; and 5) And the impact of control mechanisms and relevant trust dimensions on regulatory risk. To analyze the impact of control mechanisms on non-dyadic procedural trust a linear regression analysis was used. Due to its monadic data structure procedural trust had a small n value compared to other dependent variables making multiple linear regression analysis more appropriate than hierarchical regression.

To investigate the synergistic effects of control mechanisms with one another as well as the synergistic effects of control mechanisms and trust, our models included two-way interaction terms. Nine interaction terms were created for incorporation into the hierarchical regression models (see Table 4). Survey respondents scored multiple agencies on several dyadic questions thereby creating a repeated measures problem. Criterion scaling is a common approach for accounting for individual response bias and encoding predictors with a large number of categories (Pedhazur,1977; Gibbons & Sherwood, 1985; Song et al., 2019). Predictor sets were defined and entered into each hierarchical regression model in a pre-determined order using the following general logic: (1) control variables, (2) independent variables, and (3) interactions. Control variables include the respondents' home organization, dispositional distrust, criterion scaling, and target organization. Only predictor variables in the hypothesis for each dependent variable were included in the model to limit the number of model terms. The specific order and rationale for each predictor set are listed in Table 4.

Table 4 Hierarchical Regression Model Reasoning: Summary of the hierarchical regression predictor sets and the order in which they entered each of the six regression models.

Predictor Sets in Order Entered	**Logic**	**Rational Trust**	**Affinitive Trust**	**Performance risk**	**Relational risk**	**Regulatory risk**
Participant Organization	Codes the most general way of classifying respondents by type of organization they work for	1	1	1	1	1

Table 4, cont.

Dispositional Distrust	Reflects the predisposition of an individual to trust or distrust another entity based on personal histories (Stern and Coleman 2015)	2	2	2	2	2
Criterion-Scaling	Codes individual participants to control for individual differences in rating relationships with individual agencies.	3	3	3	3	3
Target Organization	Codes the type organization that is a target for respondent in dyadic trust, risk, and control questions.	4	4	4	4	4
Social Control (SC)	Assesses if the respondent partakes in social control mechanisms with the target organization. Social control is often developed and utilized before formal control and before informal agreements can be institutionalized (Imperial 2005). Therefore, social control is ordered before behavior and output control.	5	5	5	5	-
Behavior Control (BC)	Assesses if the respondent partakes in behavior control mechanisms with the target organization. Behavior control is ordered above output control because NRM oftentimes has low output measurability making output control difficult to implement (Das and Teng 2001).	6	6	-	6	5
Output Control (OC)	Assesses if the respondent partakes in output control mechanisms with the target organization.	7	7	6	-	6
BC * SC	Interaction between social control and behavior control entered after the relevant main effects.	8	8	-	8	-
OC * SC	Interaction between social control and output control entered after the relevant main effects.	9	9	8	-	-
OC * BC	Interaction between output control and behavior control entered after the relevant main effects.	10	10	-	-	8
SC *DT	Interaction between social control and dispositional distrust entered after the main effect. The use of social control will diminish the negative impact of dispositional distrust on other trust and risk components (Smith et al 2013).	11	11	9	9	9
SC * RT	Interaction between social control and rational trust components entered after relevant main effects. All trust types can enhance output control (Hickey et al 2022).	-	-	10	-	-

Table 4, cont.

SC *AT	Interaction between social control and affinitive trust components entered after relevant main effects. All trust types can enhance output control (Hickey et al 2022).	-	-	-	10	-
BC * PT	Interaction between behavior control and procedural trust components entered after relevant main effects. All trust types can enhance output control (Hickey et al 2022).	-	-	-	-	10
BC * AT	Interaction between behavior control and affinitive trust components entered after relevant main effects. All trust types can enhance output control (Hickey et al 2022).	-	-	-	11	-
OC * RT	Interaction between output control and rational trust component entered after relevant main effects. All trust types can enhance behavior control (Hickey et al 2022).	-	-	11	-	-
Rational Trust (RT)	Assesses the level of rational trust associated with target association. Rational trust is ordered first because recent studies indicate it is the most prevalent of trust types in NRM (Lima et al 2019; Song et al 2019)	DV	-	7	-	-
Procedural Trust (PT)	Assesses the level of procedural trust in the management network. Procedural trust is ordered below rational trust because it looks at the broader system instead of relationships and therefore can develop more slowly (Stern and Coleman 2015).	-	-	-	-	7
Affinitive Trust (AT)	Assesses the level of affinitive trust associated with the target organization. Affinitive trust is ordered last because it is based on relationship histories (Stern and Coleman 2015).	-	DV	-	7	-
Performance Risk	Assesses the performance risk level in the relationship after control mechanisms and trust have been established.	-	-	DV	-	-
Relational Risk	Assesses the relational risk level in the relationship after control mechanisms and trust have been established.	-	-	-	DV	-
Regulatory Risk	Assesses the regulatory risk level in the relationship after control mechanisms and trust have been established.	-	-	-	-	DV

4.4.2 Model Results

Figure 8 presents a summary of the significant results from the five hierarchical regression models (see Appendix C for full model summary tables). The arrows point to the dependent variable in each regression model and have the associated standardized beta coefficient for each relationship. All coefficients shown are significant ($p < .1$) and show the strength and direction of the relationships. The Figure also shows the order of predictor variables entered in the hierarchical regression model starting at the top.

Figure 8(a) presents the impact of predictor variables on rational trust. After controlling for home organization, dispositional distrust, criterion scaling, and target organization, three independent variables had a significant effect on rational trust. Both social control and behavior control had a significant and substantial positive effect on rational trust. The interaction between social control and behavior control had a significant and negative interaction on rational trust. A negative interaction indicates that as one interaction term increases the effect of the other interaction term on the dependent variable is decreased. Therefore, the combined effect of social control and behavior control is less effective at increasing rational trust compared to each variables independent effect. The entire regression model predicted 59.1 percent of the variability in rational trust.

Figure 8(b) presents the impact of predictor variables on affinitive trust. After controlling for home organization, dispositional distrust, criterion scaling, and target organization, two independent variables had a significant effect on affinitive trust. Social control had a significant and substantial positive effect on affinitive trust. The interaction between social control and output control had a significant positive interaction on affinitive trust. A positive interaction means as one interaction term increases the effect of the other interaction term on the dependent variable increases. The combined effect of social control and output control can further increase

affinitive trust compared to each variables independent effect. Output control did not have an significant independent effect. The entire regression model predicted 66.1 percent of the variability in affinitive trust.

Figure 8(c) presents the impact of predictor variables on performance risk. After controlling for home organization, dispositional distrust, criterion scaling, and target organization two independent variables had a significant effect on performance risk. Rational trust was found to have a substantial and significant negative effect on performance risk. The interaction effect between output control and social control was also found to have a significant negative interaction coefficient. Since the main effects are negative, a negative coefficient for the interaction term means a reinforcing interaction. The combined effect of output control and social control can further decrease performance risk compared to each variables independent effect. It is noteworthy that output control and social control separately did not have a significant effect. The entire regression model predicted 79 percent of the variability in performance risk.

Figure 8(d) presents the impact of predictor variables on relational risk. After controlling for home organization, dispositional distrust, criterion scaling, and target organization two independent variables had a significant effect on relational risk. Affinitive trust was found to have a significant negative effect on relational risk. The interaction between affinitive trust and social control was found to have a substantial negative interaction coefficient. The coefficients for the main effects are negative and therefore a negative interaction coefficient indicates a reinforcing interaction. The combined effect of affinitive trust and social control can further decrease relational risk compared to each variables independent effect. Behavior control and social control did not have a significant independent effect on relational risk. The entire regression model predicted about 76.6 percent of the variability in relational risk.

Figure 8(e) presents the impact of predictor variables on regulatory risk. After controlling for home organization, dispositional distrust, criterion scaling, and target organization one independent variable had a significant effect on regulatory risk. Behavior control had a significant and substantial positive effect on regulatory risk. The entire regression model predicted about 76.4 percent of the variability in regulatory risk.

Table 5 presents the impact of predictor variables on procedural trust in the linear regression analysis. Behavior and output control had a significant and substantial positive effect on procedural trust. Dispositional distrust was also found to have a significant and substantial negative effect on procedural trust. These findings confirm the importance of both trust and control mechanisms in mitigating risk in collaborative natural resource governance.

a.

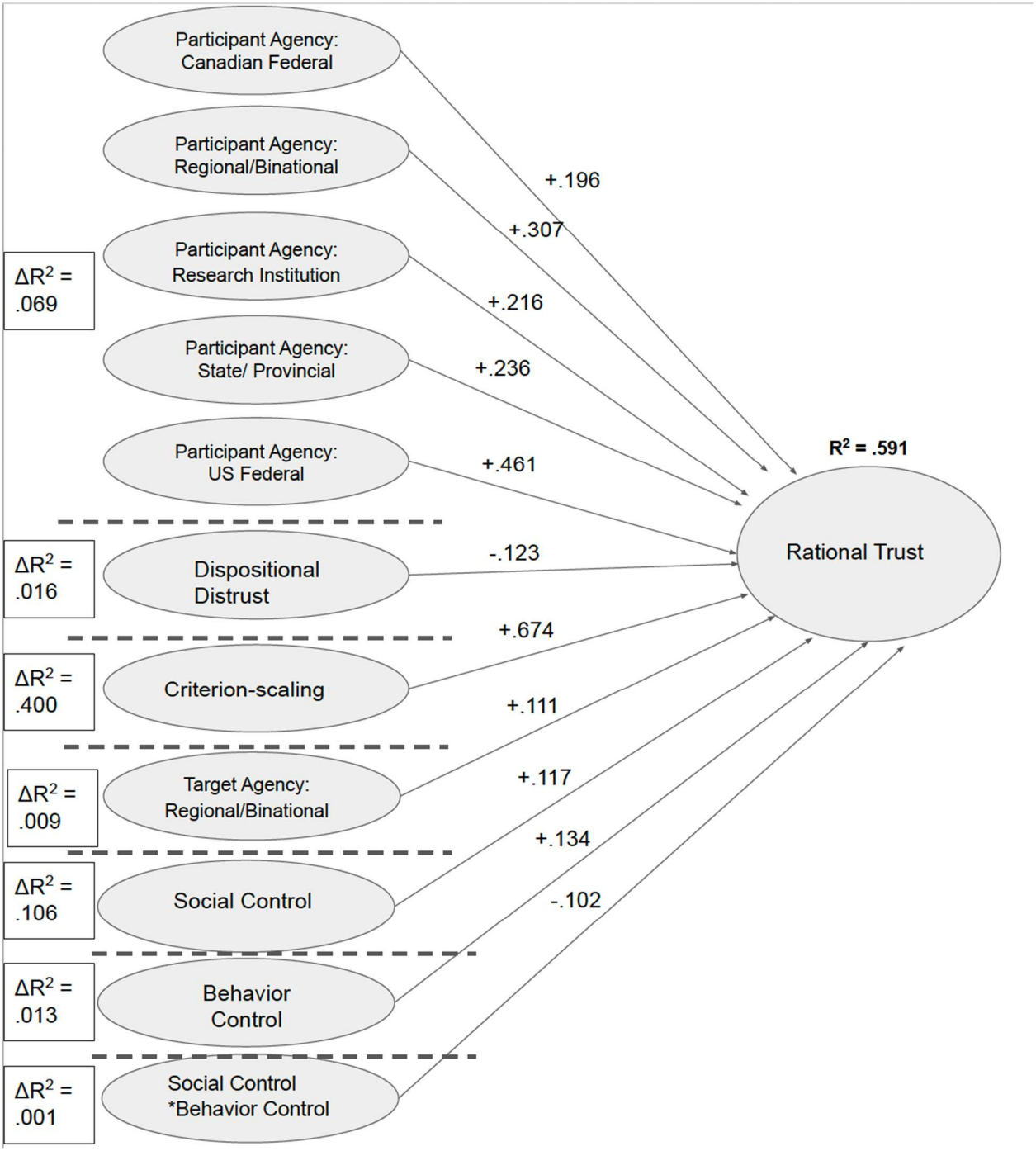


Figure 9 Hierarchical Regression Significant Results: Summary of significant hierarchical regression relationships for predicting impact on (a) rational trust (b) affinitive trust (c) relational risk (d) regulatory risk (e) performance risk. The hierarchical predictor sets are separated by short, dotted lines and the change in R^2 associated with the addition of that predictor set to each regression model is shown in solid-line boxes. Note: overall model R^2 bolded above dependent variable; path coefficients are standardized regression coefficients; only significant ($p < .01$) relationships are shown.

b.

