

USING Q METHODOLOGY TO EXAMINE SOCIOECOLOGICAL DIMENSIONS
OF CONFLICT IN THE TRINITY ALPS WILDERNESS, CALIFORNIA

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ABSTRACT

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For over a century, salmonids have been stocked in historically fishless, montane lakes for the sole purpose of creating recreational fishing opportunities. Salmonid introductions have had transformative impacts on historically fishless systems where native biological communities had previously been isolated and evolved without the presence of fish. While certain communities consider fishing for stocked trout a traditional and important use of wilderness, others are concerned with the impacts of introduced salmonids on the region's biological integrity. As management shifts from continued stocking practices toward a focus on ecological restoration, communities with differing ecological values and priorities must compromise on management of high-elevation ecosystems by utilizing a socioecological approach.

This research addresses the need for human dimensions research to understand social conflict among stakeholder communities. The recreation-biodiversity conflict surrounding the reevaluation of high-elevation stocking programs has arisen in part due to diverging valuations of wilderness, a lack of substantial educational outreach, and a lack of mutual trust between stakeholders. This research uses Q methodology, a *qualiquantilogical* method, to examine stakeholder opinions on fish stocking and the use

of fish removals as ecosystem restoration. Through an inverted factor analysis, Q method has clustered participants by perspective into four factors—1) Pro-Restoration, 2) Collaborators, 3) Legacy, and 4) Extreme Pro-Restoration. Q method facilitates discovery of collective agreement, while also revealing key differences among perspectives, which are integral to delineating conflict and developing solutions for environmental concerns. This research is a call-to-action for stakeholders to develop mutual trust through transparent communication and inclusive engagement.

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INTRODUCTION

Dr. Robert Arlinghaus, a researcher at the Leibniz-Institute of Freshwater Ecology and Inland Fisheries in Germany, argues “one of the most pressing needs in recreational fisheries governance is to identify, understand and manage ‘people conflicts’ because such conflicts can hamper any progress toward sustainability (2005, p. 145).” Fisheries managers are also becoming more aware of the need to incorporate human dimensions information into decision-making processes (Wilde et al, 1996), especially in relation to social conflicts between recreation and conservation objectives. One such activity that contributes to many adventurers’ wilderness experience, yet occasionally conflicts with conservation objectives, is fishing for stocked trout in “pristine” high mountain lakes.

As defined by the Wilderness Act of 1964 in section 2 (c), wilderness is “an area where the earth and it’s community life are untrammelled by man” and is also “undeveloped Federal land retaining its primeval character and influence [...] which is protected and managed so as to preserve its natural conditions.” However, subjective interpretations and valuations of wilderness tend to shape individual’s conceptualizations of wilderness. As there are both anthropocentric and ecocentric valuations of wilderness, independent understandings of wilderness potentially influence what individuals perceive as the purpose of wilderness, what activities are appropriate in wilderness areas, and how others should interact with wilderness. Although the central focus of this research is to address social conflict over recreational fisheries resources, differing understandings of

wilderness are important to recognize as subjective interpretations potentially influence how individuals interpret actions and management plans within wilderness areas.

This thesis uses mixed method social science techniques in an attempt to better understand social conflict surrounding wilderness fisheries management of the Trinity Alps Wilderness. I employ Q methodology (Q) to illuminate distinct perspectives as they relate to wilderness values, stocking practices and nonnative fish removals. Q was first developed in social psychology, but has been widely established in many differing disciplines (Watts & Stenner, 2012). Q is a qualitative-quantitative method used to understand human subjectivity through a first-person ranking of phrases or non-discursive elements such as photos or music that represent the discourse of commonly held beliefs, ideas, concepts, or viewpoints among a target population (Brown, 1993).

This research addresses five key objectives:

1. Understand current and historical, social and cultural connections to fish stocking;
2. Provide an in-depth review of stakeholder groups and their opinions on fish stocking and fish removals as a tool for ecosystem restoration;
3. Reveal topics of commonality and high contention between stakeholder perspectives;
4. Demonstrate the practicability of Q methodology as a tool for environmental conflict resolution, and;
5. Provide managers and local constituents with potential ways to develop inclusive education and engagement.

The introduction of trout species (*Salvelinus spp.*, *Oncorhynchus spp.*, *Salmo spp.*) into historically fishless, glacial lakes has routinely occurred as a fisheries management technique and is a socially complex phenomenon (Bahls, 1992). The initial goal of these introductions was to create or enhance recreational fishing opportunities in

wilderness areas (Pister, 2001; Knapp & Matthews, 1998; Knapp & Matthews, 2000; Dunham et al., 2004; Pacific Rivers Council, 2006). The introduction of salmonids has had transformative impacts on native aquatic systems; nevertheless, in many cases stocking practices continue to permeate through fisheries management regimes. Although largely understudied, the social value associated with the perpetuation of fish stocking is a key factor that promotes its continuation without comprehensively addressing ecological concerns. Current management of wilderness fisheries attempts to establish a new approach within the development of socioecological management plans. Although managers have set goals for public participation, feedback from stakeholders has suggested that improvements could still be made.

Current scientific debates address the potential incompatibility of recreation and conservation objectives (Pouwels et al., 2011). In the case of recreational fishing and aquatic biodiversity, the biological consequences of fish introductions are very well-documented in the scientific literature and have in part spurred a controversial lawsuit, *The Pacific Rivers Council et al. v. CDFG*. The ruling in the case mandated the reevaluation of high mountain lake stocking programs, particularly in historically fishless regions where the presence of sensitive species, such as the Cascades frog, have been observed. Although the reevaluation of stocking programs is a recognized area of confusion and high contention as differing stakeholder valuations of wilderness collide, the human dimensions of this phenomenon are not widely understood.

Although the introduction of trout into historically fishless systems is highly valued by particular communities, trout introductions have contributed to the decline of

sensitive amphibian populations and the extirpation of some large bodied macroinvertebrates from certain lakes. These biological consequences are now making the control of introduced trout a priority for management agencies attempting to preserve the natural character of the wilderness. As an attempt to remedy the negative impacts of introduced trout, some management regimes are employing fish eradication efforts as a tool for ecosystem restoration. However, in some cases the use of fish removals has been met with social resistance. In order to reduce social conflict over shifts in management of wilderness fisheries, it is of utmost importance to acknowledge differing social valuations and independent motivations for participating in wilderness activities. Additionally, encouraging management and public entities to better understand one another positively contributes to managing people conflicts.

BACKGROUND

The Trinity Alps Wilderness is an integral part of the history of Trinity County and is currently a vacation destination for many wilderness travelers. In order to understand the context in which stocking nonnative salmonids into historically fishless lakes has occurred, I will provide background information pertaining to Trinity County, the process of, and biological implications associated with, salmonid introductions and the contention between fish stocking and the Wilderness Act of 1964.

The Wilderness Act, 1964

The Wilderness Act (1964) presents a general protective framework that addresses some of the core human and environmental interactions. Wilderness is defined in section 2 (c) as “an area where the earth and its community life are untrammelled by man” and is also “undeveloped Federal land retaining its primeval character and influence... which is protected and managed so as to preserve its natural conditions.”

Trinity County and the Trinity Alps Wilderness

Communities on the periphery of the Trinity Alps Wilderness (TAW) have historically depended on natural resources. The Wintu Tribe, whose ancestral territory is on either side of the Trinity River running along the southern edge of TAW, relied on the seasonal runs of salmonids and other local resources (Kathleen & Sheppard, 2011: p. 9). After the discovery of gold in 1848 near Douglas City, the region became inundated with settlers. The increase in settlers spurred development of other industries to meet Anglo-

European cultural demands including cattle ranches, packing companies, and leisure enterprises. After mining declined, the economy maintained intensive extraction of natural resources by logging and milling large timber (Kathleen & Sheppard, 2011: p. 9). Recreation, such as camping, hunting and fishing, also became a major contributor to local economic growth (Kathleen & Sheppard 2011: p. 50). As early as 1910, professional packers brought families into the wilderness for recreational purposes (Kathleen & Sheppard, 2011: p. 11).

Designation of the Trinity Alps Wilderness

The Trinity Forest Reserve was established on April 26, 1905, and was renamed the Trinity National Forest in 1907 (Kathleen & Sheppard, 2011: p. 109). In 1915, the state of California established the Trinity Game Refuge to protect wildlife in the Trinity wilderness (Kathleen & Sheppard, 2011: 57). The California Wilderness Act of 1984 redesigned the land as official wilderness. TAW is located in the northern region of Trinity County, California and is composed of approximately 525,000 acres of wilderness. The headwater streams flow from lakes filled by snowpack and glacial runoff (Linkhart & White, 2004) with natural aquatic barriers limiting fish mobility by isolating high mountain lakes (Dunham et al., 2004).

History of Wilderness Salmonid Introductions

Human introductions of nonnative fish species have routinely occurred across the globe (Ellender et al., 2014), primarily over the past 100 years due to the expansion of Anglo-European colonialism (Cambray, 2003). In the United States, the strong emphasis

on social utilitarian use and recreation enhancement for short-term human interests has in many cases led to the dismissal of overall ecosystem health (Pister, 2001). The utilitarian ethic that promotes management and introductions of nonnative fishes is still in some cases pervasive (see Su Sin, 2006; Treasurer, 2002; Pelicice et al., 2014). Although the utilitarian ethic that has historically spurred the introduction of fishes is still prevalent, many management programs recognize the negative biological impacts of nonnative fish stocking and attempt to restructure management toward a socio-ecological framework as demonstrated by the development of Basin Management Plans in TAW.

Fish Hatcheries and Salmonid Stocking

In 1872, the first fish hatchery (Biard Hatchery) in California was established in Shasta County to harvest and artificially spawn Rainbow Trout, Steelhead and other salmonid species from the McCloud River (Halverson, 2010: 36). Salmonid eggs were dispersed throughout California, across the country and globally (Crawford & Muir, 2008). The Sission Hatchery, now named the Mount Shasta Hatchery, was later established to grow and distribute fry, fingerling, and catchable size salmonids. Today, the Mount Shasta Hatchery is the only hatchery to provide trout for the TAW (manager, pers. comm., September 2015).

Prior to centralized government control of stocking regimes, citizens had the freedom to stock fish as they desired (Pister, 2001). Early practitioners of high mountain trout stocking regularly distributed fish into remote lakes using mules. By the mid-1900s, government agencies took control of stocking practices. Historic regimes were typically

erratic and uninformed due to nonexistent pre-stocking monitoring (Pister, 2001). Post World War II, fish stocking practices expanded with the use of surplus planes piloted by experienced war veterans (Halverson, 2010: 88). The use of planes allowed fish to be planted in higher quantities, more efficiently, and into previously inaccessible locations. Although the introduction of salmonids served the purpose of creating wilderness fishing opportunities, introductions have caused tremendous and, in some cases, irreparable ecological damage (Dunham et al., 2004).

Biological Implications of Salmonid Introductions

Of the thousands of lakes in the Natural Wilderness Preservation System, approximately 95% of larger mountain lakes (> 3m in depth) and 60% of smaller lakes and ponds have been planted with salmonid species (Bahls, 1992). Biological research examining the impacts of these introductions has become well-documented (Adams et al., 2001; Pope, 2008; Pope et al., 2008; Pope et al., 2014; Ryan et al., 2014; Vrendenburg, 2004; Welsh et al., 2006). Research has demonstrated that native fauna have been impacted through several means: direct predation by introduced trout species resulting in the potential extirpation of native fishes, amphibians, zooplankton, and benthic macroinvertebrates (Eby et al., 2006; Garwood & Welsh, 2007; Knapp & Matthews, 2000; Pope et al., 2014); indirect predation via shared predators (Pope et al., 2008); increased competition (Eby et al., 2006; Pope, 2008); shifts within native food-web structure (Eby et al., 2006; Schindler et al. 2001); loss of perennial habitat for migrating amphibians (Ryan et al., 2014); and the replacement of native species by exotics through

predation and competition (Eby et al., 2006). However, other studies have observed amphibian source populations overlap in small numbers and in close proximity to introduced fish populations, suggesting potential for coexistence (Hartman, 2014).

Although in certain wilderness areas stocking continues on a large scale (Vrendenburg, 2004), managers are increasingly being asked to justify their stocking programs (Knapp et al., 2001). There has been tremendous momentum to move toward a holistic management approach, but as of 2000, more than 7,000 lakes were still stocked in the western United States (Knapp et al., 2001). The development specified management regimes have the potential to encourage informed and strategic fisheries management programs that include fish removal as a tool for ecosystem restoration, while continuing to offer recreation opportunities.

Pacific Rivers Council et al., v. California Department of Fish & Game

Documentation of negative impacts associated with introduced salmonids in part compelled the ruling of the *Pacific Rivers Council, et al., v. California Department of Fish and Game (CDFG)* (Case No. 06 CS 01451). The May 2007 Sacramento County court ordered the CDFG (now California Department of Fish and Wildlife [CDFW]) to complete an Environmental Impact Report (EIR)/Environmental Impact Statement (EIS) pertaining to stocking programs throughout the state in addition to an internal review of current stocking programs. Although the CDFW stocking programs had previously been exempt, the ruling ordered the CDFW to also comply with the California Environmental Quality Act (CEQA) and restructure future programs to comply with the National Environmental Policy Act (NEPA). Prior to *Pacific Rivers Council et al., v. CDFG*, there

had been limited acknowledged social resistance to introductions of nonnative salmonid species. Following this ruling, scientists, managers, and certain environmental groups have become more vocal about the need to restructure historic stocking regimes.

Wildness and Naturalness

Nature-society scholars write that wildness and naturalness are highly valued and inherently subjective characteristics of wilderness (Carter, 1996; Landres et al., 2001). Since naturalness and wildness are key values within social conceptualizations of wilderness, some individuals believe both are directly threatened by the introduction of nonnative species (Carter, 1996; Landres et al., 2001).

The purpose of managing wilderness is to protect and preserve “its primeval character and influence [...] so as to preserve its natural conditions” (Wilderness Act, 1964). According to the need to preserve the natural conditions of wilderness, some have asserted the purpose of wilderness should not be to maximize recreational opportunities, but to preserve wild environments for native species (Carter, 1996). To illustrate this point, protected areas in North America hold tremendous ecological and scientific value. However, aquatic habitats within protected areas are not provided the same protection from human manipulation as other aspects of wilderness (Knapp et al., 2001). Some scholars believe that high mountain lakes are often subjected to management practices, such as the continuation of trout stocking into previously fishless lakes, that are not consistent with the goal of maintaining natural system processes (Knapp et al., 2001).