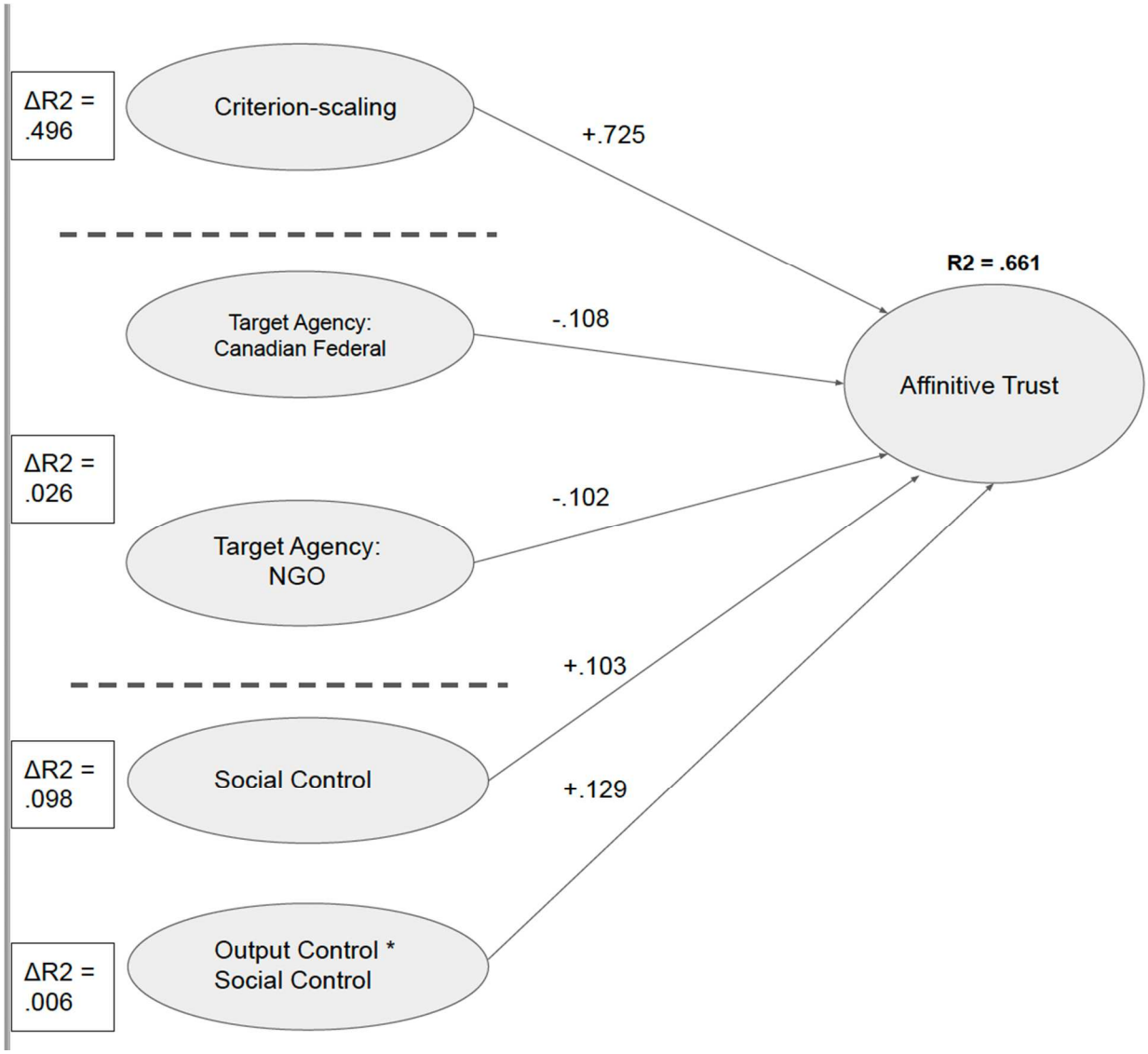
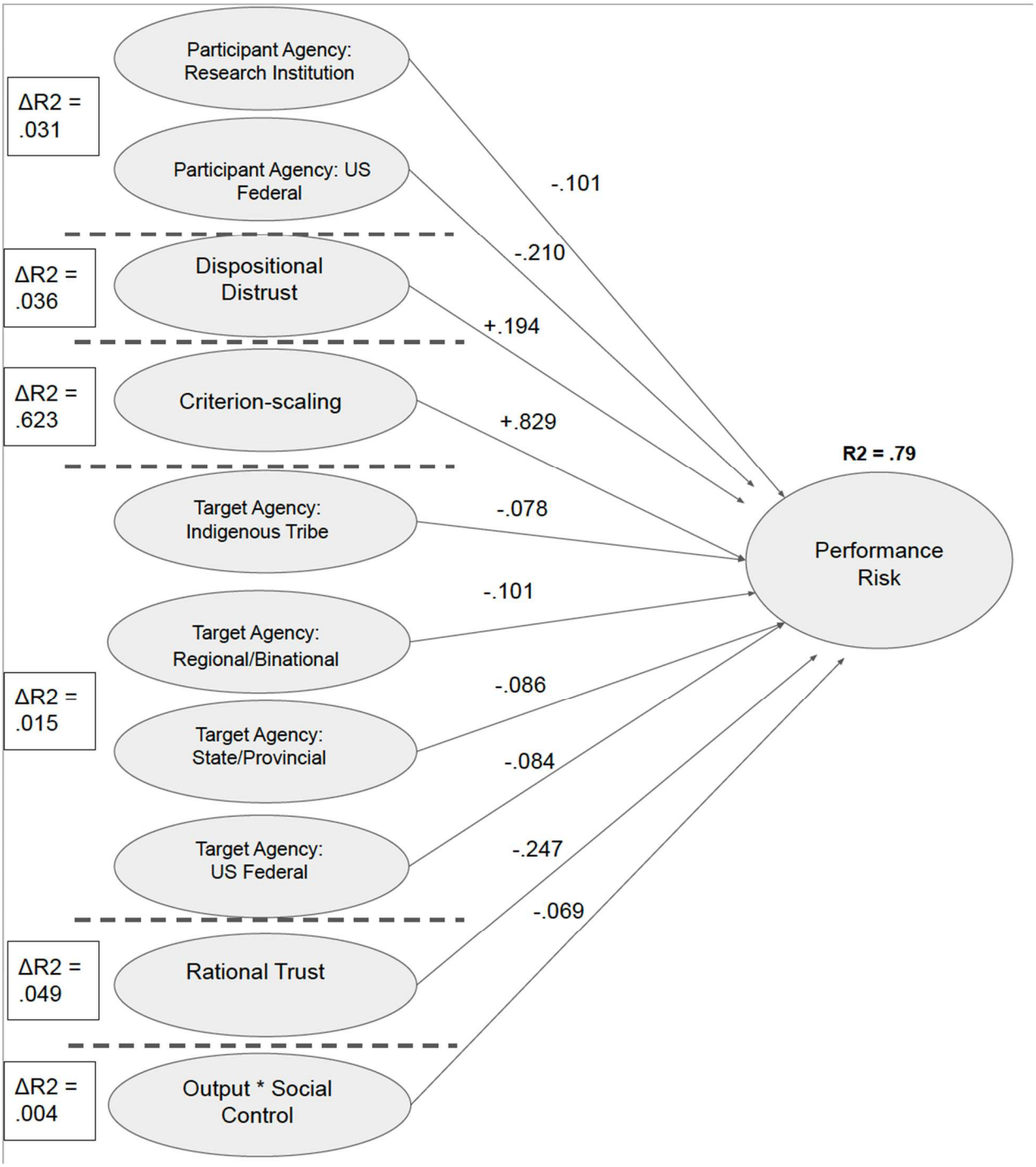


Figure 9, cont.

c.



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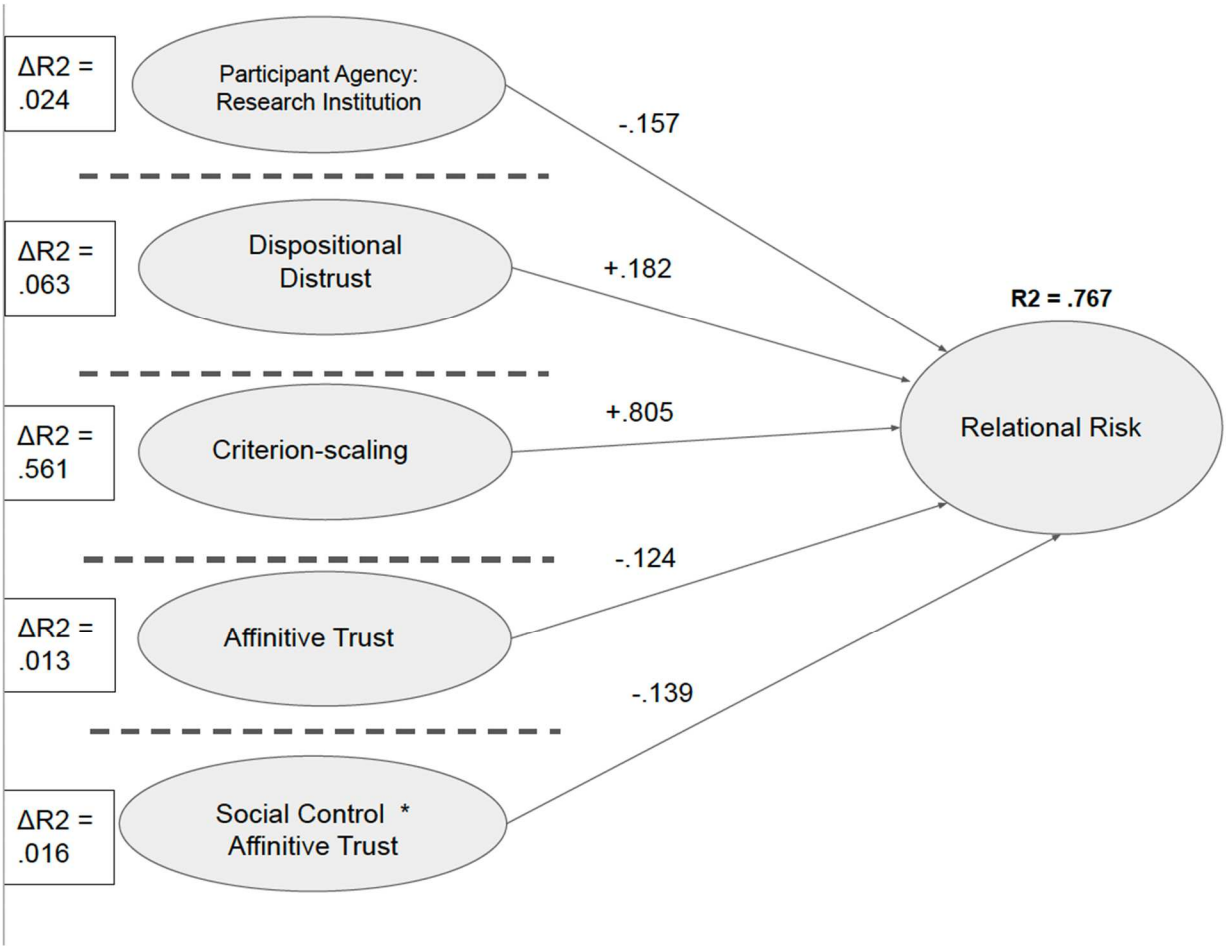

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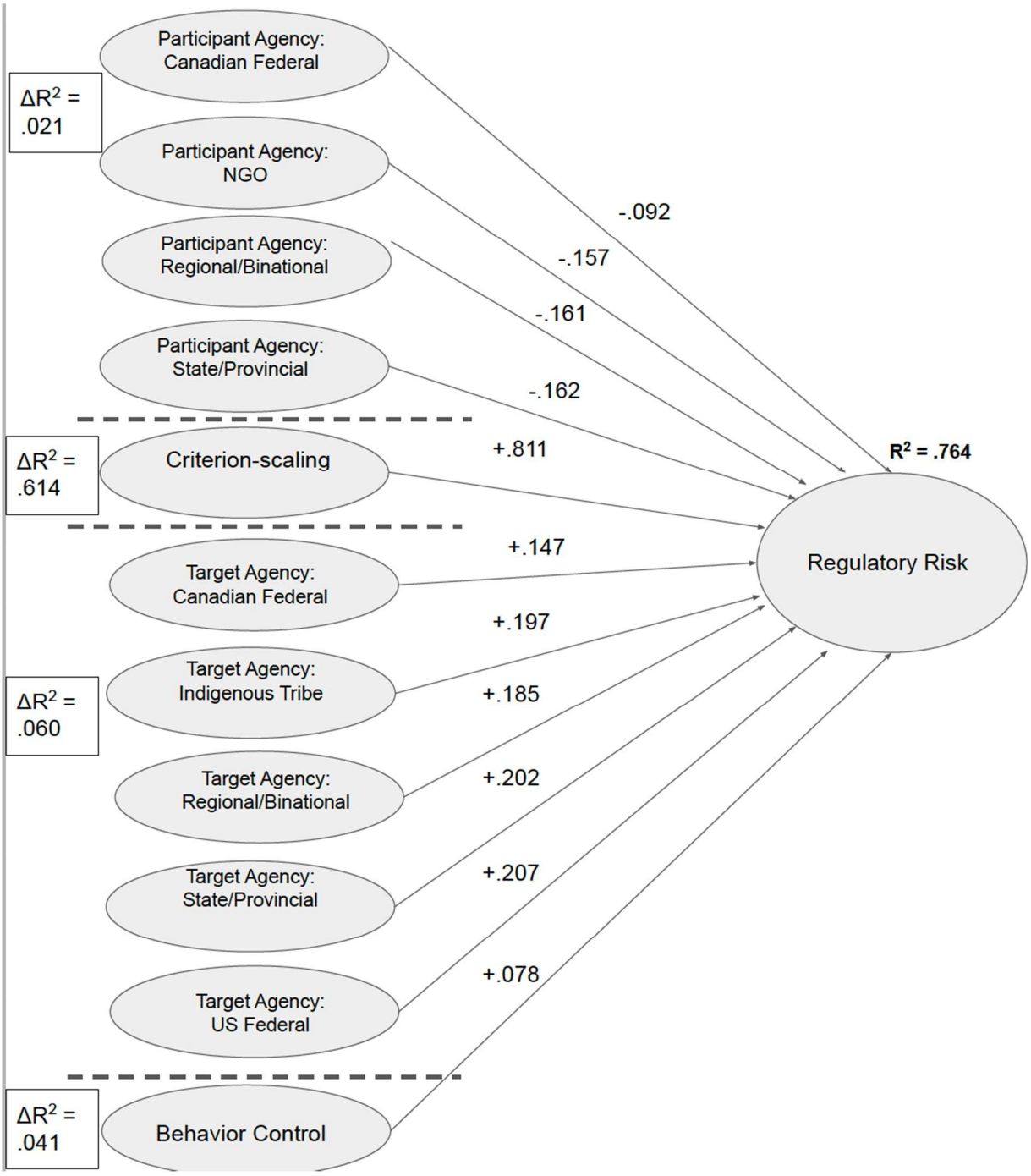

Figure 9, cont.

Table 5 Linear Regression Results: Summary of the linear regression analysis for predicting the impact of variable on procedural trust. Significant results are bolded.

	Procedural Trust	
VARIABLES	Model 1	Model 2
Dispositional Distrust	**-0.239****	**-0.303****
	(0.096)	(0.135)
Social Control	-0.286	0.264
	(0.238)	(0.430)
Behavior Control	**0.434****	**0.648***
	(0.192)	(0.383)
Output Control	0.269	**0.730***
	(0.241)	(0.404)
Behavior Control X Social Control		0.234
		(0.643)
Output Control X Social Control		-0.970
		(0.701)
Output Control X Behavior Control		-0.360
		(0.670)
Social Control X Dispositional Distrust		0.231
		(0.272)
Constant	**1.179****	**0.963***
	(0.503)	(0.531)
Home Organization Fixed Effects	Yes	Yes
Target Organization Fixed Effects	Yes	Yes
Observations	92	92
R-squared	0.248	0.278

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

CHAPTER V

DISCUSSION

The Salish Sea fishery network offers a key case of transboundary fishery governance characterized by a long history of formal cooperation and decision making. The network has been successful in many instances but sustained coordinated effort has been difficult to obtain, leading to failed outcomes and at times animosity between parties (see Brown 2005). This study sheds light on how the transboundary governance capacity of the Salish Sea fishery network can be enhanced using control mechanisms to build trust and mitigate risk. The results of this study also have a wider implication for natural resource government presenting a framework and supporting analysis linking specific control types to different dimensions of trust and risk thereby providing a guide for both researchers and managers.

The results show a greater prevalence of rational trust in the governance network with underdeveloped affinitive and procedural trust. These results support current theory that in networks with infrequent interactions rational trust will be dominant (Dietz & Den Hartog, 2006; Lewicki et al., 2006; Pirson & Malhotra, 2011). Since the Salish Sea is so large and geographically spread out there is less opportunity for interaction between network members which makes rational trust more important. The high levels of rational trust also suggest that the benefits of collaborating with groups outweigh any costs, and that past performance has been positive (Stern & Coleman, 2015). The underdeveloped affinitive trust of the network indicates that there may be institutional barriers to forming longer-term and more informal working

relationships. The network also had low procedural trust perceptions. High rational but low procedural trust also suggests that participants from several organizations accept that they must deal with these inter-jurisdictional organizations, but their interactions potentially lack clear rules guaranteeing fairness (Lima et al., 2019).

Regulatory risk was the most prevalent risk type in the network with low levels of performance and relational risk. Low relational risk values suggest network members do not worry much about opportunistic behavior when collaborating. It may also suggest limited power asymmetry in collaboration (Zhang & Qian, 2017). The low performance risk levels of the network indicate successful cooperation where parties fully commit to the efforts due to the belief that the desired outcomes will be achieved (Das & Teng, 2001). Current risk and trust perceptions of networks members indicate that regulatory risk should be reduced along with an increase in procedural trust. The high regulatory risk and low procedural trust indicates that the Salish Sea network has unclear or inadequate behavior controls particularly policies and procedures. This is line with the general characterization of the Salish Sea transboundary fishery network as being less formalized than other transboundary networks.

The results from the linear regression analysis show that output control and behavior control build procedural trust. This supports current theory that trust in procedures can be built through the joint development of procedures, transparency in decision-making processes, and the equitable distribution of benefits and risks (Gezelius, 2002; Levi & Stoker, 2000; Stern, 2008; Stern, 2010; Stern & Coleman, 2015; Suchman, 1995; Sunshine & Tyler, 2003)**.** Through these processes output control and behavior control are able to provide legitimacy to the policy network through clear structuring of network behavior and output thereby increasing procedural trust.

The results from the hierarchical regression analysis show the differing impact of trust on risk. Rational trust was found to significantly decrease perceived performance risk while affinitive trust was found to significantly decrease perceived relational risk thereby partially supporting our fourth and fifth hypothesis. These results build on previous research that depict the differing roles of trust and the importance of trust diversity (Das & Teng, 2001; Song et al., 2019; Stern & Baird, 2015; Stern & Coleman, 2015)

Rational trust was found to be fostered by behavior control which was hypothesized to undermine rational trust development. However, rational trust can be developed when there is clearly stated knowledge that shows the trustee to be competent, predictable, and consistent which behavior control can help create through clear guidelines that standardize the behavior of the trustee (Stern & Coleman, 2015). The behavior control mechanisms in place in the Salish Sea network can foster rational trust development through this knowledge development. Social control was also found to build rational trust which validates our first hypothesis. These results empirically support Stern & Coleman (2015) and Braithwaite (1998) who theorize that rational trust is based on exchange norms formed through socially defined standards. Interestingly the interaction between social control and behavior control was negative in the rational trust model. This indicates a substitutive effect between the two control mechanisms. The presence of social control reduces the ability of behavior control to build rational trust and vice versa. Social control or informal control can replace the need for behavior control as relationships develop within the governance network. These results also indicate there is a ceiling on rational trust. Therefore, as rational trust increases there is a diminishing marginal return on management efforts. Similar to the concept of trust ecology put forth by Stern and Baird (2015), different control types appear to have buffering effects. In the absence of one control, other control types

can act as substitutes thereby suggesting a possible governance ecology where the impact of control on trust fluctuates as the network changes.

Affinitive trust was also found to be enhanced by social control thereby supporting the second hypothesis and confirming the importance of social control for building multiple types of trust as suggested by Das & Teng (2001). The interaction between social control and output control was found to be synergistic meaning output control and social control are more effective in conjunction with increase affinitive trust compared to either variable alone. This result is unsurprising since oftentimes formal control is needed to overcome network member turnover that often plagues transboundary governance networks. Formal control can diffuse norms, rules, practices, and procedures developed through social control beyond individuals making the network more resilient to staff turnover (Imperial 2005**,** Lawrence et al. 2002). A similar result was also found for performance risk where the interaction between social control and output control was able to more effectively decrease performance risk compared to the variables on their own. Rational trust was also found to reduce performance risk thereby supporting our fourth hypothesis. This result also empirically supports Stern & Coleman (2015) and Das & Teng (2001) who theorized that rational trust would decrease performance risk by creating a sense of confidence in the positive outcome in the alliance. The use of both output control and social control can build trust and reduce risk by informally influencing participants behavior through the creation of social norms that are then formalized.

Affinitive trust was found to decrease relational risk thereby supporting the fifth hypothesis. This results empirically supports Stern & Coleman (2015) and Brithwaite (1998) who state that affinitive trust creates goals of peaceful coexistence and mutual respect which in turn reduces relational risk. The interaction between social control and affinitive trust was found

to be synergistic and more effective at reducing relational risk compared to the variables individually. Social control is most effective in high trust situations and as previously stated social control can build affinitive trust (Ouchi 1979). A re-enforcing cycle is formed where affinitive trust can increase the effectiveness of social control on reducing relational risk and the use of social control increases affinitive trust which then further reduces relational risk.

One of the most surprising results of the analysis was the impact of behavior control on regulatory risk. Behavior control was hypothesized to reduce regulatory risk due to its ability to standardize behavior and therefore reduce the risk of failing to comply with requirements. However, the results of the hierarchical regression analysis show that behavior control caused an increase in regulatory risk. This surprising result may be context specific. Since the Salish Sea contains less formalized structures for transboundary management the rules for compliance may be unclear. Although preliminary guidelines and basic behavior controls may be in place in the network, guidelines governing other network interactions may be less clear causing the fear of accidental non-compliance and subsequent regulations to be high. The preliminary guidelines in place in the transboundary Salish Sea network may make network members aware of regulatory risk and a lack of specifics causes the risk to increase due to an unclear understanding of non-compliance. Few studies have examined the mechanisms that affect regulatory risk, although this research provides a suitable starting point, more research is still needed to understand how to reduce regulatory risk in natural resource networks. Figure 10 provides a summary of the interactions and relationships between variables in the context of Salish Sea transboundary fishery governance network.