LITERATURE REVIEW

This thesis draws from and builds upon literature related to human dimensions of fisheries management and environmental conflict—specifically recreation-biodiversity conflict and environmental conflict resolution. In addition to reviewing the aforementioned literature, this work highlights the potential use of Q methodology (Q) as an alternative to more commonly used conflict research techniques.

Human Dimensions of Fisheries

Understanding human-environment relationships can be achieved through the implementation of human dimensions research. The human dimensions of natural resources is “an area of investigation which attempts to describe, predict, understand, and affect human thought and action toward the natural environment and to acquire such an understanding for the primary purpose of improving stewardship of natural resources” (Wilde et al., 1996: p. 12). Human dimensions research seeks to understand what people think and do, and potentially most importantly, why (Arlinghaus, 2005).

Freshwater recreational fishing activities are dominant activities that take place in most countries globally (Arlinghaus, 2005). Even with the high rate of participation, there has been minimal work conducted to study the human dimensions of recreational fisheries in comparison to biological interactions. For example, the importance and practicality of ecosystem restoration has been demonstrated in high elevation lake ecosystems (Knapp et al., 2000; Knapp & Matthews, 1998; Vredenburg, 2004). However, the human dimension of high elevation recreational fisheries is largely unexamined.

Some scholars assert that management agencies and other stakeholder groups are equally responsible for managing aquatic resources within wilderness areas (Knapp et al., 2001). Research aimed at examining perspectives across stakeholder boundaries can improve resource management by providing understandings of distinct communities of resource users, which is integral to the development of community support. Community support typically leads to increased success of management regimes (Jones et al., 2012; Sexton et al., 2011; Wilde et al., 1996). These relationships are essential to maintaining the balance between wilderness use and conservation of native systems (Landres et al., 2000). Additionally, sound recreational fisheries management encourages managers to incorporate all fields of information (ecological, economic, political, sociocultural, and institutional) in the development of management strategies (Arlinghaus, 2005).

Effective management of recreational fishing requires an understanding of anglers and their actions (Hunt et al., 2013). Although it has been acknowledged that understanding constituents would have a positive impact on management, most research examines either management or angling activity in isolation (Arlinghaus, 2005; Hunt et al., 2013). Bridging the research gap between these two arenas is essential for developing a framework that approaches education, management, and ecological impacts within the same management regime (Arlinghaus, 2005; Juutinen et al., 2011; Pouwels et al., 2011).

Defining Stakeholders

To understand conflict, it is vitally important to recognize unique perspectives associated with specialized recreation groups and other invested individuals. One

approach to recognizing unique perspectives is through stakeholder analysis. Barrow (2010) asserts that a “stakeholder” is someone (an organism or the local environment) that is affected, or perceives they are affected by a particular action. Stakeholders can be positively or negatively affected by actions within conflict, and may be affected but unaware of their position, which would include future generations or individuals off-site (Barrow, 2010). Defining stakeholders is important to delineating conflict. Knowing who groups are and what their values and perspectives are can help communities to develop solutions to local issues.

Although it is important to identify stakeholder groups, it is equally important to recognize the problematic nature of creating rigid stakeholder boundaries. For example, stakeholder analysis, which has previously been used as a technique for human dimensions research, tends to clump individuals based on demographics. To contribute to a participant-driven analysis of stakeholder values and perspectives, I employ Q. One of Q’s strengths is its ability to provide stakeholder analysis that groups participants based on similar subjectivities rather than by preconceived stakeholder structures, such as socioeconomic demographics. This can allow for a new way of understanding and delineating groups connected to natural resource concerns.

Conflict

There are many different types of conflict (Barrow, 2010; Jacob & Schreyer, 1980; Schneider, 2000; Vaske et al., 2007; Vitterso et al., 2004) and, it is important to recognize that conflict is not static. It is a dynamic and evolving manifestation of the collision of different perspectives and values, which can arise from direct or indirect

contact. Additionally, conflict needs to be defined in the context of the research being conducted (Schneider, 2000), and in relation to an individual or a specialized group of users. Persson defines conflict as a "... perceived divergence of interests, or belief that the various stakeholders' current aspirations cannot be achieved simultaneously (2010: p.3)." Conflict can also influence positive or negative environmental or socio-economic changes and create technical or cultural innovations (Barrows, 2010).

In order to address the complex relationships between recreation and aquatic systems impacted by the introduction and continuation of nonnative fish stocking, recreation-biodiversity conflict offers an approach to holistically analyze these concerns.

Recreation-Biodiversity Conflict

As recommended by Schneider (2000), the conflict has been defined within the context of this thesis as recreation-biodiversity conflict. Recreation-biodiversity conflict calls attention to the fact that land managers, recreationists, and other stakeholders may have opposing views, and may disagree about biodiversity conservation plans and actions (Pouwels et al., 2011). Biodiversity in this context refers to the variability among living organisms from all habitats (terrestrial, marine and so on) and ecological complexities such as diversity within species, between species, and of ecosystems (Cowx et al., 2010). Studies within this field suggest that biodiversity conservation and recreation are potentially incompatible (Cowx et al., 2010). This incompatibility has led land managers to confront conflict between biodiversity conservation and recreation opportunities (Pouwels et al., 2011).

Pouwels et al. (2011) assert that current legislation, limited research on the relationship between recreation activities and biodiversity concerns, and differing perspectives of stakeholder groups make it challenging to find solutions with high degrees of consensus. Additionally, the role of science as a credible provider of irrefutable knowledge for management of natural resources is being questioned more often as stakeholders desire to become involved in decision-making processes about land uses and regulations (Pouwels et al., 2011). Stakeholders also hold place-based knowledge, or local ecological knowledge (LEK). LEK is local in scale, typically based on experiential knowledge, and are “rich insights [held] by lay people” working in and around natural environments (Brook & McLachlan, 2008). Place-based knowledge is increasingly being recognized by mainstream management as vital to the development of regimes that require knowledge of current land and resource conditions.

Trust and Natural Resource Management

Multiple dimensions of trust have been identified as vital elements for collaborative natural resource management (Hahn et al., 2006; Stern & Coleman, 2014). As comprehensively discussed by Stern and Coleman (2014), trust is a multi-dimensional, psychological state where individuals accept forms of risk and vulnerabilities based upon positive expectations of another, regardless of inherent uncertainties. Since effective ecosystem management increasingly requires collaborative approaches (Frank et al., 2009), in the absence of trust, distrust can limit meaningful

communication, cause social conflict over resources, and can cause conflicts associated with inequitable power distributions among stakeholders (Stern & Coleman, 2014).

Results from Hahn et al. (2006) suggest that communication of ecological knowledge and insights have the potential to contribute to trust building, changing values, and facilitating conflict resolution, further illuminating the importance of trust in relation to natural resource management. In addition, successful conservation increasingly depends on ecologically informed communities (Frank et al., 2009). As discussed by Frank et al. (2009), as communities are both the cause and key to effective conservation and successful restoration projects, providing communities with education and enlisting their advocacy is an integral part of restoration processes. Following this trend, Cambray and Pister (2002) note that public support is essential and must be incorporated into scientific study protocols. The importance of public inclusion and the demonstrated necessity of mutual trust among stakeholders further calls attention to the need for trust building in order to foster engaged, environmentally aware communities especially in regards to controversial restoration projects, such as fish removals efforts.

Conflict Resolution and Q Methodology

Conflict research can be accomplished through various techniques including social impact assessment, discourse analysis, phenomenology, document analysis, interviews, focus groups, and environmental conflict resolution (Barrow, 2010; Elliot, 2009). These methods, while useful, are researcher directed and often focus on bundling study participants into pre-determined stakeholder categories. However, I will be

specifically focusing on the relationship between environmental conflict resolution (ECR) and Q. ECR is an attempt to “promote collaboration among stakeholder groups to resolve environmental, public land, or natural resource conflicts through direct negotiations and facilitated dialogue (Elliot, 2009).” Four key elements of ECR include:

1. Working collaboratively,
2. Inclusion of all impacted stakeholders into a structured dialogue,
3. The use of third party neutrals to facilitate, or manage the dialogue, and;
4. The attempt to achieve a consensus.

As previously mentioned, Q offers an alternative to purely researcher driven approaches of examining conflict. Although in Q research the researcher develops the topic and samples the general discourse, Q does not pre-determine stakeholder categories, which is an important distinction from traditional stakeholder research (Webler et al., 2009).

Q has the potential be useful in conflict resolution because the method identifies regions of high contention, as well as consensus topics. Q also promotes the facilitation of controversial dialogue by administering a first-person ranking process of community generated opinions and ideas. The discussion of controversial dialogue is fundamental to effective conflict resolution. Schneider (2000) asserts that researcher’s bias toward quantitative data in recreation conflict research might play a role in limiting the context and meaning of a conflict to the visitors themselves. The reflexivity of Q allows the conflict discourse to be subjectively organized by individuals in a self-directed way facilitated by the researcher (Robbins & Krueger, 2000).

METHODS

My research utilized three methodologies to investigate fish-related recreation-biodiversity conflict. I collected various perspectives associated with fish stocking and potential use of fish removals in high mountain lake regions of the Trinity Alps Wilderness using Q methodology (Q), semi-structured interviews and participant observation.

Q Methodology

Q is a *qualiquantological* (see Stenner & Rogers, 2004) research tool that quantifies an individual's subjectivity, or internal frames of reference, in a statistical manner, while also providing in-depth qualitative descriptions (Brown, 1996; Kamal et al., 2014). Q allows the researcher to systematically study subjectivity by intercorrelating individual perspectives through a first-person ranking process called a "Q sort" (Simons, 2013). The perspectives collected through the Q sort process are by-person, as opposed to by-variable, factor analyzed into distinct groups by perspective—meaning Q analyses are completed using an inverted factor analysis process.

Factors, or clusters, represent participants' perspectives that make sense of the Q sort in similar ways by broadly sharing concerns, commonalities, and points of contention (Simons 2013). Factors can also be understood as groups of individuals with very strong opinions about a particular topic. Q factors, or clusters, participants by their

subjectivities, allowing the researcher to move beyond traditional stakeholder analysis boundaries, which tend to categorize participants by demographic information.

An important advantage of Q is that it attempts to reduce researcher bias by applying mathematical algorithms to the sampled public discourse, or common rhetoric, surrounding a topic of interest (Brown, 1993; Webler et al., 2009). In theory, this allows participants to self-direct an investigation of local concern (Ray, 2011; Simons, 2013). Although Q was initially developed for use in psychology and the behavioral sciences (Watts & Stenner, 2012), Q has become widely used in differing disciplines (see Barker, 2008; Parker & Alford, 2010; Robbins & Krueger, 2000; Stergiou & Airey, 2011). In natural resource management, Q has demonstrated its practicality when used to examine environmental conflicts (Brannstrom, 2011; Kangas et al., 2010; Ray, 2011; Robins, 2006;). Additionally, Q provides a platform to help develop comprehensive solutions to conflicts over natural resources (Johnson & Sciascia, 2013; Mattson et. al., 2006; Mazur & Asah, 2013; Rutherford et. al., 2009).

Completing a Q method study involves a five step process—1) concourse development; 2) selecting the Q set and P set; 3) administering the Q sort; 4) rotated, inverted factor analysis; and 5) interpreting the emerged factors.

Concourse Development

After the research topic is chosen, the first step in a Q study is to develop a concourse. The concourse is a comprehensive accumulation of phrases or non-discursive elements, such as photos or music, that represent the discourse of commonly held beliefs, ideas, concepts, or viewpoints among the target population (Brown, 1993). Development

of a concourse is achieved through a rigorous, iterative process that identifies important sources and moves between literature and personal interaction. The concourse is designed to capture a broad spectrum of ideas and opinions in relation to the specific topic of inquiry (Brown, 1993).

I developed the concourse through: an extensive review of the literature; semi-structured preliminary interviews (n = 3); use of participant observation; and thorough media discourse analysis. The three preliminary interviews were conducted with individuals involved with wilderness fisheries—one fisheries biologist, one fly fishing shop employee, and one member of an outdoor recreation club. The interviews were approximately one hour and covered topics including: wilderness management and recreation, wilderness fisheries (recreation, management and stocking), opinions on native/nonnative fish species, ecosystem restoration (funding, restoration method, and opinions of fish removal as a tool), and opinions regarding government and management agencies. These topics were used as a guide to sample the general discourse by reviewing relevant media and literature.

Q Set Selection

The next step in a Q study is selecting the “Q set” from the full concourse. The Q set is a subset of statements that represents the greater populous of the general discourse (Brown, 1993; Watts & Stenner, 2012). I chose statements based on their overall clarity and relevancy to the research objectives. I removed similar statements from the Q set to reduce redundancy.

Once I selected the final Q set ($n = 40$), I randomly assigned each statement a number ranging from one to 40, enabling statistical analysis. I then paired statements representing opposing ideals with one another to ensure varying opinions were present (Cuppen et al., 2010). An example of a statement pair is displayed in Table 1.

Table 1 Example of paired statements

No.	Statement
4	Fish stocking is not an appropriate use of wilderness. I support managing lakes in a fishless condition.
5	We should be planting all of the resources that we have been blessed with. We need to generate all of the resources that we are capable of.

Although Q set development is an integral part of the Q process, it is more important to observe how these statements rank within the set and relate to each other than it is to have a “perfect” Q set (Simons, 2013). Since the relationships between statements are the most important quality, statements do not have to be equally balanced between “negative,” “positive,” and all encompassing (Watts & Stenner, 2012). For the full Q set, see Appendix A, Table 9.

P Set Selection

In Q, the participant group is referred to as the “P set” (Simons, 2013). My P set consisted of 18 individuals. Participants were local business owners, land management personnel, outdoor recreation club members, general wilderness users, and non-governmental organization employees. Since Q was not designed as a conclusive research method, random participant sampling is not important in Q studies. Additionally, the number of participants is not considered as important as capturing the range of

perspectives and information from individuals with expertise and knowledge related to the research topic (Kamal et. al., 2014; Simons, 2013; Watts & Stenner, 2012).

I found my first study participants through participant observation, for example, by working in the area. I utilized the snowball sampling method, meaning individuals were asked to recommend other potential study participants. The criteria I used to contact individuals included their employment—outdoor equipment and fishing stores, local business owners, and land managers—outdoor organization membership, and individuals with distinct perspectives relating to wilderness fisheries. Additionally, I utilized the social media, platform “Instagram” to find individuals who had recently visited the Trinity Alps Wilderness and posted photos using the “Trinity Alps Wilderness” hashtag.

Administering the Q Sort

The next step in the Q process is implementing the method by administering the Q sort. The “Q sort” is the process by which participants actively rank order the selected statements, or the Q set, by the *condition of instruction*, also known as the researcher’s instructions (Watts & Stenner, 2012). The goal is to engage participants in making conscious decisions about which statements are most important to them. This process also prompts the participant to think about the relationships between statements.