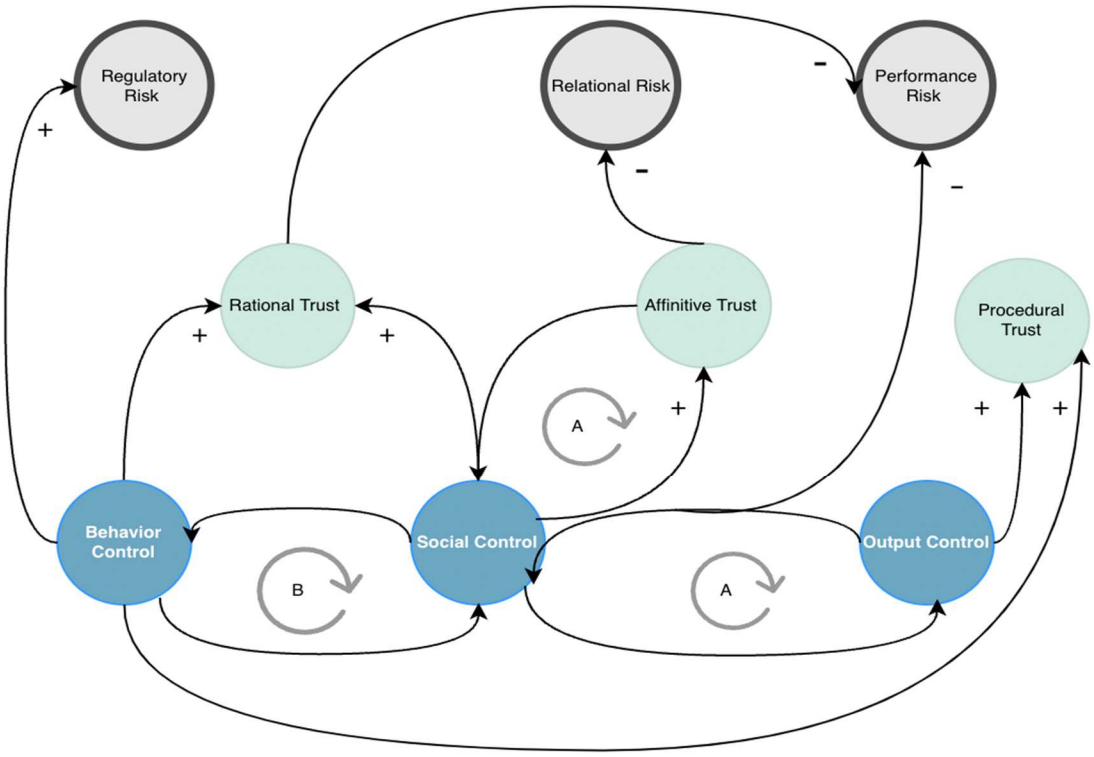

Figure 10 Summary Casual Loop Diagram: Causal loop diagram depicting the identified relationships in the Salish Sea transboundary fishery. Recursive grey loops indicate interaction between variables with A meaning reinforcing interactions while B indicates substitutive interactions (i.e., the presence of one variable reduces the ability of the other to build rational trust). Positive and negative signs indicate the direction of the relationship between variables.

CHAPTER VI

CONCLUSION

Insights from this study provide a detailed understanding of the perceived inter-organizational trust and risk among the actors collaborating within the transboundary Salish Sea region, and how layered and diverse control mechanisms enhance collaboration to better support sustainable fishery management objectives. The results highlight that the Salish Sea transboundary fishery governance network has less formalized supporting structures than other fishery networks and these structures should be enhanced to create more positive collaborative outcomes. Critically, the transboundary governance network should build upon its behavior control mechanisms to create clear procedures for interactions within the network that go beyond the current general guidelines. Through the enhancement of behavior control mechanisms, the procedural trust in the network can be increased with the possible reduction of regulatory risk.

By analyzing the interactions between control, trust, and risk the results add to the evidence that social control is a crucial factor in enhancing collaboration and increasing positive outcomes in natural resource networks. Notably, this study has depicted the additive and enhancing effect social control has on trust and formal output control when reducing risk. It also suggests a buffering effect between social control and behavior control specifically in the development of rational trust. The differing roles of social control based on trust, risk, and control type support the idea of governance ecology where the relationships and interactions of variables is dynamic and changes depending on context. A deeper understanding of governance

ecology will depict the nuanced ways network management can impact collaborative outcomes and provide the necessary tools to create an effective and adaptive transboundary natural resource governance.

Future research should look deeper into the role of regulatory risk in natural resource management and the governance strategies that influence its perception among network participants. There is minimal research that empirically analyzes regulatory risk in natural resource governance. Future work should also look to include input from network members through interviews and participant observation. Using these qualitative approaches, the survey results can be analyzed more in-depth and given additional network context. Ethnographies and interviews also provide the opportunity to trace the impact of control mechanisms on trust and risk over time which is a highly underdeveloped section of research. This research provides a key starting point to unlock the ways transboundary networks build trust and mitigate risk, but more research is still needed to understand how to improve the collaborative outcomes of these natural resource management structures.

REFERENCES

Adger, W.N. (2003). Social capital, collective action, and adaptation to climate change. Econ. Geogr. 79 (4), 387–404.

Adler, PS; Borys B (1996) Two faces of bureaucracy: enabling and coercive. Admin Sci Q 41:61–89

Agranoff, R. (2007). Managing Within Networks: Adding Value to Public Organizations. Georgetown University Press, Washington DC.

Agranoff, R.; M. McGuire. 2001. Big questions in public network management research. J. Public Adm. Res. Theory 11, 295–326.

Aldrich, H.; & D. A. Whetten. (1981). Organization-sets, action sets, and networks: Making the most of simplicity. In P. C. Nystrom & W. Starbuck (Eds.), Adapting organizations to their environments (Vol. 1, pp. 385-408). New York: Oxford University Press.

Alley, Jamie. (1998). "The British Columbia-Washington Environmental Cooperation Council: An Evolving Model of Canada-U.S. Interjurisdictional Cooperation." Pp. 53-71 in Environmental Management on North America's Borders, Richard Kiy and John D. Wirth, eds. College Station: Texas A&M University Press.

Alper, Donald K. (1996). "The Idea of Cascadia: Emergent Transboundary Regionalisms in the Pacific Northwest-Western Canada." Journal of Borderland Studies XI/2 (Fall): 1-22.

Alper, D. (2004). Emerging collaborative frameworks for environmental governance in the Georgia basin-Puget sound ecosystem. *Journal of Borderlands Studies*, *19*(1), 79–98. https://doi.org/10.1080/08865655.2004.9695618

Anderson, S. W.; M. H. Christ; H. C. Dekker; & K. L. Sedatole. (2014). The Use of Management Controls to Mitigate Risk in Strategic Alliances: Field and Survey Evidence. *Journal of Management Accounting Research* 26: 1–32. Doi:10.2308/jmar-50621.

Agrano, R.; M. McGuire. (2001). Big questions in public network management research. J. Public Adm. Res. Theory 2001, 11, 295–326. [CrossRef]

Balint, P. J.; R. E. Stewart; A. Desai; & L. C. Walters. (2011). Wicked environmental problems: Managing uncertainty and conflict. Washington, DC: Island Press.

Bardach, E. (1998). Getting agencies to work together: The practice and theory of managerial craftsmanship. Washington, DC: Brookings Institution.

Bastrup-Birk, H.; & Wildemeersch, D. (2011). Navigating the tides of change: revisiting the notion of reflexivity in the context of social learning for transboundary collective experimentation. *Studies in Continuing Education*, *33*(3), 219–234. https://doi.org/10.1080/0158037X.2011.580735

Berkes, F. (2009). Evolution of co-management: Role of knowledge generation, bridging organizations and social learning. Journal of Environmental Management, Volume 90, Issue 5,2009,https://doi.org/10.1016/j.jenvman.2008.12.00.

Béné, C. (2009) Are Fishers Poor or Vulnerable? Assessing Economic Vulnerability in Small-Scale Fishing Communities, The Journal of Development Studies, 45:6, 911-933, DOI: 10.1080/00220380902807395

Bhattacharya, R; T. M. Devinney; & M.M. Pillutla. (1998). 'A formal model of trust based on outcomes'. Academy of Management Review 23: 459–472.

Blatter, J.; & H. Ingram. (2000). "States, Markets and Beyond: Governance of Transboundary Water Resources." Natural Resources Journal 40/2 (Spring): 439-469.

Bouwen, R.; & T. Taillieu. (2004). Multi-party collaboration as social learning for interdependence: Developing relational knowing for sustainable natural resource management. Journal of Community & Applied Social Psychology 14: 13753.

Braithwaite, V. (1998). Communal and exchange trust norms: Their value base and relevance to institutional trust. In Trust and governance, ed. V. Braithwaite and M. Levi, 41–64. New York: Russell Sage Foundation.

Brondizio, E.S.; E. Ostrom; & O. R.Young. (2009). Connectivity and the governance of multilevel social-ecological systems: the role of social capital. Annu. Rev. Environ. Resour. 34, 253–278

Brown, D. (2005). Salmon wars: The battle for the west coast salmon fishery. Harbour Pub.

Burch, S. (2010). Transforming barriers into enablers of action on climate change: insights from three municipal case studies in British Columbia, Canada. Glob. Environ. Change Part A 20 (2), 287–297.

Carlsson L; & F. Berkes. (2005). Co-management: concepts and methodological implications. J Environ Manage. 2005 Apr;75(1):65-76. doi: 10.1016/j.jenvman.2004.11.008. PMID: 15748804.

Cash, D.W.; & S.C. Moser. (2000). Linking global and local scales: designing dynamic assessment and management processes. Glob. Environ. Change Part A 10 (2), 109–120.

Chisholm, D. (1995). Problem solving and institutional design. Journal of Public Administration Research and Theory, 5, 451-491.

Coleman, J. S. (1990). Foundations of social theory. Cambridge, MA: Harvard University Press.

Coleman, K.; M.J. Stern. (2018). Boundary spanners as trust ambassadors in collaborative natural resource management. J. Environ. Plan. Manag. 2018, 61, 291–308. [CrossRef]

Cristofoli, D.: & L. Macciò. (2018) To wind a skein into a ball: exploring the concept and measures of public network performance, Public Management Review, 20:6, 896-922, DOI: 10.1080/14719037.2017.1363904

Cundill G; & Rodela R. (2012) A review of assertions about the processes and outcomes of social learning in natural resource management. J Environ Manag 113:7–14

Cvetkovich, G.; & P. Winter. (2003). Trust and social representations of threatened and endangered species. Environ. Behav. 35(2):286–307.

Daniels SE, Walker GB (1996) Collaborative learning: improving public deliberation in ecosystem-based management. Environ Impact Assess 16(2):71–102

Das, T. K.; & Teng B.S. (1996). Risk types and inter-firm alliance structures. Journal of Management Studies 33: 827–843.

Das, T.K.; & B.S. Teng (2001). Trust, control, and risk in strategic alliances: An integrated framework. Organ. Stud. 2001, 22, 251–283.

Dekker, H. C. (2008). Partner selection and governance design in inter-firm relationships. Accounting, Organizations and Society 33 (7/8): 915-941.

Dekker, H. C; & A. Van den Abbeele. (2010). Organizational learning and interfirm control: The effects of partner search and prior exchange experiences. Organization Science 21 (6): 1233-1250.

Delerue, H. (2005). "Relational risk perception and alliance management in French biotechnology SMEs." European Business Review, Vol. 17, No. 6, pp. 532-546, DOI: 10.1108/09555340510630563.

Dietz, G.; & D. N. Den Hartog. (2006). Measuring trust inside organisations. Pers. Rev. 35 (5), 557–588.

Edelenbos, J.; & J. Eshuis. (2012). The Interplay Between Trust and Control in Governance Processes: A Conceptual and Empirical Investigation. Administration & Society, 44(6), 647–674. https://doi.org/10.1177/0095399711413876

Edelenbos, J.; I. van Meerkerk. (2015). Connective capacity in water governance practices: the meaning of trust and boundary spanning for integrated performance. Curr. Opin. Environ. Sustain. 12, 25–29.

Eisenhardt, Kathleen M. (1985). 'Control: Organizational and economic approaches'. Management Science 31: 134–149.

Environment Canada. (2002). Georgia Basin-Puget Sound ecosystem indicators report / by the Transboundary Georgia Basin-Puget Sound Environmental Indicators Working Group. Ottawa - Ontario: Environment Canada. Spring 2002.

Fisher, R.; W. L. Ury; & B. Patton. (1991). Getting to yes: Negotiating agreement without giving in. New York: Penguin Books.

Frankema, K.; & A. C. Costa. (2005). Understanding the trust-control nexus. International Sociology, 20, 259-282.

Frederickson, H. G. (1996). The spirit of public administration. San Francisco: Jossey-Bass.

Freelan S., (2016). "Map of the Salish Sea and Surrounding Basin," http://staff.wwu.edu/stefan/salish_sea.shtml.

Fulmer, A. C.; & M. J. Gelfand. (2012). At what level (and in whom) we trust: Trust across multiple organizational levels. J. Manage. 38(4):1167–1230.

Furlong, K. (2010). Neoliberal water management: Trends, limitations, reformulations. Environment and Society: Advances in Research, 1, 46–75.

Gambetta, D. (Ed.). (1988). Trust: Making and breaking cooperative relations. New York, NY: Basil Blackwell.

Geringer, J. Michael; & Louis Hebert (1989). Control and performance of international joint ventures. Journal of International Business Studies 20: 235–254.

Gezelius, S. S. (2002). Do norms count? State regulation and compliance in a Norwegian fishing community. Acta Sociol. 45(4):305–314.

Gibbons, J.A.; & R.D. Sherwood. (1985). Repeated measures/randomized blocks ANOVA through the use of criterion-scaled regression analysis. Educ. Psychol. Meas. 45 (4), 711–724.

Goold, M.; & A. Campbell. (1987). Strategies and styles: The role of the centre in managing diversified corporations. Oxford: Blackwell.

Ghoshal, S., & P. Moran. (1996). Bad for practice: A critique of the transaction cost theory. *The Academy of Management Review, 21*(1), 13–47. https://doi.org/10.2307/258627

Gouldner A. (1954) Patterns of industrial bureaucracy. Free Press, New York

Gulati, Ranjay. (1995). Does familiarity breed trust? The implication of repeated ties for contractual choice in alliances. Academy of Management Journal 38: 85–112.

Gutiérrez, N.; R. Hilborn; & O. Defeo. (2011). Leadership, social capital and incentives promote successful fisheries. *Nature* **470,** 386–389. https://doi.org/10.1038/nature09689

Hardin, R. (2002). Trust and trustworthiness. New York: Russell Sage Foundation.

Harries, T.; & E. Penning-Rowsell. (2011). Victim pressure, institutional inertia and climate change adaptation: the case of flood risk. Glob. Environ. Change Part A 21 (1), 188–197.

Heide, Jan B. (1994). 'Interorganizational governance in marketing channels'. Journal of Marketing 58/1: 71–85.

Hickey, G. M.; R. Voogd; J.R. de Vries; A. Sohns; O. Temby. (2022). On the architecture of collaboration in inter-organizational natural resource management networks. *Submitted to Ambio*.

Hickey G.M; H.T. Snyder; J.R. deVries; & O. Temby. (2021) On inter-organizational trust, control and risk in transboundary fisheries governance. Marine Policy, Volume 134, 2021, 104772.

Ho N.T.T.; H. Ross; & J. Coutts. (2016). Evaluation of social and ecological outcomes of fisheries co-management in Tam Giang Lagoon, Vietnam. Fisheries Research,Volume 174,2016, https://doi.org/10.1016/j.fishres.2015.09.013.

Hodge, Anthony; & R. Paul. West. (1998). Achieving Progress in the Great Lakes Basin Ecosystem and the Georgia Basin-Puget Sound Bioregion." Pp. 72-107 in Environmental Management on North America's Borders. Richard Kiy and John D. Wirth, eds. College Station: Texas A&M University Press.

Hsieh, L. H. Y.; S. B. Rodrigues; & J. Child. (2010). "Risk perception and post-formation governance in international joint ventures in Taiwan: The perspective of the foreign partner." Journal of International Management, Vol. 16, No. 3, pp. 288-303, DOI: 10.1016/j.intman. 2010.06.007.

Huxham, C. (1996). Collaboration and collaborative advantage. In C. Huxham (Ed.), Creating collaborative advantage (pp. 1-18). Thousand Oaks, CA: Sage.

Imperial, M.T., (1999). Institutional analysis and ecosystem-based management: the institutional analysis and development framework. Environ. Manage. 24 (4), 449–465.

Imperial, M. T. (2005). Using Collaboration as a Governance Strategy. *Administration & Society*, *37*(3), 281–320. https://doi.org/10.1177/0095399705276111

Imperial, M. T.; & T. Hennessey. (2000). Environmental governance in watersheds: The importance of collaboration to institutional performance. Washington, DC: National Academy of Public Administration.

Jennings, M. K. (1998). Political trust and the roots of devolution. In Trust and governance, ed. V. Braithwaite, and M. Levi, 218–244. New York: Russell Sage Foundation.

John G. (1984). An empirical investigation of some antecedents of opportunism in a marketing channel. Journal of Marketing Research 21(August): 278–289.

Jolly, C. (1998). The BC-WA Environment and the founding of the ECC. Lecture notes from International Environmental Law Class. Seattle: University of Washington.

Kahneman, D.; & A. Tversky. (1979). "Prospect Theory: An Analysis of Decision under Risk," Econometrica 47, 263–291.

Katznelson, D. A. (2020). *Predicting collaboration: Risk, power, and dependence in the gulf of maine* (Order No. 28091296). Available from ProQuest Dissertations & Theses Global. (2505376348). Retrieved from https://proxy.openathens.net/login?entityID=https://idp.utrgv.edu/openathens&qurl=https://www.proquest.com/dissertations-theses/predicting-collaboration-risk-power-dependence/docview/2505376348/se-2?accountid=7119

Klijn, E.-H.; J. Edelenbos; & B. Steijn. (2010). Trust in governance networks: Its impacts on outcomes. Adm. Soc. 2010, 42, 193–221.

Korkeila, K.; S. Suomimen; J. Ahvenainen; A. Ojanlatva; P. Rautava; H. Helenius; M. Koskenvuo. (2001). Non-response and related factors in a nation-wide health survey. Eur. J. Epidemiol. 17, 991-999.

Landau M; & R. Stoudt Jr. (1979) To manage is not to control: of the folly of type II errors. Public Adm Rev 39:148–156.

Lawrence, T. B.; C. Hardy; & N, Phillips. (2002). Institutional effects of interorganizational collaboration: The emergence of proto-institutions. Academy of Management Journal, 45, 281-290.

Leana, C. R.; & H. J.Van Buren III. (1999). Organizational social capital and employment practices. Academy of Management Review, 24, 538-555.

Leifer, Richard; & P.K.Mills. (1996) An information processing approach for deciding upon control strategies and reducing control loss in emerging organizations. Journal of Management 22: 113–137.

Levi,M; & L. Stoker. (2000). Political trust and trustworthiness. Annu. Rev. Polit.Sci. 3:475–507.

Lewicki, R. J.; E. C. Tomlinson; & N. Gillespie. (2006). Models of interpersonal trust development: Theoretical approaches, empirical evidence, and future directions. J.Manage. 32(6):991–1022.

Lima A.; D. Kim; A.M. Song; G.M. Hickey; & O. Temby. (2019). Trust and Influence in the Gulf of Mexico's Fishery Public Management Network. *Sustainability* 11, no. 21: 6090. https://doi.org/10.3390/su11216090

Littler; Dale; & F. Leverick. (1995). 'Joint ventures for product development: Learning from experience'. Long Range Planning 28/3: 58–67.

Lynn, L. E., Jr.; C.J. Heinrich; & C. J. Hill. (2000). Studying governance and public management: Challenges and prospects. Journal of Public Administration Research and Theory, 10, 233-261.

Margerum, R. (2011). Beyond consensus: Improving collaborative planning and management. Boston, MA: Massachusetts Institute of Technology.

McCaffrey, S. (2006). Understanding international law. Elsevier: LexisNexis.

Meier K.J.; & L. J. O'Toole Jr. (2007) Modeling public management, Public Management Review, 9:4, 503-527, DOI: 10.1080/14719030701726630

Merton, RK (1940) Bureaucratic structure and personality. Soc Forces 18:560–568

Milward, H. B.; & K.G. Provan. (2000). Governing the hollow state. Journal of Public Administration Research and Theory, 10, 359-379.

Ming'ate F.L.M.; H.G. Rennie; A. Memon. (2014). Potential for co-management approaches to strengthen livelihoods of forest dependent communities: A Kenyan case. Land Use Policy, Volume 41,2014, https://doi.org/10.1016/j.landusepol.2014.06.008.

Möllering, G. (2006). Trust: Reason, routine, reflexivity. Oxford, UK: Elsevier.

Munton, D. (2006). Transboundary air pollution: dependence and interdependence. In: Le Prestre, P.G., Stoett, P.J. (Eds.), Bilateral Ecopolitics: Continuity and Change in Canadian□American Environmental Relations. Ashgate., Aldershot, England, pp. 73–92.

Nooteboom, Bart. (1996). 'Trust, opportunism and governance: A process and control model'. Organization Studies 17/6: 985–1010.

Norman E. S.; & K. Bakker. (2015) Do good fences make good neighbours? Canada–United States transboundary water governance, the Boundary Waters Treaty, and twenty-first-century challenges, Water International, 40:1, 199-213, DOI: 10.1080/02508060.2014.978973

Ostrom, E. (2003). Toward a behavioral theory linking trust, reciprocity, and reputation. In Trust and reciprocity, ed. E. Ostrom and J. Walker, 19–79. New York: Russell Sage Foundation.

Ostrom, E. (2010). Beyond Markets and States: Polycentric Governance of Complex Economic Systems. American Economic Review, 100 (3): 641-72.

Ostrom, E.; & T. K. Ahn. (2003). Foundations of Social Capital. Edward Elgar Publishing, Northampton, MA.

Paul, C.J.; E.S. Weinthal: M.F. Bellemare; & M. A. Jeuland. (2016). Social capital, trust, and adaptation to climate change: evidence from rural Ethiopia. Glob. Environ. Change Part A 36, 124–138.

Pedhazur, E.J., (1977). Coding subjects in repeated measures designs. Psychol. Bull. 84, 298–305.

Phillips, N.; T. B. Lawrence,; & C. Hardy. (2000). Interorganizational collaboration and the dynamic of institutional fields. Journal of Management Studies, 37(1), 23-43.

Pirson, M.; & D. Malhotra. (2011). Foundations of organizational trust: What matters to different stakeholders? Organ. Sci. 22 (4), 1087–1104.

Powell, W. W. (1990). Neither Market Nor Hiearchy: Network forms of organization. *Reseach in Organizational Behavior* 12: 295–336.

Pretty, J., (2003). Social capital and the collective management of resources. Science 302 (5652), 1912–1914.