Prior to administering the Q sort, I provided each participant with a Humboldt State University (HSU) Institutional Review Board (IRB) approved information and consent form, which clearly explained my research objectives and informed participants of their role in this research. As part of the IRB form, individuals were asked for consent

to be audio recorded. Upon consent, Q sorts were audio recorded in order to provide the context of participant’s engagement with statements for further analysis.

After consent, I provided the first *condition of instruction*, which was to sort the statement cards into three piles: agree, neutral/do not care, and disagree. Once the cards were preliminarily sorted, I recorded the number of statements in each pile to get a sense of how individual’s perspectives fit with the statement cards provided. Next, I instructed participants to chose a pile and prioritize the statements from most disagree to most agree in line with a quasi-normal distribution (Table 2, Appendix K: Figure 12, 13).

Table 2 The quasi-normal distribution board with columns labeled with the value and condition of instruction

Strongly Disagree -4	-3	-2	-1	Neutral 0	+1	+2	+3	Strongly Agree +4

I recorded the time each participant took to complete the Q-sort, which ranged between 20 minutes and an hour. Upon completion of the sort, participants were asked to discuss their initial responses and to show their neutral line on the board if it did not match the center neutral column.

Three participants did not follow the distribution provided because they felt it could not accurately portray their perspective. This does not have an impact on the Q method results, or viability of the study (Brown, 1993; Watts & Stenner, 2012). I

administered Q sorts in the Echo Lake Basin of the Trinity Alps, and in surrounding communities including Redding, Anderson, Weaverville, Coffee Creek, Hyampom, Junction City and Trinity Center.

Semi-Structured Interviews

The combination of Q sort and interview is recommended in order for the participant to provide detailed explanations about their Q sort (Watts & Stenner, 2012). Immediately following the Q sort, I conducted semi-structured interviews with each participant using a set of questions or talking points I developed prior to conducting fieldwork (see Appendix J). However, I allowed participants to direct the conversation toward important topics they wanted to discuss. Interview times ranged from one to four hours. At the end of each interview, participants filled out demographics forms. Most but not all complied, as some participants did not feel comfortable providing personal information such as their age, political affiliation or highest level of formal education.

I conducted four semi-structured interviews, including preliminary interviews, with individuals who did not participate in the Q sort: one wilderness user, one member of an outdoor recreation organization, one fly shop employee, and one biologist—three of whom did not fill out socio-demographic forms.

Statistical Analysis

I used PQMethod to analyze the Q data. PQMethod is a statistical analysis program designed specifically for use with Q. It allows for simple data entry, computes intercorrelations among sorts, and allows for rotated by-person factor analysis (Watts & Stenner, 2012). PQMethod was adapted, revised, and is maintained by Peter Schmolck

(2014). I referred to the PQMethod manual (Schmolck, 2014) in combination with the Watts and Stenner (2012) approach to guide the analysis.

First, I entered the statements into PQMethod in order of their randomly assigned number. I then entered the data from the Q sorts (n=18) into the PQMethod distribution. Once I had completed the data entry, I performed a centroid analysis, which computes raw data and outputs an un-rotated correlation matrix. Next, I ran the Brown (1980) centroid extraction with seven centroids. I then performed a principle components analysis, which outputs Eigenvalues and percent of explained variance per unrotated factor. I ran a varimax rotation, which yielded four extracted factors. I compared the absolute and relative sizes of the Eigenvalues and used the Watts and Stenner (2012) approach to decide how many factors to keep for rotation. After the varimax rotation was complete, I flagged significant loadings (± 0.41 or greater at the $P < 0.01$ level) on each factor by hand. Lastly, I ran a full analysis of the rotated factors and exported the results for further analysis.

For more information on the statistical analysis process, see Watts and Stenner (2012), and the PQMethod manual (Schmolck, 2014).

Qualitative Data Analysis

After I completed administering the Q sorts, I had approximately twenty-five hours of interview data. I partially transcribed the audio-recorded interviews using the online program "Transcribe." Following transcription, I utilized Microsoft Excel to perform preliminary coding. I created a second Excel document for a secondary coding process with four columns (question, individual, quote and sub-code). I divided interview

topics into common themes—trust, transparency, communication, education, restoration, wilderness, economics, Q critique, management, and personal wilderness experiences. These major themes provided additional depth and context to the by-person factor analysis resulting from the Q method.

Participant Observation

Participant observation is a data collection process that encourages the researcher to accompany one or more people to observe what they do and say and to participate in varying degrees in the activities being studied (Puri, 2010). In May through November of 2015, I worked for a land management agency in northern California. As a biological technician, I participated in various data collection and monitoring projects across the region. The day-to-day work with a land management agency provided an understanding of management that I would not have been able to receive solely from the Q process and interviews.

Part of my fieldwork consisted of a collaborative restoration project between multiple land management agencies in an experimental study basin in a wilderness area in northern California. The main objective of the experimental restoration project was to closely observe what happened to the basin once nonnative salmonids are removed. The participation in this project was integral to my framing and understanding of fish removals as a tool for ecosystem restoration and what that means to individuals working on and advocating for this particular type of management strategy. As an additional part

of my participant observation, I spent numerous weekends fishing in the high mountain lakes.

The inclusion of these activities provided a firsthand account of what it means to have fishing as a recreational priority in the high country. By participating in these activities, I was better able to connect with study participants. Data collected through participant observation contributed to the comprehensive Q method factor interpretations and my overall understanding of the complex relationships between opinions on fish stocking and the potential use of fish eradication for restoration.

RESULTS

I intercorrelated and by-person factor analyzed the Q sorts ($n = 18$) using the Q method computer package PQMethod (Schmolck, 2002). I extracted four factors, which account for 68% of the explained variance in my study. All 18 Q sorts loaded significantly on one or multiple emerged factors. I used the equation presented in Watts and Stenner (2012)¹ to calculate the significant factor loading value for my study, which is ± 0.41 at $P < 0.01$ level.

I rotated the four statistically significant factors, all of which satisfy the *Kaiser-Guttman* criterion (eigenvalues ≥ 1.00), using the varimax rotation method. Although the unrotated factor matrix revealed five factors that satisfy this criterion, I based my decision to extract four factors on the number of study participants, as recommended by Watts and Stenner (2012: 207), in combination with the percent of explained study variance the factors accounted for.

I developed labels for each of the four factors that reflected the general participant sentience of the factors (see Table 1). These labels are: Extreme Pro-Restoration, a bipolar factor that identifies the crux of the recreation-biodiversity conflict; Pro-Restoration; Legacy; and Collaborators. Watts and Stenner (2012) explain bipolar factors are perspectives that are defined by both positively and negatively loading sorts.

¹ Significant factor loading (SFL) at $P < 0.01$
 $SFL = 2.58 \times (1 \div \sqrt{\text{no. of items in Q set}})$

Table 3 Factor titles and key cluster characteristics

1. Pro-Restoration and Wilderness Advocacy	2. Wilderness Generalists and Educational Value
<ul style="list-style-type: none"> • Accounts for 24% of the study variance with 8 participants • Pro fish removal as a form of ecosystem restoration • Open to compromise and strategic management plans that take social value somewhat into consideration (Basin Mgmt Plans) • Desire for agencies to maintain transparency, communication, and provide educational opportunities 	<ul style="list-style-type: none"> • Accounts for 17% of the study variance with 6 participants • Generally pro-stocking and pro-restoration including fish removal as an ecosystem restoration tool • Desire for agencies to maintain transparency, communication, and provide educational opportunities • Do not want to lose trout fishing opportunities, but are supportive of restoring critical habitat
3. Anthropogenic Conservation and Leaving a Legacy	4. The Bipolar Manifestation of Conflict
<ul style="list-style-type: none"> • Accounts for 15% of the study variance with 5 participants • Generally pro-stocking and anti-restoration • Desire to leave their children with a legacy of wilderness fishing • Utilitarian valuation of wilderness areas and fisheries • Individuals who feel their voices are not heard, yet are invested in wilderness management 	<ul style="list-style-type: none"> • Accounts for 12% of the study variance with 4 participants • Two part factor interpretation: negatively and positively associating participants • All confounding sorts • Displays salient ends of wilderness fish stocking conflict in the Trinity Alps Wilderness

Confounding sorts are participants who significantly associate with more than one factor. Five individuals loaded on multiple factors (participants C, D, J, K, and M).

Although Q methodologists' opinions on how to best cope with confounding sorts varies (see Dziopa et. al., 2011; Watts & Stenner, 2005), I have allowed for individuals to load on multiple factors if the factor loading is significant (≥ 0.41). A fundamental aspect of my study aims to demonstrate the occurrence of coexisting perspectives within individuals and among stakeholder groups where perspectives are assumed to be within a dichotomous framework. An objective of Q is to facilitate the examination of the

convoluted nature of human subjectivity, which often overlaps within and between stakeholder group boundaries. By allowing for individuals to load on multiple factors, I am able to better understand intersecting perspectives and the conflict that surrounds introduced salmonids and the potential use of fish removal as a principal restoration tool.

As I present each factor interpretation, I also display the top five statements each cluster most agrees and most disagrees with. The statements most agreed and most disagreed with are vital to the factor interpretations and allow for an in-depth examination of each perspective. Although I have only displayed the most salient statements, statements within the entire continuum are integral to a complete understanding of each individual viewpoint, therefore, the complete factor array as been added for reference (Appendix B, Table 13).

Participant Demographics

Following the Q sort and semi-structured interview, I collected basic demographics. This included gender, age, education level, and political affiliation. I also asked questions pertaining directly to use of the Trinity Alps Wilderness. As described previously, I initially identified individuals to participate in my study through active participant observation. I further identified individuals to participate in my study using the snowball sampling method and identified individuals with strong opinions pertaining to wilderness fisheries. Wilderness angling is a predominately male activity, interviewing a statistically balanced number of male and female participants would not be a representative sample of my desired population (Figure 1).

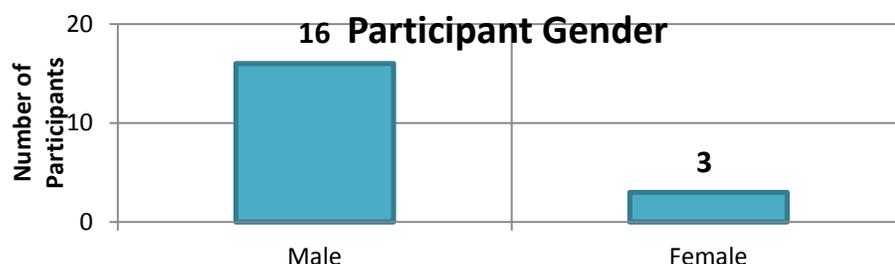


Figure 1 Total study participants sorted by gender

Age of participants ranged between twenty-eight and seventy-five (Figure 2). The participant sample skewed toward an older generation with 38% ($n = 7$) of participants above the age of 51.

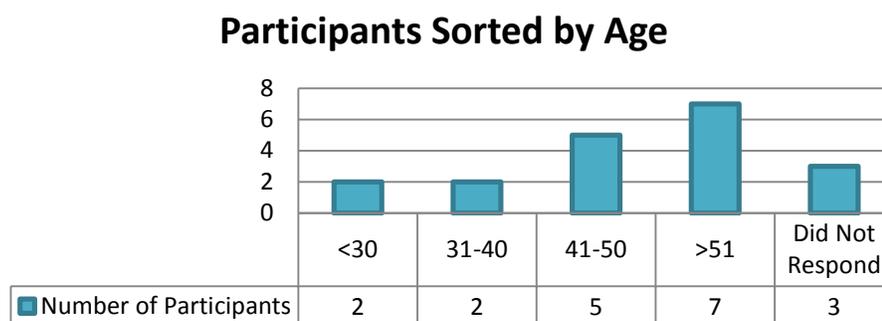


Figure 2 Age of total study participants sorted by year increments

Response rate for participant political affiliation was low (Appendix I, Figure 8, 9). Sixty-eight percent of participants ($n = 13$) declined to provide their political affiliation. On the demographic information form this question was open-ended. It is

possible that if the question had been multiple-choice more participants may have answered. Due to the low response rate, I did not use participants' political affiliation in my analysis.

Eighty-nine percent (n = 17) of participants provided information about their educational background (Figure 3).

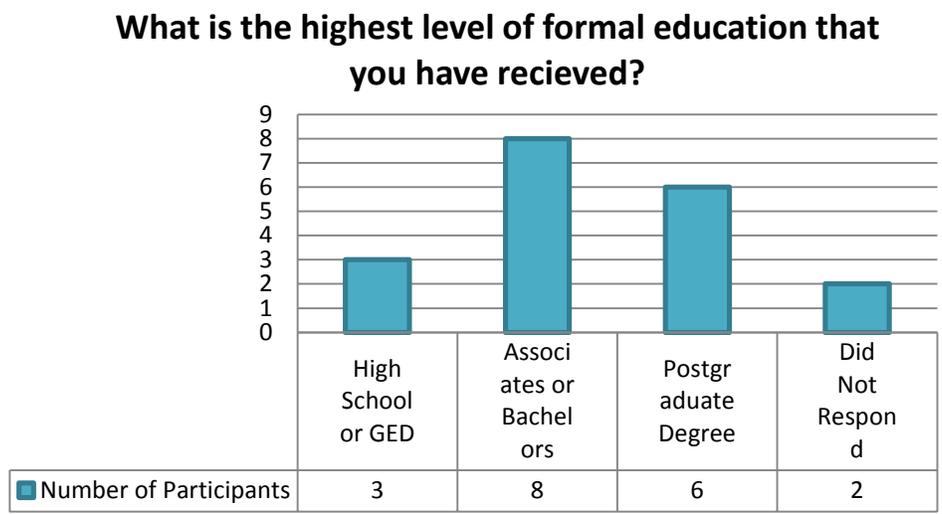


Figure 3 Total participants levels of formal education.

Participants were asked to indicate which category(s) best describes them between local, visitor, and management (Figure 4).

Which category most accurately describes you? Please check as many boxes as necessary.

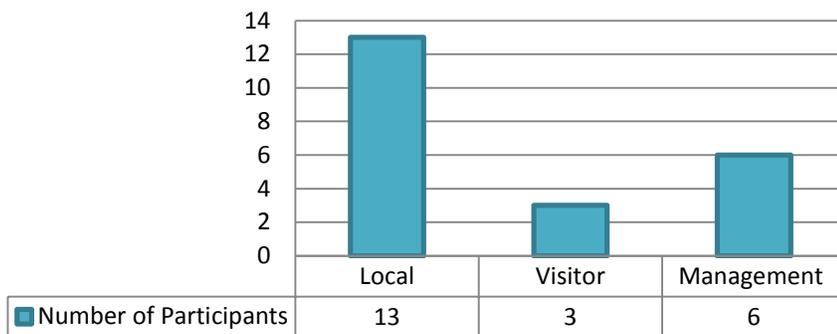


Figure 4 Participants self-identified as local, management, or visitor. Individuals were able to select as many categories as were relevant.

Participants and Fishing

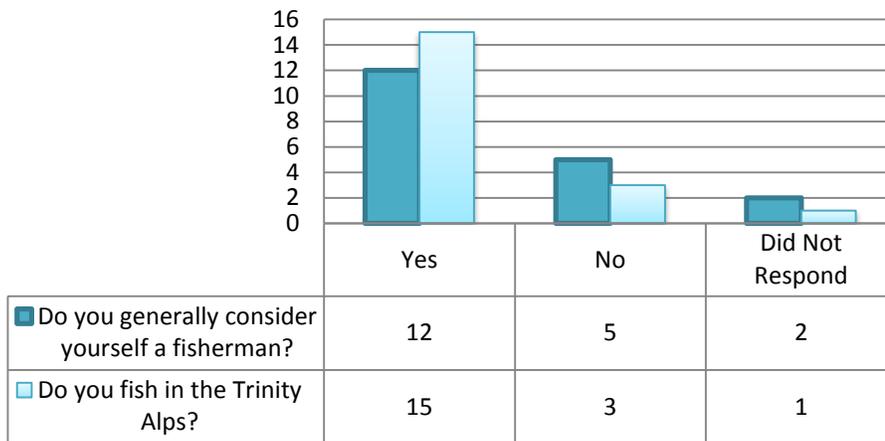


Figure 5 Participants and self-identified fishing preferences

Participants were asked two questions about their fishing practices (Figure 5). These basic questions were discussed in more depth during semi-structured interviews. All nineteen participants answered these questions.

Table 2 displays factor loadings for sorts on all four factors. Confounding sorts, or individuals that load significantly on multiple factors are participants C, D, J, K, and M. Eigenvalues and percent of variance explained are indicated in the bottom rows of Table 2. See Appendix C, Table 17 for statement numbers and Q sort values.

Table 4 Factor matrix with bold indicating a defining sort, and highlighted row indicating a confounding sort.

Individual— Gender	Age	Agency	Stakeholder Category	Education	Pro- Restorat ion	Education	Legacy	Bipolar	
Pro-Restoration Matches (1)									
B—Male	---	Yes	Manager	Bachelors	0.6686	0.3021	0.1449	0.2901	
C—Male	42	Yes	Manager	Masters	0.5046	0.1851	0.2734	0.6515	
D—Male	41	Yes	Manager	Masters	0.5624	0.1477	0.1364	0.6305	
E—Male	35	No	W. User	PhD	0.7908	0.3907	-0.0904	-0.0686	
L—Male	42	No	W. User	Bachelors	0.7484	-0.2564	0.1062	0.1701	
M—Male	40	Yes	Manager	Bachelors	0.5174	0.5216	0.0411	0.3225	
N—Male	---	No	W. User	PhD	0.8550	0.2272	0.0165	0.1502	
R—Male	65	No	W. User	Masters	0.8246	-0.1186	0.1467	0.0159	
Collaborators Matches (2)									
F—Male	64	No	Business	HS/GED	-0.1990	0.6613	0.3780	-0.2945	
G—Male	47	Yes	Manager	College/AS	0.1447	0.7392	0.0845	-0.0903	
H—Male	54	No	Business	HS/GED	-0.0168	0.5951	0.1335	0.0865	
I—Female	56	No	Business	Bachelors	0.3193	0.7476	0.2894	-0.0580	
J—Male	70	No	W. User	---	0.0307	0.4063	0.3342	-0.6979	
M—Male	40	Yes	Manager	Bachelors	0.5174	0.5216	0.0411	0.3225	
Legacy Matches (3)									
A—Male	62	Yes	Manager	Masters	0.3653	0.3859	0.4280	0.2852	
K—Male	59	No	W. User	HS/GED	-0.0434	0.2185	0.6404	-0.5749	
O—Female	---	No	Business	---	0.3827	0.1985	0.5425	-0.0095	
P—Female	47	No	W. User	College/AS	0.2148	0.3674	0.7456	-0.0954	
Q—Male	28	No	W. User	College/AS	-0.0641	0.0528	0.8454	0.0883	
Extreme Pro- Matches (4)									
C—Male	42	Yes	Manager	Masters	0.5046	0.1851	0.2734	0.6515	
D—Male	41	Yes	Manager	Masters	0.5624	0.1477	0.1364	0.6305	
J—Male	70	No	W. User	---	0.0307	0.4063	0.3342	-0.6979	
K—Male	59	No	W. User	HS/GED	-0.0434	0.2185	0.6404	-0.5749	
					EV	9.6	6.8	6	4.8
					% Expl. Var.	24	17	15	12

Factor 4: Extreme Pro-Restoration

Factor 4 has an eigenvalue of 4.8 and explains 12% of the study variance. Four self-identified males were significantly associated with this cluster. The sorts associated are all confounding sorts—participants significantly loading on more than one perspective. Participants are employed as managers ($n = 2$) or are employed by industries outside the natural resources field ($n = 2$). Two individuals are positively associated, and two individuals are negatively associated making the Extreme Pro-Restoration a bipolar factor. The two individuals who load positively are between the ages of 41-50, while the other two individuals are over the age of 51. Educationally, this cluster is divided between positive and negative associations with two participants having obtained postgraduate degrees, one participant having obtained a high school degree or GED, and one individual declining to respond. All individuals identify as fishermen participate in fishing during trips to the Trinity Alps Wilderness.

Table 5 displays the top five statements this cluster most strongly agreed and disagreed with and the accompanying z-score. Appendix D, Table 16 is a full crib-sheet (see Watts & Stenner, 2012) displaying items ranked at +4 and -4, items ranked higher in this factor array than other factor arrays, and items ranked lower in this factor array than other factor arrays.

Table 5 Five heaviest loaded positively and negatively defining statements for Extreme Pro-Restoration: Factor 4

No.	Statement	Z-Score
26	Stocking fish compromises wilderness by manipulating the wildness and the naturalness of the lakes both directly and indirectly, and has especially contributed to the decline of native amphibians worldwide.	2.251
22	The treatment & removal of the invasive, nonnative trout will have long lasting benefits. There will be greatly reduced impacts on native aquatic ecology leading to improved or wider biodiversity value to the water bodies.	1.892
18	Ecosystem restoration means to bring a system back to pre-human contact. With that said, fish removals in the wilderness should be taking place if the species aren't native to that area.	1.790
21	I am concerned with the effects of stocked fish on the biodiversity of native species and the clash of social values associated with wilderness.	1.446
28	Wilderness is pristine and untrammled by man. It is the one place in our increasingly human-dominated world that is specifically designated to be left untouched and not manipulated by human desires. You can go to the wilderness to get away from it all, and to me there is great comfort in that.	1.225

36	A high elevation lake without fish just becomes a big, barren puddle.	-2.104
2	I do not believe that fish stocking in wilderness lakes had been a major cause for the decline of amphibians. Those who blame stocking programs for amphibian decline are not fully aware of habitat requirements and life cycles of fish and amphibians. I think we're seeing some biologists get frustrated about what they can influence and pointing at fish stocking as a scapegoat.	-2.091
5	We should be planting all of the resources that we have been blessed with. We need to generate all of the resources that we are capable of.	-1.925
10	It is not possible to bring our wilderness back to pre-European contact.	-1.245
1	I like being able to go up into the high country and fish for trout, I don't want to lose those trout fishing opportunities in the wilderness.	-1.218

Extreme Pro-Restoration is the crux of the recreation-biodiversity conflict in the Trinity Alps Wilderness and represents the conflict boundaries as it contains some of the most extreme statements on either end of the conflict. Although this factor accounts for the least variance (12%), it explains the most salient conflict within wilderness fisheries. Being a bipolar factor, this perspective is defined by both positively and negatively associating participants that also all load on other factors (see Table 4).

In order to better examine this factor, I will provide a two-part factor interpretation that provides detail on the contradicting perspectives it represents—Extreme Pro-Restoration and Extreme Pro-Stocking. Here, and when other factors are explained below, I will use the statements from the Q sort to construct a comprehensive narrative representing the perspectives of the participants who constitute the factor. The Q sort statements can be found in Appendix A, Table 13.

Extreme Pro-Restoration

Participants positively aligning with Extreme Pro-Restoration associate with a pro-restoration stance. They do not agree that we should be stocking as many lakes as possible, particularly in wilderness areas. Although participants agree management should be providing environmental education to constituents, they are inclined to only provide educational opportunities to “core responsible user groups.”

Fish Stocking and Restoration

These participants generally do not believe that fish stocking is an appropriate use of wilderness and support managing lakes in a fishless condition. Individuals all participate in fishing during excursions in the Trinity Alps Wilderness, but do not consider recreational fishing as a traditional use of wilderness or an activity in need of preservation. Additionally, they agree that fish removals should occur if species are not native to the region, especially since stocking fish compromises wilderness by manipulating lakes, and contributing to amphibian declines. Further following this trend, they agree that implementing fish removals for ecosystem restoration will reduce impacts on local native aquatic ecology. Although participants support restoration projects, they

do not generally believe that wilderness areas can be returned to a state of pre-human contact. These individuals support fish removals and restoration projects and also agree that restoration projects are not a waste of money.

Wilderness Values

These participants identify with wilderness advocacy, natural environments, and aesthetic values, but value other concepts directly relating to restoration, fish removals, and native species over particular wilderness ideologies. They value the importance of biological integrity over sociological value of recreation and value native systems for their intrinsic significance. Further, they do not feel that the removal of fish would detract from individuals' wilderness experiences. These participants do not specifically worry about leaving their children with a pristine landscape, nor are they anxiously waiting for their children to catch their first fish in the wilderness.

Although these participants believe in managing the wilderness and also value the human enrichment that wilderness provides, the organization of their statements suggests a slightly contradictory wilderness ideology. They have identified wilderness as a pristine area untrammelled by man, which has been left untouched by human desires, as defined by the Wilderness Act (1964). However, they agree that management is needed, as indicated by their high consensus on statements pertaining to aquatic restoration. The idea that wilderness is pristine and untrammelled suggests an idealistic perspective and does not necessarily align with the concept of land management, which inherently provides opportunities for humans to transform the landscape.

Public Engagement

Participants within this perspective do not value education and outreach as much as participants in other factors. They indicated that user groups are naïve about management practices and invasive species, and most members of the public are unaware of complex environmental issues. Further, they are inclined to feel agencies should not inform the public about restoration projects because the public might hinder progress. Nevertheless, participants do agree the public needs outreach, but only to core respectable user groups, which are often subjectively defined. Whether or not education actually makes a difference is open to skepticism. One participant stated in regards to education:

Education is important. I'm not in the education realm, [...] but I can see the lack of it. However, I don't think it's a case where you want to create advocates out of pinning folks against each other and setting up certain cases where you're trying to educate, but it actually creates more harm and more obfuscation (manager, pers. comm., July 2015).

This participant expressed caution about complete transparency and candid communication with the public because in their experience, education or outreach is not always well received.

Participants do not particularly feel the public should be engaged in all Agency decisions even if public exclusion leads to eroding trust in management agencies. As one participant explained, "...look at any management scenario—the public doesn't know every detail about everything (manager, pers. comm., July, 2015)." These participants agree if the public were to start trusting management actions, conflict between agencies and the constituents would be greatly reduced.

Participants find it difficult to accept the public's opinions since they agree the public is not well-informed about complex environmental issues. Following this trend, they did not particularly agree that a reasonable goal for fisheries management would be to compromise by providing fishing opportunities consistent with wilderness values. They tend to view high mountain lakes in wildernesses and national parks as reserves for native species. Managers want to be trusted to make appropriate management decisions (manager, pers. comm., July, 2015). This sentiment leads them to disagree that all waterways belong to all people for largely anthropocentric purposes.

Extreme Pro-Stocking

Participants associating with Extreme Pro-Stocking maintain a strong pro-stocking stance and do not support the removal of fish as a tool for ecosystem restoration. Additionally, they strongly disagree that the introduction of trout species has caused negative impacts on high mountain aquatic systems. These participants are willing to fight for the subjective health of their waterways and fish.

Fish Stocking and Wilderness

These participants view recreational fishing as a traditional and important use of the wilderness. They generally believe that we should be stocking as many bodies of water as possible, especially since lakes without fish become big, barren puddles. Stocking does not compromise wilderness by manipulating wildness or naturalness; it is traditional and should be maintained for generations to come. Since these individuals like being able to go into the high country and fish, they do not want to lose those opportunities. They love going into the wilderness, and a big part of their wilderness

experience is being able to bring their children to catch their first fish. They hope to leave a legacy behind that encourages the continuation of high mountain fishing, and they generally hope to leave their children with a pristine landscape. In terms of wilderness, they do not think wilderness should remain untouched, or be inaccessible to human interaction.

Restoration

Regarding restoration, these participants do not believe that it is possible to bring the wilderness back to a state of pre-human contact. They also feel that restoration is potentially a waste of time and money. Since they have agreed that introduced fish do not cause significant ecological damage, they do not believe that removing salmonid populations would have long lasting benefits in the high mountain region. This further suggests they are generally not concerned with effects of stocked fish. Removing fish from high mountain regions would not significantly improve biological integrity since participants indicated stocking salmonids has not been a major cause for native amphibian declines.

Public Engagement

Education and outreach should not be confined to subjectively defined core respectable user groups. Participants do not generally agree that user groups are naïve when it comes to management, neither do they agree that most people are unaware of complex environmental issues. If there were a restoration project occurring in the wilderness, they would like to be made aware of the issues management is facing. They

generally would like to be involved in the decision-making process even if they do not agree with management actions. As one participant puts it,

I tend to read into some of these cards at the arrogance of management agencies thinking that they know best [...] precludes any reasonable conversation. It should go and come in a public hearing process. But without the motivation to pay attention to and require public input that's accepted and useful [...] the effect is that it doesn't make any difference what you say, nobody pays attention to it (wilderness user, pers. comm., August, 2015).

These participants want to fight for the health of their waterways and of their fish, but the interpretation of what that means tends to be subjectively defined. Although they are willing to fight for the safety and health of their water bodies, they agreed that it is horrifying that they may be forced to fight the government to protect their resources. Following this trend, participants do not believe fear of the government is unfounded, neither is it closely related to paranoid schizophrenia.