Rosen, F.& P.Olsson. (2013). Institutional entrepreneurs, global networks, and the emergence of international institutions for ecosystem-based management: the Coral Triangle Initiative. Mar. Policy 38, 195–204.

Schreiner, M.; & P. Kale; & D. Corsten. (2009). What really is alliance management capability and how does it impact alliance outcomes and success? Strategic Management Journal 30: 1395-1419.

Sheppard, Blair H.; & D. M. Sherman. (1998). 'The grammars of trust: A model and general implications'. Academy of Management Review 23: 422– 437.

Sitkin, Sim B. (1995). 'On the positive effect of legalization on trust'. Research on Negotiation in Organizations 5: 185–217.

Smith, J. W.; J. E. Leahy; D. H. Anderson; & M. A. Davenport. (2013). Community agency trust and public involvement in resource planning. Society Nat. Resources 26:452–271.

Sohn, J.H.D. (1994).Social knowledge as a control system: A proposition and evidence from the Japanese FDI behaviour. Journal of International Business Studies 25: 295–324.

Soliku O.; U. Schraml. (2020). Protected areas management: A comparison of perceived outcomes associated with different co-management types. Forest Policy and Economics,Volume 118, 2020, https://doi.org/10.1016/j.forpol.2020.102258.

Song, A.M.; O. Temby; D. Kim; A. S. Cisneros; & G. M. Hickey. (2019). Measuring, mapping and quantifying the effects of trust and informal communication on transboundary collaboration in the Great Lakes fisheries policy network. Glob. Environ. Change 2019, 54, 6–18.

Stedman, R. C.; N.A. Connelly; T.A. Heberlein; D.J. Decker; & S. B. Allred. (2019). The end of the (research) world as we know it? Understanding and coping with declining response rates to mail surveys. *Society & Natural Resources*, 32(10), 1139–1154. doi:https://doi.org/10.1080/08941920.2019.1587127

Stern, M.J. (2008). The power of trust: toward a theory of local opposition to neighboring protected areas. Soc. Nat. Resour. 21 (10), 859–875.

Stern, M. J. (2010). Payoffs vs. process: Expanding the paradigm for park-people studies beyond economic rationality. J. Sustain. For. 29(2–4):174–201.

Stern, M.J.; & T. D. Baird. (2015). Trust ecology and the resilience of natural resource management institutions. Ecol. Soc. 2015. [CrossRef]

Stern, M.J.; & K. J. Coleman. (2015). The multidimensionality of trust: applications in collaborative natural resource management. Soc. Nat. Resour. 28 (2), 117–132.

Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. Acad. Manage. Rev. 20(3):571–610.

Sundaramurthy, Ch; & M. Lewis. (2003). Control and collaboration: Paradoxes of governance. Academy of Management Review, 28, 397-415.

Sunshine, J.; &T. R. Tyler. (2003). The role of procedural justice and legitimacy in shaping public support for policing. Law Society Rev. 37(3):513–547.

Supper, I.; O. Catala; M. Lustman; C. Chemla; Y, Bourgueil; & L. Letrilliar. (2015). Interprofessional collaboration in primary health care: a review of facilitators and barriers perceived by involved actors. *Journal of public health*, *37*(4), 716-727.

Temby, O.; J. Sandall; R. Cooksey; & G. M. Hickey. (2017). Examining the role of trust and informal communication on mutual learning in government: the case of climate change policy in New York. Organ. Environ. 30 (1), 71–97.

Tsai,W.; & S. Ghoshal. (1998). Social capital and value creation: The role of intrafirm networks. Academy of Management Journal, 41, 464-476.

Tyler, T. R. (1990). Why people obey the law. New Haven, CT: Yale University Press.

U.S. Environmental Protection Agency and Environment Canada. (2008). "Joint Statement of Cooperation on the Georgia Basin and Puget Sound Ecosystem 2008-2010 Action Plan."

Van Meerkerk, I.; J. Edelenbos; & E. H. Klijn, (2015). Connective management and governance network performance: the mediating role of through put legitimacy. Findings from survey research on complex water projects in the Netherlands. Environ. Plann. C Gov. Policy 33 (4), 746–764.

Vaske, J.J.; J. D. Absher; & A. D. Bright. (2007). Salient value similarity, social trust and attitudes toward wildland fire management strategies. Hum. Ecol. Rev. 14 (2), 223–232.

Weber, E. P.; &A. M. Khademian. (2008). Wicked problems, knowledge challenges, and collaborative capacity builders in network settings. Public Admin. Rev. 68(2):334–349.

Wicks, A. C.; S. L. Berman; & T. M. Jones. (1999). The structure of optimal trust: Moral and strategic implications. Academy of Management Review, 24(1), 99-116.

Wilson, J. Q. (1989) Bureaucracy: what government agencies do and why they do it. Basic Books, New York

Wondolleck, J.; & S. L. Yaffee. (2017). Drawing Lessons from Experience in Marine Ecosystem-Based Management. 10.5822/978-1-61091-800-8_1.

Wondolleck, J. M.; & S. L. Yaffee. (2000). Making collaboration work: Lessons from innovation in natural resource management. Washington, DC: Island.

Young, Oran R. (1991). “Political Leadership and Regime Formation: On the Development of Institutions in International Society.” International Organization 45 (Summer): 281-308.

Zand, D. E. (1972). Trust and managerial problem solving. Administrative Science Quarterly, 17, 229-239.

Zbicz, Dorothy C. (1999). “Transboundary Cooperation in Conservation: A Global Survey of Factors Influencing Cooperation Between Internationally Adjoining Protected Areas.” Ph.D. diss., Nicholas School of the Environment, Duke University, Durham, North Carolina, U.S.A.

Zhang, L.Y.; & F. Li. (2015). The impact of risk perception on developing incentive systems for relational contracting. KSCE J. Civ. Eng. 19 (5), 1203–1213.

Zhang, L.; & Q. Qian. (2017). How mediated power affects opportunism in owner–contractor relationships: The role of risk perceptions. International Journal of Project Management, 35(3), 516–529.

APPENDIX A

APPENDIX A

SURVEY QUESTIONS

Demographic Questions

1) What is the main organization that you work for?
2) How long have you been working in this organization?
3) Please indicate which category best describes your current role? You may select multiple categories.
4) How long have you held your current position?
5) Although this study is concerned with people are involved directly and indirectly with fisheries, some participants may be more focused on particular fisheries than others. If you work directly with any of these fish species, please select them below. Select as many as apply.
6) Do you have a secondary affiliation with one of the following regional councils or commissions? Select as many as apply.

Dyadic Questions

1) Which of these regional and binational governmental organizations do you communicate with the most?
2) Which of these state/provincial governmental organizations do you communicate with the most?
3) Which of these United States federal governmental organizations do you communicate with the most?
4) Which of these Canadian federal governmental organizations do you communicate with the most?
5) Which of these Indigenous tribes do you communicate with the most?
6) Which of these non-governmental organizations do you communicate with the most?
7) Which of these business and trade groups do you communicate with the most?
8) Which of these research institutions do you communicate with the most?

Trust-Related Variables

1) Because we have been working with this organization for so long, all kinds of procedures have become self-evident.
2) In our relationship with the people in this organization, informal agreements have the same significance as formal contracts.
3) This organization can be relied upon to perform its objectives.
4) In our relationship with this organization, both sides treat each other in a consistent and predictable manner.

Risk-Related Variables

1) People in this organization may break promises.
2) The relationship with this organization will deteriorate in the foreseeable future.
3) People in this organization will take advantage of us when the opportunity arises.
4) The performance of this project is likely to decline in the foreseeable future.
5) Our objectives in the fishery management project with the organization will not be achieved.
6) This organization has no ability to offer us support when faced with difficulties in the management of this fishery.
7) In opposing this organization, we would be negatively affected in the future
8) The actions of this organization may expose my organization to additional regulations if relevant rules are not followed.

Influence-Related Variables

1) Working with people from this organization has enhanced my knowledge of fishery science or management.
2) Working with people from this organization has led me to make professional choices or decisions that I would not have made otherwise.
3) Working with people from this organization has led to me to rethink my approach to the management of fisheries and/or harvesting and conservation policies.

Control Variables

1) In fishery management, there are a range of different ways in which collaboration is supported. Select from the ways that collaboration is supported with [SELECTED AGENCY TYPE] from the list below. You can specify the collaborative activity you partake in with this organization in the example column next to the corresponding category.
2) Are there other ways you collaborate with the selected organization that does not fall into the above categories?

Non-Dyadic Trust-Related Variables

1) You can't be too careful dealing with people.
2) People are almost always interested only in their own welfare.
3) Most people would try to take advantage of you if they got the chance.
4) In the fishery management of this region, the strongest side is expected not to pursue its interests at all costs.
5) When managing fish in this region, it is expected that any unfair dealings will be avoided or rectified by existing regulatory, legal, or reputational measures.
6) When managing fish in this region, people are expected not to make demands that can serious damage the interests of other

APPENDIX B

APPENDIX B

SURVEY ORGANIZATION LIST

Regional and Binational Governmental Organizations

1. City of Vancouver
2. **Columbia River Inter-Tribal Fish Commission**
3. Environmental Cooperation Council
4. International Joint Commission
5. International Pacific Halibut Commission
6. King County
7. Northwest Indian Fisheries Commission
8. Pacific Fishery Management Council
9. Pacific Salmon Commission
10. Pacific States Marine Fisheries Commission
11. San Juan County
12. Washington Conservation Commission

State/Provincial Government

13. **BC Ministry of Agriculture and Fisheries**
14. British Columbia Conservation Office Service
15. **British Columbia Ministry of Environment**
16. British Columbia Ministry of Forests
17. Maritime Blue
18. **Oregon Department of Fish and Wildlife**
19. Puget Sound Partnership
20. Puget Sound Water Quality Authority
21. Washington State Department of Ecology
22. Washington State Department of Fish and Wildlife
23. **Washington State Department of Health**
24. Washington State Department of Natural Resources
25. Washington State Department of Transportation
26. Washington State Ferries
27. Washington State Office of the Attorney General
28. Washington State Recreation and Conservation Office

US Federal Government

29. **Bureau of Indian Affairs**
30. Environmental Protection Agency
31. National Oceanic and Atmospheric Administration
32. United States Army Corps of Engineers
33. United States Coast Guard
34. United States Fish and Wildlife Services

35. United States Forest Service
36. United States Geological Survey
37. USDA - Natural Resources Conservation Services

Canadian Federal Government

38. Canadian Coast Guard
39. Department of Fisheries and Oceans Canada
40. Environment and Climate Change Canada
41. Natural Resources Canada
42. Parks Canada
43. Transport Canada
44. Vancouver Fraser Port Authority

Indigenous Tribe

45. Coast Salish First Nations
46. Hoh Indian Tribe
47. Jamestown S'Klallam Tribe
48. Lower Elwha Klallam Tribe
49. Lummi Nation
50. Maa'Nulth Treaty Group
51. Makkah Nation
52. Muckleshoot Tribe
53. Nisqually Indian Tribe
54. Nooksack Tribe
55. Northwest tribes
56. Nuu-chah-nulth Tribe
57. Port Gamble S'Klallam
58. Puyallup Tribe of Indians
59. Quileute Indian Tribe
60. Quinault Indian Nation
61. Samish Tribe
62. Sauk-Suiattle Tribe
63. Skokomish Tribe
64. Squaxin Island Tribe
65. Stillaguamish Tribe
66. Suquamish Tribe
67. Swinomish Tribe
68. Tulalip Tribes
69. Upper Skagit Tribe

Non-Governmental Organization

70. British Columbia Environment Industry Association
71. Beam Reach
72. The Centre for Whale Research
73. Cetus Society
74. David Suzuki Foundation
75. Environmental Defense Fund
76. Friends of the San Juans
77. Georgia Strait Alliance