Factor 1: Pro-Restoration

Factor 1 has an eigenvalue of 9.6 and explains 24% of the study variance. The Pro-Restoration clustering is the strongest perspective revealed through the Q sort factor analysis. The Pro-Restoration group is composed of eight self-identifying males. Participants were employed either as natural resource managers (n = 4), educators (n = 2), or in the non-profit sector (n = 2). Education level of this cluster trends higher than total sample demographics with all associated participants having obtained their Bachelors degree or a postgraduate degree. Ages of participants in this cluster trend younger than the overall sample with five individuals between the ages of thirty-one and

fifty. Four individuals identified as fishermen, and six participate in fishing during trips in the Trinity Alps Wilderness.

Table 6 displays the top five statements this group most strongly agreed and disagreed with and the accompanying z-score. Appendix D: Table 17 and shows the factor's full crib-sheets (see Watts & Stenner, 2012), displaying items ranked at +4 and -4, items ranked higher in this factor array than other factor arrays, and items ranked lower in this factor array than other factor arrays.

Table 6 Five heaviest loaded positively and negatively defining statements for Pro-Restoration: Factor 1

No.	Statement	Z-Score
22	The treatment & removal of the invasive, nonnative trout will have long lasting benefits. There will be greatly reduced impacts on native aquatic ecology leading to improved or wider biodiversity value to the water bodies.	1.744
35	The fact that an issue may be controversial is not an excuse to make decisions behind closed doors. It makes it even more important for management agencies to seek out the input of all its constituents through a transparent and open public process.	1.524
21	I am concerned with the effects of stocked fish on the biological diversity of native species and the clash of social values associated with wilderness.	1.478
26	Stocking fish compromises wilderness by manipulating the wildness and the naturalness of the lakes both directly and indirectly, and has especially contributed to the decline of native amphibians worldwide.	1.458
37	Wilderness advocacy, natural environments, aesthetic values and many resource concerns draw me to enjoy and participate in our public lands. Wilderness has a high intrinsic and sociological value to add to our culture.	1.221
20	There is no such thing as “native.”	-2.078
36	A high elevation lake without fish just becomes a big, barren puddle.	-1.966
8	Even if there was enough funding to do ecosystem restoration, restoration projects are a potential waste of money. It is technically difficult to execute and it just takes one person to reintroduce trout.	-1.510
2	I do not believe that fish stocking in wilderness lakes has been a major cause for the decline of amphibians. Those who blame stocking programs for amphibian declines are not fully aware of habitat requirements and life cycles of fish and amphibians. I think we’re just seeing some biologists get frustrated about what they can influence and pointing at fish stocking as a scapegoat.	-1.291
6	Wilderness is manicured, and strategically designed by management authorities. Ultimately, all wildlands will become “gardenified.”	-1.249

Pro-Restoration identifies with statements relating to the positive implications of fish removals as restoration, the importance of public engagement, and a particular wilderness ideology. This cluster is a moderate version of Extreme Pro-Restoration and promotes a strong stance on maintaining transparency and public inclusion in decision-making processes, which is a major distinguishing difference from the Extreme Pro-Restoration.

Restoration

Participants in Pro-Restoration generally agree that fish stocking is not an appropriate use of wilderness and they support managing *some* lakes in a fishless condition. As one participant explains,

Stocking had been going on almost 100 years [...] You know peoples' thinking at that time may have even been that fish are part of the wilderness but as we learn more about it, the fish stocking and the impacts on native species, particularly the Cascades frogs up here, we have to adjust. As you learn more and get more science, you have to adapt and change (manager, pers. comm., July 2015).

As management adapts and changes from historic management practices, wilderness culture and traditional activities must also evolve to reflect the best available science. Since recreational fishing is not a traditional and important use of wilderness, these participants agree that not all lakes need to be, or should be stocked with salmonids. However, they do agree a reasonable fisheries management objective would be providing fishing opportunities and taking wilderness values into management consideration. They strongly agree the treatment and removal of invasive, non-native trout will have long lasting benefits with reduced impacts on native species.

Public Engagement

This perspective exhibits the desire for management to provide for constituent's needs through communication, engagement and outreach. They indicate it is important for managers to properly consult with stakeholders about fish eradication projects in an effort to prevent unnecessary conflict. Although they aim to include the public, they find it difficult to accept all opinions as equal when the public does not know all of the

information. They also tend to see user groups as relatively naïve and unaware of complex ecological issues. Additionally, participants agree that education is needed in order for the public to be taken seriously in management conversations. These participants also strongly agree that transparency is needed within management activities regardless of how controversial the issues may be, which is a defining difference from the Extreme Pro-Restoration.

Wilderness Ideology

Wilderness advocacy, natural environments, aesthetic values and many other resource concerns have drawn these participants to engage with public lands. One participant described wilderness as a place that,

Reminds us that we are one species among many here on this planet. Having a wilderness there allows other critters to flourish without excessive human interference. I think for me it's having that understanding that [...] makes us humble (wilderness user, pers. comm., September, 2015).

They do not agree that the wilderness is manicured and strategically designed by management authorities. They strongly agree that there are native species are intrinsically valuable, as indicated by their strong consensus that “a high-elevation lake without fish would *not* just become a big, barren puddle.” Additionally, they agree that the wilderness has a high intrinsic and sociological value and view high mountain lakes in wilderness or natural parks as pristine and reserves for native species.

Factor 3: Legacy

Factor 3 has an eigenvalue of 6.0 and explains 15% of the study variance. Three self-identified males and two self-identified females are significantly associated with this

cluster. The two females loaded higher on this factor than the other factors, but whether gender played a significant role cannot be determined. Participants are employed as a business owner (n = 1), manager (n = 1), and general wilderness users (n = 3).

Participants in this cluster have varying degrees of educational backgrounds ranging from obtaining a high school diploma or GED (n = 1), Associates/Bachelors (n = 2), postgraduate degree (n = 1), and one declining to respond. Four identify as fishermen, while all participants fish in the Trinity Alps Wilderness.

Table 7 displays the top five statements this cluster most strongly agreed and disagreed with and the accompanying z-scores. Appendix D, Table 18 are full crib-sheets (see Watts & Stenner, 2012) which display items ranked at +4 and -4, items ranked higher in each factor array than other factor arrays, and items ranked lower in each factor array than other factor arrays.

Table 7 Five heaviest loaded positively and negatively defining statements for Legacy:

Factor 3

No.	Statement	Z-Score
11	I am anxious to take my children to catch their first fish in the wilderness.	1.738
31	It is horrifying that we have to fight our own government to save the environment.	1.685
3	Wildlife makes wilderness worth preserving. People love to see animals, that is an important part of the whole experience. Think about what it feels like to see a bear. Seeing an animal makes it tangible and connects people to their environment.	1.473
36	A high elevation lake without fish just becomes a big, barren puddle.	1.410
32	The best way for students to recognize that their actions can make a difference in our wilderness is to have projects organized by the school or community on which the students can have hands on participation.	1.143
20	There is no such thing as “native.”	-2.129
27	If voting made any difference they wouldn’t let us do it.	-1.575
4	Fish stocking is not an appropriate use of wilderness. I support managing lakes in a fishless condition.	-1.524
21	I am concerned with the effects of stocked fish on the biodiversity of native species and the clash of social values associated with wilderness.	-1.395
6	Wilderness is manicured, and strategically designed by management authorities. Ultimately, all wildlands will become “gardenified.”	-1.374

The Legacy perspective identifies with the desire to leave a legacy behind for their children and grandchildren. They are anxiously waiting to take their children to catch their first fish in the wilderness. Additionally, they largely desire to leave their children with a pristine landscape to explore that is free from human manipulation. These participants maintain a pro-stocking stance and a hope to perpetuate wilderness fishing for generations to come.

Native Species and Fish Stocking

Following trends from the Extreme Pro-Restoration and the Pro-Restoration groups, the Legacy perspective has coalesced on their agreement that native species exist (z-score of -2.129). Participants agree high mountain lakes in wilderness or national

parks are pristine and reserves for native species. Participants also agree that high elevation lakes without fish become barren puddles, which is slightly contradictory as scientific literature suggests native aquatic species are negatively impacted by the continuation of nonnative salmonid stocking. Since there are typically no native fish in isolated high elevation glacial lakes, this creates an interesting contradiction to investigate. To clarify, participants believe there are native species, but potentially may not understand that fish species in isolated glacial lakes have been historically introduced by humans. Participants disagree on the use of fish removals, suggesting participants may value introduced fish over most native aquatic species.

Public Engagement and Government Behavior

Participants somewhat agree that user groups are naïve when it comes to management and might be unaware of complex environmental issues. To help foster constituent groups that are more aware of environmental issues, participants agree education and engagement should be provided to younger generations. They feel that by incorporating youth into wilderness projects, students may recognize their actions can make a difference. Participants agree that although user groups may be naïve, it is important for management to engage constituents in potential fish eradication efforts to prevent unnecessary conflicts. Providing avenues for discussion could potentially help agencies develop future management regimes.

Although participants voiced the desire to be included in wilderness management processes, their sorts indicated they are inclined to allow agencies to make decisions regardless of complete transparency. Transparency is not as important to participants as

having agencies make decisions with the best interest of the environment in mind.

Participants indicate that although they feel their voices may not be heard, it is still possible for voting to make a significant difference. They also indicate that issues of general distrust of management agencies do not contribute to management issues. These participants do not agree that fear of government is unfounded, or that it is a recognizable mental illness closely related to paranoid schizophrenia.

Wilderness Ideology

Wilderness advocacy, natural environments, aesthetic values, and resource concerns have drawn these participants to engage with public lands. They agree that wilderness has intrinsic value, which contributes sociological value to our culture. These individuals are proponents of wilderness in part because they greatly value the wildlife it protects. The desire to leave a legacy and a wilderness filled with wild animals is demonstrated from participants agreement that, “Wildlife makes wilderness worth preserving. [...]” This indicates the importance of wildlife in terms of anthropocentric value, opposed to valuing wildlife regardless of human enrichment. In their eyes wilderness is wild, not manicured or strategically designed.

Fish Stocking and Restoration

These participants maintain a pro-stocking stance. They agree that fish stocking is an appropriate use of wilderness, and do not support defunding and shelving stocking programs. However, they agree that not all bodies of water need to be stocked, which is an important digression from the Extreme Pro-Stocking perspective. Some participants agree there is a right place for stocking and compromises need to be made. To illustrate

this point, one participant specified, “Well, I love fishing [...], but I understand the value of removing fish from certain basins. I would not like to see all fish removed from the wilderness (manager, pers. comm., July, 2015).”

Since participants agreed wilderness lakes without fish become barren puddles, the removal of fish from high mountain lakes would detract from individuals’ wilderness experiences. Following this trend, they generally do not support managing lakes in fishless condition regardless of whether lakes were historically fishless. Another participant voiced concern about fish removals by saying, “A lake without fish is like a person with no clothes on. I mean they belong together. [...] What’s wrong with having fish in the lake? It doesn’t make any sense to me.” This participant further stressed, “We need to keep them [lakes] stocked. It’s a healthy habitat. It’s part of our being in the wilderness to have fish in the lakes (wilderness user, pers. comm., August, 2015).” Generally, these participants are not concerned with the effects of stocked fish on the local biodiversity and the clash of social values associated with wilderness. Additionally, they do not agree fish stocking compromises wilderness by manipulating wildness and naturalness of lakes. They also do not agree that introduced salmonids have contributed to the global decline of native amphibians.

Factor 2: Collaborators

Factor 2 has an eigenvalue of 6.8 and explains 17% of the study variance. Five self-identified males and one female significantly associated with this cluster. Participants are employed as local business owners (n = 3), state and federal management

personnel (n = 2), members of outdoor organizations (n = 2), and professional fisherman (n = 1). Educationally, participants in this cluster indicated that none of them received higher than a Bachelors degree, while one individual declined to respond. Five out of six individuals generally identify as fishermen, and four individuals indicated they participate in fishing during trips in the Trinity Alps Wilderness.

Table 8 displays the top five statements this group most strongly agreed and disagreed with and their accompanying z-score. Appendix D, Table 19 are full crib-sheets (see Watts & Stenner, 2012) which display items ranked at +4 and -4, items ranked higher in each factor array than other factor arrays, and items ranked lower in each factor array than other factor arrays.

Table 8 Five heaviest loaded positively and negatively defining statements for

Collaborators: Factor 2

No.	Statement	Z-Score
33	We need to focus on education, because that is what it is all about. Education and communication are vitally important in order to show individuals of their responsibility for the health and future of the Earth. People need to know and understand why management is changing so they can understand the actions that will be taken.	1.805
1	I like being able to go up into the high country and fish for trout, I don't want to lose those trout fishing opportunities in the wilderness.	1.495
35	The fact that an issue may be controversial is not an excuse to make decisions behind closed doors. It makes it even more important for management agencies to seek out the input of all its constituents through a transparent and open public process.	1.335
32	The best way for students to recognize that their actions can make a difference in our wilderness is to have projects organized by the school or community on which the students can have hands on participation.	1.158
38	Healthy waterways and the lakes belong to all of the people. These playgrounds have been set aside for reasons of health and recreation, and also for our own well-being and enjoyment to be experienced forever and a day. It is now time to save our lands, the waterways, and our fish before it's too late.	1.136
14	Agencies shouldn't let the public know about restoration projects because they will try to go into the study area and mess it up.	-1.72
8	Even if there was enough funding to do ecosystem restoration, restoration projects are a potential waste of money. It is technically difficult to execute and it just takes one person to reintroduce trout.	-1.451
27	If voting made any difference they wouldn't let us do it.	-1.432
18	Ecosystem restoration means to bring a system back to pre-human contact. With that said, fish removals in the wilderness should be taking place if the species aren't native to the area.	-1.374
34	We need to have outreach, but only to core respectable user groups. Education won't make a difference with some people; you can't change who people are.	-1.180

Statements concerning education, transparency, inclusion and communication uniquely define the Collaborator perspective. I describe this cluster as Collaborators because these participants have suggested their desire to compromise with differing constituents in order to reconcile community conflicts. Participants also generally enjoy the wilderness and have been drawn to use public lands for reasons of wilderness

advocacy, experiencing the natural environment, aesthetic values, or specific resource concerns. Since participants live locally or manage lands regionally all participants have a strong ownership of, and are invested in, the health and well-being of the area for personal or economic reasons.

Public Engagement

Participants strongly agree we need to focus on education and communication in order to allow the public to understand management objectives and their own responsibility. The consensus on education and communication suggest these participants desire to understand differing perspectives surrounding wilderness fisheries management. Additionally, they agree everyone is in need of outreach and education, not specifically core respectable user groups. Consistent with the negatively associated participants in the Manifestation of Conflict, these participants understand they may not agree or like all agency decisions, but they like a seat at the table during these discussions. However, they do find it difficult to accept all opinions as equal, particularly if opinions are naïve or coming from the public who may know very little about the subject at hand. For these participants, public education is vital to make well-informed decisions about natural resources and to be taken seriously in management conversations.