78. Living Oceans
79. Long Live the Kings
80. Lummi Island Heritage
81. Natural Resources Defense Council
82. The Nature Conservancy
83. Ocean Conservancy
84. Oceanwise
85. Pacific Salmon Foundation
86. Pacific Whale Watching Association
87. Port of Vancouver
88. Raincoast Conservation Foundation
89. Raincoast Research Society
90. Salmon Safe
91. Seachoice
92. Seadoc Society
93. Sierra Club
94. Surfrider
95. Trout Unlimited
96. Vancouver Aquarium
97. Washington Environmental Council
98. Washington Toxics Coalition
99. Whale Museum

Business and Trade Groups

100. Aboriginal Journeys
101. Adventure Whale Watching
102. Anglers Coalition
103. BC Salmon Gillnetters Association
104. Canfisco
105. Commercial Fishers
106. Deep Sea Fishermen's Union of the Pacific
107. Fishing Vessel Owners Association
108. Freezer-Longline Coalition
109. Gulf Trollers Association
110. Halibut Association
111. North Pacific Seafood Coalition
112. Northwest Fisheries Association
113. Northwest Marine Trade Association
114. Northwest Sportfishing Industry Association
115. Pacific Coast Shellfish Growers Association
116. Pacific Merchant Shipping Association
117. Pacific Whiting Conservation Cooperative
118. Regional Fisheries Coalition
119. Sport Fishing Advisory Board
120. Sport Fishing Institute
121. Washington Charter Boat Association
122. Washington Forest Protection Association

123. Whale Scout

Research Institution

124. Hakai Institute

125. Natural Resources Consultants, Inc./Independent research consultant

126. North Pacific Research Board

127. Oregon State University

128. Simon Fraser University

129. University of Alaska, Fairbanks

130. University of British Columbia

131. University of Puget Sound

132. University of Victoria

133. University of Washington

134. Western Washington University

Note: bolded organizations were identified by respondents.

APPENDIX C

APPENDIX C

HIERARCHICAL REGRESSION TABLES

Table 6 Hierarchical Regression Analysis: **Rational Trust**

Hierarchical regression model summary [a]

		R^2 change statistics					
Model	Predictor set entered	Model R^2	R^2 Change	*df* predictors	*df* residual	F-test	P
1	Participants Agency	0.0694	0.0694	6	644	8.01	**0**
2	Dispositional Distrust	0.0539	0.0155	7	518	4.22	**0.0002**
3	Criterion-scaled Participants	0.454	0.4001	8	517	53.73	**0**
4	Target Agency	0.4626	0.0086	15	510	29.27	**0**
5	Social Control	0.5689	0.1063	16	164	13.52	**0**
6	Behavior Control	0.5817	0.0128	17	163	13.33	**0**
7	Output Control	0.5817	0.0128	17	163	13.33	**0**
8	Behavior Control * Social Control Interaction	0.5829	0.0012	18	162	12.58	**0**
9	Output Control * Social Control Interaction	0.5899	0.007	19	161	12.19	**0**
10	Output Control * Behavior Control Interaction	0.5911	0.0012	20	160	11.57	**0**
11	Social Control * Dispositional Distrust Interaction	0.5913	0.0002	21	159	10.96	**0**

Model coefficients

		Unstandardized coefficients		Standardized coefficients	Correlations		
Model	Individual predictor	β	Std. error	β	Part	sr^2	P
1	**Participants Agency: Canadian Federal**	**0.6436364**	**0.1757164**	**0.1955424**	**0.1392**	**0.0194**	**0.0003**
	Participants Agency: NGO	0.2978469	0.1882558	0.0796697	0.0601	0.0036	0.1141
	Participants Agency: Regional/Binational	**0.6197339**	**0.1443255**	**0.3069515**	**0.1632**	**0.0266**	**0**
	Participants Agency: Research Institution	**0.7469697**	**0.1802279**	**0.2161841**	**0.1575**	**0.0248**	**0**
	Participants Agency: State/Provincial	**0.5575616**	**0.1522404**	**0.2357558**	**0.1392**	**0.0194**	**0.0003**
	Participants Agency: US Federal	**0.8722571**	**0.1413623**	**0.4610093**	**0.2346**	**0.055**	**0**
2	**Dispositional Distrust**	**-0.1257158**	**0.0459989**	**-0.1228515**	**-0.1168**	**0.0136**	**0.0065**
3	**Criterion-scaled Participants**	**1**	**0.0513805**	**0.67377**	**0.6325**	**0.4001**	**0**
4	Target Agency: Canadian Federal	0.0390417	0.1303203	0.0158407	0.0097	0.0001	0.7646
	Target Agency: Indigenous Tribe	0.1445342	0.1289376	0.0615533	0.0364	0.0013	0.2628
	Target Agency: NGO	0.0417714	0.1346929	0.0159037	0.0101	0.0001	0.7566
	Target Agency: Regional/Binational	**0.2882625**	**0.1336134**	**0.1105913**	**0.07**	**0.0049**	**0.0314**
	Target Agency: Research Institution	0.1577251	0.1272577	0.0697299	0.0402	0.0016	0.2158
	Target Agency: State/Provincial	0.1267722	0.1258163	0.0576914	0.0327	0.0011	0.3141
	Target Agency: US Federal	0.1197285	0.1293959	0.0498109	0.03	0.0009	0.3553
5	**Social Control**	**0.2370995**	**0.1135752**	**0.1167198**	**0.107**	**0.0115**	**0.0384**
6	**Behavior Control**	**0.2473609**	**0.1106863**	**0.134194**	**0.1132**	**0.0128**	**0.0268**
7	Output Control	-0.0928331	0.1351177	-0.0463397	-0.0349	0.0012	0.493
8	**Behavior Control * Social Control Interaction**	**-0.4827653**	**0.2907006**	**-0.102392**	**-0.0838**	**0.007**	**0.0987**
9	Output Control * Social Control Interaction	0.3026879	0.4417583	0.0573241	0.0346	0.0012	0.4942
10	Output Control * Behavior Control Interaction	0.1061795	0.3694112	0.0210243	0.0146	0.0002	0.7742
11	Social Control * Dispositional Distrust Interaction	-0.1147474	0.1534211	-0.041082	-0.038	0.0014	0.4556

Note. Bold font gives us statistically significant predictors and values.

Table 7 Hierarchical Regression Analysis: **Affinitive Trust**

Hierarchical regression model summary [a]

		R^2 change statistics					
Model	Predictor set entered	Model R^2	R^2 Change	*df* predictors	*df* residual	F-test	P
1	Participants Agency	0.02	0.02	6	655	2.23	**0.0386**
2	Dispositional Distrust	0.0293	0.0093	7	518	2.23	**0.0303**
3	Criterion-scaled Participants	0.5256	0.4963	8	517	71.61	**0**
4	Target Agency	0.5518	0.0262	15	510	41.85	**0**
5	Social Control	0.6499	0.0981	16	164	19.03	**0**
6	Behavior Control	0.6527	0.0028	17	163	18.02	**0**
7	Output Control	0.6529	0.0002	18	162	16.93	**0**
8	Behavior Control * Social Control Interaction	0.6532	0.0003	19	161	15.96	**0**
9	Output Control * Social Control Interaction	0.6594	0.0062	20	160	15.49	**0**
10	Output Control * Behavior Control Interaction	0.6606	0.0012	21	159	14.74	**0**
11	Social Control * Dispositional Distrust Interaction	0.661	0.0004	22	158	14	**0**

Model coefficients

		Unstandardized coefficients		Standardized coefficients	Correlations		
Model	Individual predictor	β	Std. error	β	Part	sr^2	P
1	Participants Agency: Canadian Federal	-0.1327273	0.1936021	-0.0372667	-0.0265	0.0007	0.4932
	Participants Agency: NGO	-0.2069378	0.2074179	-0.0511475	-0.0386	0.0015	0.3188
	Participants Agency: Regional/Binational	0.1297118	0.159016	0.0594999	0.0316	0.001	0.415
	Participants Agency: Research Institution	-0.3033395	0.1945246	-0.0843835	-0.0603	0.0036	0.1194
	Participants Agency: State/Provincial	-0.1185217	0.1677365	-0.0463592	-0.0273	0.0007	0.4801
	Participants Agency: US Federal	0.0534632	0.1552881	0.0264383	0.0133	0.0002	0.7307
2	Dispositional Distrust	-0.0786748	0.0527635	-0.0678911	-0.0645	0.0042	0.1365
3	**Criterion-scaled Participants**	**1**	**0.0429969**	**0.7249967**	**0.7045**	**0.4963**	**0**
4	Target Agency: Canadian Federal	**-0.3013945**	**0.1351043**	**-0.1079863**	**-0.0661**	**0.0044**	**0.0261**
	Target Agency: Indigenous Tribe	0.0400222	0.1336197	0.0150511	0.0089	0.0001	0.7647
	Target Agency: NGO	**-0.3032371**	**0.1394621**	**-0.1019503**	**-0.0645**	**0.0042**	**0.0301**
	Target Agency: Regional/Binational	0.0898972	0.1382804	0.0304555	0.0193	0.0004	0.5159
	Target Agency: Research Institution	-0.1930287	0.1318969	-0.0753575	-0.0434	0.0019	0.144
	Target Agency: State/Provincial	0.0596273	0.1301473	0.0239618	0.0136	0.0002	0.647
	Target Agency: US Federal	-0.0512356	0.1339088	-0.0188229	-0.0113	0.0001	0.7022
5	**Social Control**	**0.2665578**	**0.1321636**	**0.1028119**	**0.0932**	**0.0087**	**0.0453**
6	Behavior Control	0.1466328	0.1292639	0.0623263	0.0524	0.0027	0.2583
7	Output Control	-0.0445204	0.1568663	-0.017412	-0.0131	0.0002	0.7769
8	Behavior Control * Social Control Interaction	0.1354421	0.3403094	0.0225072	0.0185	0.0003	0.6912
9	**Output Control * Social Control Interaction**	**0.866681**	**0.5063789**	**0.1285996**	**0.079**	**0.0062**	**0.0889**
10	Output Control * Behavior Control Interaction	-0.3200992	0.4316338	-0.0496595	-0.0343	0.0012	0.4594
11	Social Control * Dispositional Distrust Interaction	-0.0726469	0.1799809	-0.0203781	-0.0187	0.0003	0.687

Note. Bold font gives us statistically significant predictors and values.