Stocking and Restoration

The Collaborators take an interesting stance on stocking and fish removals. Participants want management to compromise by continuing to provide fishing opportunities while opening the possibility of restoring specific lakes to a more pristine condition. Although they recognize fish stocking in wilderness lakes may be a major

cause for amphibian declines, they still enjoy fishing in the high country and do not want to lose those opportunities. Participants do not want to see stocking programs defunded and shelved, especially since they are unsure if the treatment and removal of nonnative fishes would have long lasting ecological benefits. Participants agree that recreational fishing is a traditional and important use of wilderness and the complete removal of fish would detract from some individual's wilderness experiences.

In terms of restoration, Collaborators agree that it is not possible to bring wilderness back to a pre-European state. However, they agree that restoration projects are important and should be incorporated into management plans. Participants indicated that there is no such thing as native, which may contribute to why they have less controversial opinions on nonnative fish. They do, however, agree high mountain lakes in wilderness or natural parks are pristine reserves for native species.

Regarding restoration and education, one participant stated in order to make a positive impact on the success of restoration processes, we need to be "removing what we have implanted in people's brains for the last 100 years (manager, pers. comm., June, 2015)." This individual was speaking both about returning fire to the landscape as a form of ecosystem restoration, as well as publically relearning acceptable management techniques, such as the use of fish removals to restore impacted habitats.

Utilizing prescribed fire and fish removals can both be inherently controversial restoration regimes. Providing education to constituents is a potential approach that may lead to less controversy. One participant shared, "...education is the most important thing. [We should be] educating people about the problem because people make

decisions based on uneducated information, and I think the younger you educate people the more impactful it is (wilderness user, pers. comm. July, 2015).” The concept that education leads to well-informed decision-making reveals the need for better lines of communication between those who possess knowledge, and those who need it.

Transparency and Communication

These participants have placed importance on both transparency and the role that communication should play in natural resource management. Participants strongly agree that management agencies should disclose sensitive information about restoration projects to the public because they can be trusted to understand and respect ongoing projects. Agencies’ distrust of the public is reflected in their lack of inclusion, communication, and transparency, which is problematic since these variables are integral characteristics of fully functioning, successful relationships between public and management entities. Removing public inclusion from restoration projects severs the line of communication that would engage community members in hands-on learning opportunities. Hands-on learning might potentially evolve into better-informed decision-making, particularly for younger generations. The cyclical nature of transparency, communication, inclusion, and education influence and interact with one another. When one of the pieces is removed, the process becomes dysfunctional. This demonstrates the importance of maintaining all factions of the process in order to foster engaged and environmentally conscious steward communities.

Trends Across Boundaries

In combination with Q-method results, semi-structured interviews revealed complexity within and among perspectives. Post-transcription, I coded interview data into core categories. Predominant trends crossed boundaries between traditional stakeholder groups. Commonly discussed topics included 1) transparency and trust; 2) wilderness subjectivities; 3) management practices; and 4) education, outreach, inclusion, and communication surrounding issues related to the Trinity Alps Wilderness.

All participants cited transparency and trust as necessary for successful relationships. One participant stated in regards to the relationship between the public and management agencies, “[...] there is always room for improvement, but the main thing is to be open and honest and not politicize management plans [...] (manager, pers. comm., July, 2015)” Without transparency, participants did not feel as though it would be possible to trust each other. For example, one participant felt as though, “It’s terrible to not be able to trust the government. I don’t think we can ever fight ‘em. It’s just the trust bond is gone. We just don’t trust what they tell you (wilderness user, pers. comm., August, 2015).” One manager participant relies, “upon honesty because if you’re dishonest or want to hold something back from someone and they find out later then lose their trust in you [...] Then, just because you want to be open and honest with them [the public] doesn’t mean they’ll be open and honest with you [managers] (manager, pers. comm., July, 2015).” This indicates the need for trust and transparency to be reciprocated between competing stakeholder groups.

Participants were asked their opinion on the purpose of wilderness. Most individuals provided a societal description in addition to their own personal explanation. The general descriptions alluded to wilderness as an untrammeled and protected landscape free from human harm; similar to the Wilderness Act (1964). Personal wilderness subjectivities ranged from wilderness as untouched land for the preservation of species, to a more utilitarian description. For instance, one participant described the wilderness as a place to, “preserve for my grandchildren, and their grandchildren, and their children [...] I think it’s a safe area (wilderness user, pers. comm., July, 2015).” Other participants described wilderness in a spiritual way such as, “Wilderness is my church (wilderness user, pers. comm., September, 2015).” Overall, the ways participants interact with wilderness greatly shapes how they conceptualize wilderness. Through descriptions of favorite places and wilderness experiences, it is clear all participants care deeply about and are invested in the well-being of the Trinity Alps Wilderness.

Management practices were a big area of discussion with all participants. Wilderness management is a topic with many varying and occasionally conflicting opinions. The management of the wilderness can also be interpreted in differing ways depending on participant’s professional and personal subjectivities. For instance, although management agencies are considered to genuinely care about natural resources, some participants found their actions to be in direct conflict with Agency mission statements. One participant even referred to state managers as “Elmer Fuds.” The interpretability of mission plans and individual understandings of appropriate management activities may cause individuals to disagree about management activities.

Education, outreach, inclusion, and communication are intersecting characteristics that relate to and influence one another. Providing education allows participants to be included and opens lines of communication. Allowing participants to openly communicate with each other fosters an environment for mutual education. Education was a topic with a large level of interpretability as perspectives revealed differing opinions of who needs to be provided education. Some participants commented on the reliability of education. One participant mentioned, “[...] education is good if what you’re told is true—not the way somebody wishes it would be but the way it is and the way it has been.” Concerns associated with the reliability of education relate to issues of trust. These issues also impact how the public interprets management practices, and how agencies view the public’s opinions.

Fishing preferences and opinions on wilderness stocking varied among participants. Some individuals cited fishing as a large component of their wilderness experience. In contrast, other participants acknowledged societal interest in fishing, but do not personally describe fishing as part of their wilderness experience. Discussions surrounding the potential use of fish removals provided a wide range of opinions from individuals interested in understanding the environmental impacts, to strongly objecting to the possibility of implementing fish removals to restore impacted ecosystems. One explanation for such resistance may stem from a lack of communication and deliberate exclusion of the public done on behalf of management agencies.

Consensus statements, which are statements participants sorted similarly, are important in order to recognize common ground. For a full list see Appendix C: Table 15.

DISCUSSION

Use of Q methodology revealed important information regarding the nature of this particular recreation-biodiversity conflict. The results displayed important nuances in the nature of conflict and the subjectivities of the multitude of stakeholders involved. These findings can make important contributions to strategies managers in the region might employ to reduce social conflict surrounding shifts in wilderness fisheries management, and implications for managing environmental conflict more broadly. To provide this information, the following section has been divided into three parts: stocking and wilderness subjectivities, the importance of trust, education and communication and the use of Q within an environmental conflict resolution framework.

Stocking and Wilderness Subjectivities

The Q results revealed perspectives clustered on their opinions of restoration and fish stocking preferences (pro- and anti-). The results showed that particular wilderness ideologies might contribute to how individuals have formed opinions regarding fish stocking, and use of fish removals. The polar boundaries of this recreation-biodiversity conflict significantly associated with specific wilderness ideologies. Participants positively associating with the Extreme Pro-Restoration aligned with wilderness as pristine and untrammled and strongly agreed with the use of fish removals. The Extreme Pro-Stocking and the Legacy perspectives aligned with the concept that “wildlife makes wilderness worth preserving,” and did not support fish removals. These two alignments

display different ways of valuing the wilderness—pristine ideology with intrinsic valuation, and wildlife for humans with a utilitarian valuation. Differing valuations—anthropocentric and ecocentric—potentially indicate that issues other than differing options of stocking might contribute to this conflict and potentially stem from divergent views of wilderness and the human-nature relationship.

Although particular alignments were statistically observed in the Q data, the qualitative interviews revealed more nuanced perspectives within factors and individual opinions. Additionally, commonalities among perspectives emerged in relation to some aspects of wilderness. Two consensus statements from the Q data related to wilderness, offering potential common ground to approach environmental conflict resolution:

- 1) Disagreement that, “wilderness is manicured, and strategically designed by management authorities. Ultimately, all wildlands will become “gardenified.”
- 2) Agreement that, “wilderness advocacy, natural environments, aesthetic values and many resources concerns draw me to enjoy and participate in our public lands. Wilderness has a high intrinsic and sociological value to add to our culture.”

Qualitative data showed all participants had a deep and passionate connection to the Trinity Alps Wilderness. This love and admiration for the region that affects individuals’ lives in various ways (through leisure, spiritual, through employment and other recreation enrichments) could provide a base for differing groups to collaborate and advocate for best management practices of the region that all participants genuinely care about.

Another finding from this research centers around the social capital produced through the act of stocking fish in high elevation systems. The social and historical context that spurred the introduction of fish species throughout the Trinity Alps

Wilderness has been completed by a large number of individuals, including both managers and the public. Stocking fish into high elevation systems has contributed to the establishment of distinct communities of wilderness users that greatly value trout species. Additionally, some participants gave historical accounts, and overviews of wilderness stocking such as:

There basically are no such things as native trout in the high mountain lakes. So, we're building on a scenario that's not factual. They [lakes] were planted over a period of time with different species, at different times, and different sizes, shapes and everything. Some Goldens planted, there was some German Browns planted, there were Eastern Brook planted, there were various strains of Shasta Rainbows planted, and they were all the way from fingerlings to catchable sizes. So, as that changed over a period of time it improved the quality of fishing, people continued to plant and they may have different species that they planted last year from what they planted this year. Above the waterfalls, above where the natural streams exist, there's no such thing as an actual native trout. So, everybody should remember that; not a native fish in any of those lakes, they've all been planted. Is that bad? I don't think that's bad at all. I support that (wilderness user, pers. comm., August, 2015).

As indicated by the above quote, some participants are well-versed in the historical context of the wilderness and fish stocking. This information is valuable to managers, and the public alike, to acknowledge in order to foster a greater understanding of one another. The act of fish stocking contributes to developing morale and fostering a connection to, and "ownership" of, the high mountain region through the generation of social capital for certain communities. Although connection to the land is an area of common ground as indicated by Q and semi-structured interview data, there were different valuations of wilderness and different connections to the landscape that have developed from those values.

The alignment with pristine versus utilitarian, non-consensus wilderness

ideologies with particular management preferences displays specific diverging wilderness values at the polar boundaries of the recreation-biodiversity conflict. Further, these two alignments represent the two common valuations of nature as discussed by Cocks and Simpson (2015): ecocentric and anthropocentric valuations. Although the Extreme Pro-Restoration and Legacy participants align with ecocentric or anthropocentric values, Collaborators and Pro-Restoration participants are defined by both valuations, as both are present within each viewpoint.

Although the literature relating to wilderness valuations tends to categorize individuals as either “ecocentric” or “anthropocentric,” this research displays the occurrence of intricate valuations of wilderness showing that an individual cannot be defined within just one particular valuation. For example, many participants voiced their enjoyment of wilderness for reasons of peace, solitude, and wilderness experiences, and then further commented on the intrinsic value of wilderness. It is important to recognize that it is not always the case that one individual has one particular valuation of nature.

The results presented in this thesis further corroborate previous research citing the connection between utilitarian, or anthropocentric, valuations of wilderness and support for stocking programs. Pister (2001) discusses the utilitarian valuation of stocking trout in high mountain lakes and describe the sole purpose of high mountain lake stocking programs being to create, or enhance, recreational fishing opportunities in high mountain regions. Historically fish stocking practices were maintained regardless of ecological consequences. However, as more research is conducted regarding the impacts of stocked trout on high mountain systems, management of these regions has begun to reevaluate

current regimes.

In the Trinity Alps Wilderness, managers are approaching the reevaluation of stocking programs and the potential use of fish removals to restore critical habitats for sensitive species. Regionally, stocking programs have significantly changed over the last decade, for example, there has been a dramatic decrease in the number of high mountain lakes currently stocked (manager, pers. comm., September 2015). Additionally, the current development of regional Basin Management Plans is shifting management objectives toward a socio-ecological management design (manager, pers. comm., July 2015). The need to incorporate both ecological, and social concerns into management plans is increasing becoming more prevalent (Chan et al., 2007; Hunt et al., 2013; Juutinen et al., 2011; Pouwels et al., 2011; Rutherford et al., 2009), and the fact that managers in the Trinity Alps Wilderness region are attempting this feat is both an interesting finding from this research and provides hope for eventual coexistence of multiple stakeholder objectives within the same region.

Based on these findings, I encourage agency employees to provide comprehensive outreach, education and expansive public awareness as a portion of their management plans. Awareness of environmental concerns, and comprehensive education opportunities is especially important in relation to restoration projects that employ techniques that have the potential to ignite social conflict. In the Trinity Alps Wilderness region, many constituents are unaware of reasons why these methods should be used. Additionally, taking into account different systems of valuation—ecocentric and anthropocentric valuations—should to be incorporated to reach the full potential of participants to be

included in these outreach endeavors. The need to understand individual's motivations for participating in wilderness activities further calls attention to the importance of managers to know who constituents are, their perspectives, and motivations in order to develop applicable outreach and education that reaches the full breadth of individuals in need of knowledge.

Another recommendation is that managers should be encouraged to understand the social value and historical context of resource use, which might help managers relate to perspectives outside of formalized education and personal lived experience. Understanding these contexts would make it possible for managers to know where to begin reframing management plans, developing outreach needs for local communities, and developing solutions to social conflict. For example, managers would benefit from recognizing and valuing the social and historical context in which fish stocking and fishing has become a predominant activity for wilderness users, such as some members from the Backcountry Horsemen Association of California (BHAC). The BHAC highly values introduced trout and members volunteer to stock lakes in the Trinity Alps Wilderness. As management shifts to regimes that incorporate fish removals, managers would benefit from understanding why constituent groups such as the BHAC, might be opposed to restoration projects.

Trust, Education and Communication

The combination of Q results and semi-structured interviews revealed the longstanding difficulty of people and communities not being able to trust one another in

regards to natural resources. Participants predominately found it difficult to trust that others were being transparent and honest in their motivations. For example, an incident where the public felt managers did not have benevolent motivations is illustrated in a story told by a participant when managers neglected to inform volunteers they were no longer stocking reproductively viable fish. Although the decision to stock triploid fish (sterilized fish) was required by law, the public was left uninformed. The lack of transparency in this management decision eroded the public's trust in managers and has led to the belief that management is now switching to triploid fish in order to eventually halt high mountain stocking programs and eradicate stocked trout from all high mountain lakes. However, current management regimes have not indicated a complete halt in stocking trout. The lack of communication and transparency has inflamed social indignation in regards to management decisions.

The relationship between trust and education is an important finding that might also have large implications for regions outside of the Trinity Alps Wilderness. For instance, this research found that even if managers provide education to the public, the public might not believe the information provided as they generally find it difficult to trust managers. Distrust of one another couples with differing individual interpretations of what education actually is, and *who* needs to be provided education. An important concern discussed was the issue of management agencies not "recognizing the difference that environmental education would make to people" (wilderness user, pers. comm., July 2015). Countering this sentiment one manager stated, "I'll always go for the education, it's a good way to go," (manager, pers. comm., July 2015); however, many managers

were “not sure what it would look like” (manager, pers. comm., July 2015).

Contrary to managers’ opinions, members of the public had different interpretations of education. To illustrate this, one participant cautioned, “Education is good if what you’re told is true” (wilderness user, pers. comm., August 2015). Another participant went on to assert, “We need to focus on education, okay. That’s an important statement, but so often any more the educators don’t necessarily stick to the facts. All of a sudden stuff starts coming from the heart as opposed to reality” (wilderness user, pers. comm., August 2015). These opinions openly question the validity of education that is provided by educators and management.

Distrust of education provided by management is further indicated as another participant discussed their opinion of the mentality of managers by stating, “An awful lot of them have this attitude that they have a degree and *know*, and you don’t know, what could you possibly know? In my opinion, some of these guys about the only thing they learned is how to pronounce all the Latin names of the fish and the bugs and stuff. Beyond that, they haven’t learned a whole lot,” (wilderness user, pers. comm., August 2015). Contrary to the concept that the public needs to be educated, many non-manager participants commented on the need for managers to “learn from the old-timers,” (wilderness user, pers. comm., August 2015), as they have lived, and experience the region for much longer than most managers had.

Q results and interview data revealed concerns about communication, or lack thereof. As one manager commented that they “are always available to answer questions,” (manager, pers. comm., July 2015), and that “open lines of communication

are important,” (manager, pers. comm., July 2015). However, members of the public were concerned they are not heard. For instance, one individual noted, “there’s a big gap there, they’re not willing to really listen to the public’s side, they just want to hear their side, their ‘educated’ side. I’ve sat through the meetings and they’re [managers] smart about having to answer a question with another question and you not knowing they did that. So, yeah, I think there is a lack of communication,” (wilderness user, pers. comm., August 2015). To further illustrate the lack of communication, one individual explained:

That’s one of my pet peeves too is these agencies having these public things looking for input. You go to the meeting, you hear their thing, now it’s time to get up and say your peace and you get ‘oh, okay thank you,’ ‘we’ll take that,’ ‘we’ve already thought about that but we didn’t know,’ blah, blah, blah. But when the meeting is all over and you’re going out the door, “here’s what we’re doing.” None of the public’s input had anything to do with what they decided. They already decided what they were going to do. It’s that blatant (wilderness user, pers. comm., August 2015).

Although there are opportunities for communication about important environmental concerns, non-manager participants still feel improvements can be made in terms of having their concerns legitimized by managers, and also having real opportunities to discuss issues that are important to them.

The results from this thesis reaffirm work by Cambray (2003) stressing the need for scientists and managers to communicate research findings and management objectives to the public. Further, this thesis contributes to research presented in Hunt et al. (2013) asserting that managers need to refine effective communication activities. For the public to understand the impacts introduced salmonids have on historically fishless high mountain lakes, and for some perspectives of wilderness to move beyond an

anthropocentric system of valuation, managers must provide wilderness users with education through effective communication and associated outreach opportunities (Frank et al. 2009).

As comprehensively discussed by Stern and Coleman (2015), trust is a multidimensional, psychological state that has important implications for collaborative natural resource management. The multiple types and levels of trust have the potential to contribute (negatively and/or positively) to conflict resolution, particularly for natural resource concerns such as recreation-biodiversity conflict in the Trinity Alps Wilderness (Balint et al., 2011; Stern & Coleman, 2015). Developing multidimensional trust should be a greater priority, as developing trust offers tremendous opportunities for accomplishing collaborative resource objectives, and providing comprehensive outreach, education, and communication between stakeholder groups.

I echo recommendations by Cambray (2003); managers should take responsibility for relaying and communicating important research findings with the public as part of the position requirements. The outdated “I am a scientist and that is not my job” attitude should no longer be perpetuated through natural resource management. Further, transparency in terms of motivation for management should take priority over other project objectives, excluding issues of human health or safety. Perceived secretive management approaches erode public trust in management programs. The lack of trust is unfortunate since trust can have important impacts on success of management decisions.

Many managers supported the use of education and outreach programs, but were not necessarily certain how to implement them. One recommendation would be to

combat the public negativity associated with community meetings regarding environmental concerns. Participants described outreach meetings as not being “well advertised” and felt as though the lack of advertising was a tactic used to exclude the public from participating in management processes. Management might find it more beneficial to restructure outreach meetings to include pre- and post- prescription events to discuss environmental concerns, management options, and to receive feedback about how the current management regime is working. As many managers commented on their desire to maintain transparency and communication, they would greatly benefit from moving toward an inclusive communication model that promotes diversity of thought, tactics, and genuine concern for public comments.

Environmental Conflict Resolution and Q Methodology

Conservation and recreation management plans often become focal points having the potential to ignite social conflict among resource users with differing, or opposing value structures, beliefs, and lived experiences. As Rutherford et al. (2009) explain, constructing and implementing more successful management strategies increasingly relies on scientists, managers, and other participants being able to identify core and underlying concerns, evaluate knowledge in terms of available and needed, integrate knowledge from a variety of sources to develop a understanding of fundamental problems, and develop effective solutions that are mutually important. In addition to discovering underlying concerns, it is crucial to find areas of commonality within conflicts (Hahn et al., 2006; Rutherford et al., 2009).

The development of the Collaborator perspective—clustered on the need for mutual education, communication and transparency—and Pro-Restoration perspective—composed of four managers, and four wilderness users aligning—revealed overlap in opinion and associated stakeholder categories. The emergence of perspectives showed the complexity of viewpoints and key important underlying issues, and common ground (the need for mutual education, trust, and communication) where there was previously hypothesized to be none. The use of Q in this research has provided managers and constituents with a core set of concerns, all of which have been discussed throughout this thesis, and indicate that deeper issues, such as wilderness ideologies, have contributed to social conflict associated with wilderness fisheries management.

The Q results provided statistically determined consensus statements that display subjects of collective agreement. As previously mentioned, collective agreement is important in working toward conflict resolution. These areas of agreements (the need for mutual education, communication, and deep connection to the landscape) from Q in combination with interview discussions are important to recognize and use during future discussions about the management of the Trinity Alps Wilderness. The discovery of these issues would not have been possible without the use of Q.

Although Q is a less frequently used approach to examining conflict, it provides regions of commonality by way of consensus statements and through the emergence of unique perspectives such as the Collaborators perspective. The Collaborators perspective reveals a more nuanced viewpoint, which had developed over topics that offer potential common ground moving toward conflict resolution and are not centrally focused on

restoration or stocking preference. Additionally, only four participants loaded onto the most salient conflict perspectives, however, these participants also loaded onto other, more moderate viewpoints as well. The relationships between perspectives revealed in this thesis offer approaches to understanding and solving complex recreation-biodiversity conflicts such as increased communication and increased educational opportunities. Additionally, the use of Q in this research made controversial fisheries topics approachable and encouraged participants to feel comfortable sharing their personal views. Participants acknowledged they were more comfortable sharing their opinions knowing that I personally did not write or say the items in the Q set.

Through the use of Q, this research contributes to human dimensions of recreational fisheries, particularly in management of introduced sport fisheries. In this research, Q has identified that trust is a large mutual concern for managers and the public alike, and in some cases distrust of one another is a root cause for differing perspectives. This information is corroborated by both the Q data, and the semi-structured interviews. Using Q to delineate recreation-biodiversity conflict offers the potential to approach conflict resolution by gathering distinct understandings of current issues, and providing a platform to have important discussions regarding issues that are important to participants.

The objective of environmental conflict resolution (ECR) as defined by Elliot is to “resolve environmental, public land, or natural resource conflict through direct negotiations and dialogue amongst disputants (2009).” This thesis has demonstrated the practical use of Q to examine recreation-biodiversity conflict and to develop recommendations in order to approach conflict resolution. The use of Q has allowed the

examination of salient ends of conflict in addition to “the shades of gray” along the continuum and how these particular viewpoints relate to one another. Prior to this research, managers and the public hypothesized only two perspectives existed—pro- and anti- stocking and restoration—however, Q distinguished three distinct perspectives and one bipolar perspective. These results align with other Q methodology studies citing the complexity within conflicts that is revealed through the use of the method (Ellis et al., 2007; Johnson & Sciascia, 2013; Rutherford et al., 2009).

A core recommendation for managers is to further utilize the Q method data discussed in this thesis within an interdisciplinary problem-solving framework and structured workshops as presented by Rutherford et al. (2009). Rutherford et al. (2009) examined social conflict of grizzly bear conservation in Banff National Park, Canada, utilizing a preliminary Q methodology study followed by three professionally facilitated community workshops with Q study participants. The three workshops were set up to first allow participants to discuss the results from the Q study, which were inherently controversial. The following workshops encouraged finding common ground, and collaborative decision-making among various stakeholder groups such as scientists, managers, and members of the public. The goal of these workshops was to help participants clarify their standpoints, develop mutual agreed upon objectives, generate trust building, and create a collaborative decision-making process.

The use of preliminary Q studies to structure workshops and collaborative decision-making has achieved great success within interdisciplinary problem-solving frameworks (Mattson et al., 2006; Rutherford et al., 2009). As Rutherford et al. (2009)

explain, talking about perspectives, decision-making, and putting the social processes to work opposed to arguing about scientific data and high uncertainty encourages participants to find common ground instead of returning back to areas of disagreement. I encourage managers to use the Q results presented in this thesis to design an interdisciplinary problem-solving framework similar to previously mentioned studies in order to develop a collaborative alternative to the status quo.

CONCLUSION

This research has demonstrated that recreation-biodiversity conflict in the Trinity Alps Wilderness has developed from more than participants having differing opinions of fish stocking and ecosystem restoration. Management would benefit from making mutual education and public inclusion a priority in planning processes in order to reduce conflict over stocking salmonids and potential use of fish removals. This study also showed that many participants were proponents of education and outreach; however, since education and outreach are interpreted differently among participants, workshops designed to develop contextual definitions might enhance development of common ground. Additionally, communication and trust are fundamental concerns in need of greater attention in order for participants to work together to develop conflict resolutions.

Q Methodology and Environmental Conflict Resolution

Q methodology is an innovative and interactive tool with the potential to be readily utilized to understand constituent perspectives associated with conflict. Understanding perspectives and finding areas in need of resolution are key components of both human dimensions research, and environmental conflict resolution. Q methodology offers the potential to be used as a tool for environmental conflict resolution by providing the first step for delineating conflict—an overview of perspectives associated with the conflict. Moving forward, the Q results can be utilized further to design and implement workshops, similar to the interdisciplinary problem solving

workshops employed by Rutherford et al. (2009). The perspectives revealed through the Q sort offer talking points, such as education, communication, trust and transparency, that need to be defined by communities associated with wilderness fisheries in the Trinity Alps Wilderness. The underlying issues discussed in this thesis offer potential for trust-building, mutual respect, and understanding of differing perspectives.

Study Limitations and Future Research

Q interpretations are not designed for extensive generalization, therefore, data presented in this thesis represents participants interviewed but does not characterize populations outside of the Trinity Alps Wilderness region. Although the Q data typically is not for extensive generalization, results from this thesis might be useful for designing studies regarding other recreation-biodiversity conflicts. Some statements in the Q set included exclusionary language and others were too lengthy for participants to quickly read and place on the distribution board. These limitations within the Q set would have benefitted from a study pilot, which my project did not have.

This research provides an overview of perspectives associated with wilderness fisheries in the Trinity Alps Wilderness region. Future research focused on conflict resolution would benefit from using the Q data to design and implement comprehensive workshops to establish trust among diverse community groups and managers. Although beyond the scope of this project, management would benefit from further research aimed at understanding relationships between individual wilderness ideologies and fish stocking, restoration, and wilderness management preferences.

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APPENDICES

APPENDIX A: STATEMENT LIST AND STATEMENT NUMBERS

No.	Full Statement
1	I like being able to go up into the high county and fish for trout, I don't want to lose those trout fishing opportunities in the wilderness.
2	I do not believe that fish stocking in wilderness lakes has been a major cause for the decline of amphibians. Those who blame stocking programs for amphibian decline are not fully aware of habitat requirements and life cycles of fish and amphibians. I think we're just seeing some biologists get frustrated about what they can influence and pointing at fish stocking as a scapegoat.
3	Wildlife makes wilderness worth preserving. People love to see animals, that is an important part of the whole experience. Think about what it feels like to see a bear. Seeing an animal make it tangible and connects people to their environment.
4	Fish stocking is not an appropriate use of wilderness. I support managing lakes in a fishless condition.
5	We should be planting all of the resources that we have been blessed with. We need to generate all the resources that we are capable of.
6	Wilderness is manicured, and strategically designed by management authorities. Ultimately, all wildlands will become "gardenified."
7	Every person in California needs to write their Congressman before it is too late as these stocking programs need to be defunded and shelved immediately before there is an ecological meltdown in the entire state.
8	Even if there was enough funding to do ecosystem restoration, restoration projects are a potential waste of money. It is technically difficult to execute and it just takes one person to reintroduce trout.
9	User groups are naïve when it comes to management and how invasive species affect wilderness ecosystems. Most people are very unaware of the complex environmental issues.
10	It is not possible to bring out wilderness back to pre-European contact.
11	I am anxious to take my children to catch their first fish in the wilderness.
12	High mountain lakes in wilderness or national parks are pristine and can be viewed as reserves for native species.
13	We don't expect to like all Agency decisions, but we would like to be engaged in the decision-making process and know that our concerns are being carefully considered. Management in wilderness areas must have public support or it will not be successful. The people who value wildlife should be consulted in an open and transparent process. Seeming covert biological control erodes the public's trust and disenfranchises wildlife supporters who are critical to the Department's long-term success.
14	Agencies shouldn't let the public know about restoration projects because they will try to go into the study area and mess it up.
15	It is important for fisheries managers to properly consult constituents and stakeholder in eradication efforts to prevent unnecessary conflicts. Public input will help managers determine future management of our ecosystems.
16	The California Department of Fish and Wildlife is a schizophrenic agency.
17	Unfounded fear of the government is a recognizable mental illness, closely related to paranoid schizophrenia.
18	Ecosystem restoration means to bring a system back to pre-human contact. With that said, fish removals should be taking place if the species aren't native to that area.
19	The inherent value of wilderness is what makes it worth preserving. It is also the setting, and the lack