Table 8 Hierarchical Regression Analysis: **Performance Risk**

Hierarchical regression model summary [a]

		R^2 change statistics					
Model	Predictor set entered	Model R^2	R^2 Change	*df* predictors	*df* residual	F-test	P
1	Participants Agency	0.0312	0.0312	5	605	**3.24**	**0.0038**
2	Dispositional Distrust	0.0672	0.036	7	518	**5.33**	**0**
3	Criterion-scaled Participants	0.6905	0.6233	7	604	**192.53**	**0**
4	Target Agency	0.705	0.0145	15	510	**81.24**	**0**
5	Social Control	0.7354	0.0304	16	164	**28.49**	**0**
6	Output Control	0.7358	0.0004	17	163	**26.71**	**0**
7	Rational Trust	0.7849	0.0491	18	162	**32.84**	**0**
8	Output * Social interaction	0.7887	0.0038	19	161	**31.63**	**0**
9	Social Control * Dispositional Distrust Interaction	0.7889	0.0002	20	160	**29.91**	**0**
10	Social control * Rational trust interaction	0.7904	0.0015	21	159	**30.15**	**0**
11	Output control * Rational trust interaction	0.7906	0.0002	22	158	**27.12**	**0**

Model coefficients

		Unstandardized coefficients		Standardized coefficients	Correlations		
Model	Individual predictor	β	Std. error	β	Part	sr^2	P
1	Participants Agency: Canadian Federal	-0.0034965	0.1966797	-0.0009454	-0.0007	0	0.9858
	Participants Agency: NGO	-0.0227273	0.1980468	-0.0060714	-0.0046	0	0.9087
	Participants Agency: Regional/Binational	-0.0998878	0.1520298	-0.0487831	-0.0263	0.0007	0.5114
	Participants Agency: Research Institution	**-0.3779904**	**0.1980468**	**-0.1009768**	**-0.0764**	**0.0058**	***0.0568***
	Participants Agency: State/Provincial	-0.2377273	0.1617834	-0.0972987	-0.0588	0.0035	0.1422
	Participants Agency: US Federal	**-0.4088529**	**0.1495443**	**-0.2097093**	**-0.1094**	**0.012**	**0.0064**
2	**Dispositional Distrust**	**0.2105471**	**0.0484455**	**0.1939791**	**0.1844**	**0.034**	**0**
3	**Criterion-scaled Participants**	**1**	**0.0312091**	**0.8292161**	**0.7876**	**0.6204**	**0**
4	Target Agency: Canadian Federal	0.0240026	0.1024166	0.0091816	0.0056	0	0.8148
	Target Agency: Indigenous Tribe	**-0.1937574**	**0.1012862**	**-0.0777954**	**-0.046**	**0.0021**	**0.0563**
	Target Agency: NGO	0.0605662	0.1058526	0.0217403	0.0138	0.0002	0.5675
	Target Agency: Regional/Binational	**-0.2799983**	**0.1049871**	**-0.1012751**	**-0.0641**	**0.0041**	**0.0079**
	Target Agency: Research Institution	-0.0820706	0.10001	-0.0342075	-0.0197	0.0004	0.4122
	Target Agency: State/Provincial	**-0.2007387**	**0.0987825**	**-0.0861258**	**-0.0489**	**0.0024**	**0.0427**
	Target Agency: US Federal	**-0.2129825**	**0.1016396**	**-0.0835383**	**-0.0504**	**0.0025**	**0.0366**
5	Social Control	-0.0584565	0.0923571	-0.0277423	-0.0254	0.0006	0.5277
6	Output Control	-0.0534541	0.1038612	-0.0257234	-0.0207	0.0004	0.6075
7	**Rational Trust**	**-0.2562647**	**0.0421547**	**-0.2470503**	**-0.2215**	**0.0491**	**0**
8	**Output * Social interaction**	**-0.3793434**	**0.2226611**	**-0.0692582**	**-0.0617**	**0.0038**	**0.0904**
9	Social Control * Dispositional Distrust Interaction	-0.0494609	0.1142243	-0.0170713	-0.0157	0.0002	0.6656
10	Social control * Rational trust interaction	0.1141971	0.1104361	0.0407428	0.0375	0.0014	0.3027
11	Output control * Rational trust interaction	-0.053671	0.116582	-0.0215054	-0.0168	0.0003	0.6459

Note. Bold font gives us statistically significant predictors and values.

Table 9 Hierarchical Regression Analysis: **Relational Risk**

Hierarchical regression model summary [a]

		R^2 change statistics					
Model	Predictor set entered	Model R^2	R^2 Change	*df* predictors	*df* residual	F-test	P
1	Participants Agency	0.0238	0.0238	6	644	2.61	**0.0165**
2	Dispositional Distrust	0.0867	0.0629	7	518	7.03	**0**
3	Criterion-scaled Participants	0.6478	0.5611	8	517	118.86	**0**
4	Target Agency	0.6582	0.0104	15	510	65.46	**0**
5	Social Control	0.7349	0.0767	16	164	28.42	**0**
6	Behavior Control	0.7375	0.0026	17	163	26.94	**0**
7	Affinitive Trust	0.7501	0.0126	18	162	27.01	**0**
8	Behavior * Social interaction	0.7512	0.0011	19	161	25.58	**0**
9	Social Control * Dispositional Distrust Interaction	0.7513	1E-04	20	160	24.16	**0**
10	Social control * Affinitive trust interaction	0.767	0.0157	21	159	24.92	**0**
11	Behavior control * Affinitive trust interaction	0.767	0	22	158	23.64	**0**

Model coefficients

		Unstandardized coefficients		Standardized coefficients	Correlations		
Model	Individual predictor	β	Std. error	β	Part	sr^2	P
1	Participants Agency: Canadian Federal	0.0177273	0.2102244	0.0046108	0.0033	0	0.9328
	Participants Agency: NGO	-0.3391148	0.2252264	-0.0776575	-0.0586	0.0034	0.1326
	Participants Agency: Regional/Binational	-0.1053215	0.1726688	-0.0446599	-0.0237	0.0006	0.5421
	Participants Agency: Research Institution	**-0.6356061**	**0.2156219**	**-0.1574872**	**-0.1148**	**0.0132**	**0.0033**
	Participants Agency: State/Provincial	-0.0275064	0.182138	-0.0099572	-0.0059	0	0.88
	Participants Agency: US Federal	-0.1318294	0.1691237	-0.0596505	-0.0303	0.0009	0.436
2	**Dispositional Distrust**	**0.2234029**	**0.0540055**	**0.18269**	**0.1737**	**0.0302**	**0**
3	**Criterion-scaled Participants**	**1**	**0.0348461**	**0.804857**	**0.749**	**0.561**	**0**
4	Target Agency: Canadian Federal	-0.0092533	0.1242001	-0.0031418	-0.0019	0	0.9406
	Target Agency: Indigenous Tribe	-0.1772728	0.122848	-0.0631769	-0.0374	0.0014	0.1496
	Target Agency: NGO	-0.1143758	0.1283589	-0.0364409	-0.0231	0.0005	0.3733
	Target Agency: Regional/Binational	-0.3274958	0.1273075	-0.1051413	-0.0666	0.0044	0.0104
	Target Agency: Research Institution	-0.0458957	0.1212784	-0.0169795	-0.0098	0.0001	0.7053
	Target Agency: State/Provincial	-0.1341484	0.1198125	-0.0510868	-0.029	0.0008	0.2634
	Target Agency: US Federal	-0.0106789	0.1232531	-0.0037178	-0.0022	0	0.931
5	Social Control	-0.109899	0.0988015	-0.0486934	-0.0447	0.002	0.2676
6	Behavior Control	-0.1242956	0.0977298	-0.0606904	-0.051	0.0026	0.2052
7	**Affinitive Trust**	**-0.1079038**	**0.037854**	**-0.123954**	**-0.112**	**0.0125**	**0.0049**
8	Behavior * Social interaction	0.1957054	0.234043	0.037359	0.0329	0.0011	0.4043
9	Social Control * Dispositional Distrust Interaction	-0.0325076	0.1307374	-0.010475	-0.0098	0.0001	0.804
10	**Social control * Affinitive trust interaction**	**-0.310618**	**0.0947477**	**-0.1386151**	**-0.1255**	**0.0157**	**0.0013**
11	Behavior control * Affinitive trust interaction	0.0062152	0.087741	0.0031651	0.0027	0	0.9436

Note. Bold font gives us statistically significant predictors and values.

Table 10 Hierarchical Regression Analysis: **Regulatory Risk**

Hierarchical regression model summary [a]

		R^2 change statistics					
Model	Predictor set entered	Model R^2	R^2 Change	*df* predictors	*df* residual	F-test	P
1	Participants Agency	0.0207	0.0207	6	601	2.12	**0.0492**
2	Dispositional Distrust	0.0433	0.0226	7	518	3.35	**0.0017**
3	Criterion-scaled Participants	0.657	0.6137	8	517	123.81	**0**
4	Target Agency	0.7168	0.0598	15	510	86.05	**0**
5	Behavior Control	0.7577	0.0409	16	164	32.05	**0**
	Output Control	0.7578	1E-04	17	163	30.01	0
6	Procedural Trust	0.761	0.0032	18	162	28.66	0
	Behavior control * Output control interaction	0.7622	0.0012	19	161	27.16	0
7	Behavior control * Procedural trust interaction	0.7637	0.0015	20	160	25.86	0
	Output control * Procedural trust interaction	0.7639	0.0002	21	159	24.49	0

Model coefficients

		Unstandardized coefficients		Standardized coefficients	Correlations		
Model	Individual predictor	β	Std. error	β	Part	sr^2	P
1	**Participants Agency: Canadian Federal**	**-0.3534382**	**0.2065827**	**-0.091759**	**-0.0691**	**0.0048**	***0.0876***
	Participants Agency: NGO	**-0.6142344**	**0.2080187**	**-0.1575469**	**-0.1192**	**0.0142**	**0.0033**
	Participants Agency: Regional/Binational	**-0.3444164**	**0.1596847**	**-0.1613449**	**-0.0871**	**0.0076**	**0.0314**
	Participants Agency: Research Institution	-0.1142344	0.2080187	-0.0293004	-0.0222	0.0005	0.5831
	Participants Agency: State/Provincial	**-0.4131818**	**0.1699294**	**-0.1623004**	**-0.0981**	**0.0096**	**0.0153**
	Participants Agency: US Federal	-0.2479947	0.1573883	-0.1212692	-0.0636	0.004	0.1156
2	Dispositional Distrust	-0.0087587	0.0520514	-0.0076061	-0.0072	0.0001	0.8664
3	**Criterion-scaled Participants**	**1**	**0.032877**	**0.810581**	**0.7834**	**0.6137**	**0**
4	**Target Agency: Canadian Federal**	**0.4074335**	**0.1064676**	**0.1469033**	**0.0902**	**0.0081**	**0.0001**
	Target Agency: Indigenous Tribe	**0.5202025**	**0.1052773**	**0.1968708**	**0.1164**	**0.0136**	**0**
	Target Agency: NGO	-0.0169063	0.1100156	-0.00572	-0.0036	0	0.8779
	Target Agency: Regional/Binational	**0.5412378**	**0.1091383**	**0.1845223**	**0.1169**	**0.0137**	**0**
	Target Agency: Research Institution	0.0916965	0.1039728	0.0360246	0.0208	0.0004	0.3782
	Target Agency: State/Provincial	**0.4990952**	**0.102676**	**0.2018362**	**0.1145**	**0.0131**	**0**
	Target Agency: US Federal	**0.5595743**	**0.1056377**	**0.2068774**	**0.1248**	**0.0156**	**0**
5	**Behavior Control**	**0.1698226**	**0.0910902**	**0.0775897**	**0.0717**	**0.0051**	**0.0641**
6	Output Control	-0.0354593	0.1157319	-0.0149069	-0.0118	0.0001	0.7597
7	Procedural Trust	-0.0812463	0.0552733	-0.0632208	-0.0565	0.0032	0.1435
8	Behavior control * Output Control	-0.2362564	0.2635043	-0.0393976	-0.0345	0.0012	0.3713
9	Behavior control * Procedural trust interaction	-0.1184748	0.1169797	-0.1696779	-0.0389	0.0015	0.3127
10	Output Control * Procedural trust interaction	-0.0514789	0.1772779	-0.0680284	-0.0112	0.0001	0.7719

Note. Bold font gives us statistically significant predictors and v

BIOGRAPHICAL SKETCH

Evelyn Roozee received her Bachelor of Science at Tufts University with a focus on biology and environmental science. During her time at Tufts, she did an internship for Massachusetts Institute of Technology Sea Grant where her interests expanded beyond the biological sciences, and she became more interested in the social sciences specially in environmental management. Following her graduation in 2020 from Tufts University she applied to the University of Texas Rio Grande Valley (UTRGV) and received a fellowship from the National Oceanic and Atmospheric Administration (NOAA) Center of Coastal and Marine Environments to complete her master's degree. During her time at UTRGV she interned for the West Coast Regional Office of NOAA focusing on the Pacific Salmon Commission. She received her Master of Science from the department of Ocean, Coastal and Earth Sciences at UTRGV in July of 2022. She was accepted into the doctoral program at the University of McGill department of Natural Resource Science where she plans to continue her research on trust, risk, and control in transboundary fisheries. She can be reached at evelynroozee@gmail.com.