	of civilization that is important. Having the native plants and animals is important too. We need to keep everything and save it because that is what makes it.
20	There is no such thing as "native."
21	I am concerned with the effects of stocked fish on the biological diversity of native species and the clash of social values associated with wilderness.
22	The treatment and removal of the invasive, non-native trout will have long lasting benefits. There will be greatly reduced impacts on native aquatic ecology leading to improved or wider biodiversity value to the water bodies.
23	I find it hard to accept [ALL] people's opinions as equal, when they know little of the subjects at hand. For them to be taken seriously, education is key to inform the public before they discuss a topic they know very little about.
24	If I am spending the time and effort to fish, I want to catch something pristine, let the other folks that want to keep everything catch the hatchery fish.
25	I want to leave my children with a pristine landscape they can explore that is free of human manipulations.
26	Stocking fish compromises wilderness by manipulating the wildness and the naturalness of the lakes both directly and indirectly, and has especially contributed to the decline of native amphibians worldwide.
27	If voting made any difference they wouldn't let us do it.
28	Wilderness is pristine and untrammled by man. It is the one place in our increasingly human-dominated world that is specifically designated to be left untouched and not manipulated by human desires. You can go to the wilderness to get away from it all, and to me there is great comfort in that.
29	Since a faction of society has a general distrust of land managers, management issues are beyond the science.
30	Hatchery fish are easier to catch, and because so many people want to catch and keep all the fish they can, having fish to supplement the wild populations is very beneficial.
31	It is horrifying that we have to fight our own government to save the environment.
32	The best way for students to recognize that their actions can make a difference in our wilderness is to have projects organized by the school or community on which the students can have hands on participation.
33	We need to focus on education, because that is what it is all about. Education and communication are vitally important in order to show individuals of their responsibility for the health and future of the Earth. People need to know and understand why management is changing so they can understand the actions that will be taken.
34	We need to have outreach, but only to core respectable user groups. Education won't make a difference with some people; you can't change who people are.
35	The fact that an issue may be controversial is not an excuse to make decisions behind closed doors. It makes it even more important for management agencies to see out the input of all its constituents through a transparent and open public process.
36	A high-elevation lake without fish just becomes a big, barren puddle.
37	Wilderness advocacy, natural environments, aesthetic values and many resource concerns draw me to enjoy and participate in our public lands. Wilderness has a high intrinsic and sociological value to add to our culture.
38	Healthy waterways and the lakes belong to all of the people. These playgrounds have been set aside for reasons of health and recreation, and also for our own well-being and enjoyment to be experienced forever and a day. It is now time to save our lands, the waterways, and our fish before it's too late.
39	Recreational fishing is a traditional and important use of wilderness. The removal of fish would detract from people's wilderness experiences.
40	A reasonable goal for fisheries management in wilderness is to provide fishing opportunities consistent with wilderness values. If we compromise, we can restore a few lakes to pristine condition,

	and there will only be minimal negative effects on the trout fisheries.
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APPENDIX B: ADDITIONAL Q METHOD DATA

Table 9 Correlations between factor scores

Factor	1	2	3	4
1	1.0000	0.3416	0.2242	0.5056
2	0.3415	1.0000	0.5235	-0.1964
3	0.2242	0.5235	1.0000	-0.2200
4	0.5056	-0.1996	-0.2200	1.0000

Table 10 Factor characteristics: number of defining variables, average relative coefficient, composite reliability, and S.E. of factor Z-Scores

Factor Characteristics

	Factors			
	1	2	3	4
No. of Defining Variables	8	6	5	4
Average Rel. Coef.	0.8	0.8	0.8	0.8
Composite Reliability	0.97	0.96	0.952	0.941
S.E. of Factor Z-Scores	0.174	0.2	0.218	0.243

Table 11 Standard errors for differences in factor Z-Score

**Standard Errors for Differences in Factor Z-Score
(Diagonal Entries Are S.E. Within Factors)**

Factors	1	2	3	4
1	0.246	0.265	0.279	0.299
2	0.265	0.283	0.296	0.314
3	0.279	0.296	0.309	0.326
4	0.299	0.314	0.326	0.343

Table 12 Factor Q sort values for each statement - factor array

Factor Arrays	1	2	3	4
Statement No.				
1	-1	4	1	-3
2	-3	1	-1	-4
3	2	1	3	0
4	1	-2	-3	1
5	-1	-2	-1	-3
6	-3	-2	-3	-2
7	-1	-2	-2	0
8	-3	-4	-1	-1
9	1	1	1	2
10	0	2	0	-3
11	-1	0	4	-2
12	1	1	2	1
13	1	2	1	-1
14	-2	-4	0	1
15	2	1	1	1
16	0	-1	-2	-2
17	-1	-2	-2	2
18	0	-3	-2	3
19	1	0	0	2
20	-4	1	-4	0
21	3	-1	-3	3
22	4	-1	0	4
23	2	2	0	-1
24	-2	-1	0	2
25	1	0	2	0
26	3	-1	-2	4
27	-1	-3	-4	-1
28	0	0	2	3
29	-2	-1	-2	1
30	-2	0	-1	-2
31	2	0	4	-1
32	0	3	3	-1
33	2	4	2	0
34	-2	-3	-1	2
35	4	3	-1	1
36	-4	-2	3	-4
37	3	2	2	2
38	0	3	1	-2
39	-2	2	2	-2
40	2	2	1	0

Table 13 Factor Q sort values for statements sorted by consensus vs. disagreement

Factor Arrays	1	2	3	4
Statement No.				
12	1	1	2	1
9	1	1	1	2
37	3	2	2	2
6	-3	-2	-3	-2
19	1	0	0	2
15	2	1	1	1
40	2	2	1	0
30	-2	0	-1	-2
16	0	-1	-2	-2
3	2	1	3	0
23	2	2	0	-1
7	-1	-2	-2	0
13	1	2	1	-1
29	-2	-1	-2	1
25	1	0	2	0
8	-3	-4	-1	-1
17	-1	-2	-2	2
32	0	3	3	-1
28	0	0	2	3
27	-1	-3	-4	-1
5	-1	-2	-1	-3
38	0	3	1	-2
33	2	4	2	0
24	-2	-1	0	2
31	2	0	4	-1
35	4	3	-1	1
34	-2	-3	-1	2
14	-2	-4	0	1
10	0	2	0	-3
39	-2	2	2	-2
4	1	-2	-3	1
2	-3	1	-1	-4
1	-1	4	1	-3
11	-1	0	4	-2
18	0	-3	-2	3
22	4	-1	0	4
21	3	-1	-3	3
20	-4	1	-4	0
26	3	-1	-2	4
36	-4	-2	3	-4

APPENDIX C: CONSENSUS STATEMENTS

Table 14 Consensus statements: statements that do not distinguish between ANY pair of factors. All statements listed are non-significant at $P > 0.01$, and those flagged with an * are also non-significant at $P > 0.05$

No.	Statement	Factor 1		Factor 2		Factor 3		Factor 4	
		Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
6	Wilderness is manicured, and strategically designed by management authorities. Ultimately, all wildlands will become “gardenified.”	-3	-1.25	-2	-1.1	-3	-1.37	-2	-0.67
9*	User groups are naïve when it comes to management and how invasive species affect wilderness ecosystems. Most people are very unaware of the complex environmental issues.	1	0.66	1	0.26	1	0.63	2	0.72
12*	High mountain lakes in wilderness or national parks are pristine and can be viewed as reserves for native species.	1	0.69	1	0.76	2	0.82	1	0.37
19*	The inherent value of wilderness is what makes it worth preserving. It is also the setting, and the lack of civilization that is important. Having the native plants and animals is important too. We need to keep everything and save it because that is what makes it.	1	0.55	0	0.08	0	0.04	2	0.65
37*	Wilderness advocacy, natural environments, aesthetic values and many resource concerns draw me to enjoy and participate in our public lands. Wilderness has a high intrinsic and sociological value to add to our culture.	3	1.22	2	1.09	2	0.85	2	0.67

APPENDIX D: FACTOR CRIB SHEETS

Table 15 Crib Sheet for Factor 4: Extreme Pro-Restoration

Items Ranked at +4		
No.	Statement	Rank
22	The treatment and removal of the invasive, non-native trout will have long lasting benefits. There will be greatly reduced impacts on native aquatic ecology leading to improved or wider biodiversity value to the water bodies.	+4
26	Stocking fish compromises wilderness by manipulating the wildness and the naturalness of the lakes both directly and indirectly, and has especially contributed to the decline of native amphibians worldwide.	+4
Items Ranked Higher in Factor 4 Array than in Other Factor Arrays		
No.	Statement	Rank
4	Fish stocking is not an appropriate use of wilderness. I support managing lakes in a fishless condition.	+1
7	Every person in California needs to write their Congressman before it is too late as these stocking programs need to be defunded and shelved immediately before there is an ecological meltdown in the entire state.	0
8	Even if there was enough funding to do ecosystem restoration, restoration projects are a potential waste of money. It is technically difficult to execute and it just takes one person to reintroduce trout.	-1
9	User groups are naïve when it comes to management and how invasive species affect wilderness ecosystems. Most people are very unaware of the complex environmental issues.	+2
14	Agencies shouldn't let the public know about restoration projects because they will try to go into the study area and mess it up.	+1
17	Unfounded fear of the government is a recognizable mental illness, closely related to paranoid schizophrenia.	+2
18	Ecosystem restoration means to bring a system back to pre-human contact. With that said, fish removals should be taking place if the species aren't native to that area.	+3
19	The inherent value of wilderness is what makes it worth preserving. It is also the setting, and the lack of civilization that is important. Having the native plants and animals is important too. We need to keep everything and save it because that is what makes it.	+2
21	I am concerned with the effects of stocked fish on the biological diversity of native species and the clash of social values associated with wilderness.	+3
27	If voting made any difference they wouldn't let us do it.	-1
28	Wilderness is pristine and untrammelled by man. It is the one place in our increasingly human-dominated world that is specifically designated to be left untouched and not manipulated by human desires. You can go to the wilderness to get away from it all, and to me there is great comfort in that.	+3
29	Since a faction of society has a general distrust of land managers, management issues are beyond the science.	+1
34	We need to have outreach, but only to core respectable user groups. Education won't make a difference with some people; you can't change who people are.	+2

Items Ranked Lower in Factor 4 Array than in Other Factor Arrays		
No.	Statement	Rank
1	I like being able to go up into the high county and fish for trout, I don't want to lose those trout fishing opportunities in the wilderness.	-3
3	Wildlife makes wilderness worth preserving. People love to see animals, that is an important part of the whole experience. Think about what it feels like to see a bear. Seeing an animal make it tangible and connects people to their environment.	0
5	We should be planting all of the resources that we have been blessed with. We need to generate all the resources that we are capable of.	-3
10	It is not possible to bring out wilderness back to pre-European contact.	-3
11	I am anxious to take my children to catch their first fish in the wilderness.	-2
12	High mountain lakes in wilderness or national parks are pristine and can be viewed as reserves for native species.	+1
13	We don't expect to like all Agency decisions, but we would like to be engaged in the decision-making process and know that our concerns are being carefully considered. Management in wilderness areas must have public support or it will not be successful. The people who value wildlife should be consulted in an open and transparent process. Seeming covert biological control erodes the public's trust and disenfranchises wildlife supporters who are critical to the Department's long-term success.	-1
15	It is important for fisheries managers to properly consult constituents and stakeholder in eradication efforts to prevent unnecessary conflicts. Public input will help managers determine future management of our ecosystems.	+1
16	The California Department of Fish and Wildlife is a schizophrenic agency.	-2
23	I find it hard to accept [ALL] people's opinions as equal, when they know little of the subjects at hand. For them to be taken seriously, education is key to inform the public before they discuss a topic they know very little about.	-1
24	If I am spending the time and effort to fish, I want to catch something pristine, let the other folks that want to keep everything catch the hatchery fish.	-1
25	I want to leave my children with a pristine landscape they can explore that is free of human manipulations.	0
30	Hatchery fish are easier to catch, and because so many people want to catch and keep all the fish they can, having fish to supplement the wild populations is very beneficial.	-2
31	It is horrifying that we have to fight our own government to save the environment.	-1
32	The best way for students to recognize that their actions can make a difference in our wilderness is to have projects organized by the school or community on which the students can have hands on participation.	-1
33	We need to focus on education, because that is what it is all about. Education and communication are vitally important in order to show individuals of their responsibility for the health and future of the Earth. People need to know and understand why management is changing so they can understand the actions that will be taken.	0
37	Wilderness advocacy, natural environments, aesthetic values and many resource concerns draw me to enjoy and participate in our public lands. Wilderness has a high intrinsic and sociological value to add to our culture.	+2
38	Healthy waterways and the lakes belong to all of the people. These playgrounds have been set aside for reasons of health and recreation, and also for our own well-being and enjoyment to be experienced forever and a day. It is now time to save our lands, the waterways, and our fish before it's too late.	-2

39	Recreational fishing is a traditional and important use of wilderness. The removal of fish would detract from people's wilderness experiences.	-2
40	A reasonable goal for fisheries management in wilderness is to provide fishing opportunities consistent with wilderness values. If we compromise, we can restore a few lakes to pristine condition, and there will only be minimal negative effects on the trout fisheries.	0
Items Ranked at -4		
No.	Statement	Rank
2	I do not believe that fish stocking in wilderness lakes has been a major cause for the decline of amphibians. Those who blame stocking programs for amphibian decline are not fully aware of habitat requirements and life cycles of fish and amphibians. I think we're just seeing some biologists get frustrated about what they can influence and pointing at fish stocking as a scapegoat.	-4
36	A high-elevation lake without fish just becomes a big, barren puddle.	-4

Table 16 Crib Sheet for Factor 4: Extreme Pro-Stocking

Items Ranked at +4		
No.	Statement	Rank
2	I do not believe that fish stocking in wilderness lakes has been a major cause for the decline of amphibians. Those who blame stocking programs for amphibian decline are not fully aware of habitat requirements and life cycles of fish and amphibians. I think we're just seeing some biologists get frustrated about what they can influence and pointing at fish stocking as a scapegoat.	+4
36	A high-elevation lake without fish just becomes a big, barren puddle.	+4
Items Ranked Higher in Factor 4 Array than in Other Factor Arrays		
No.	Statement	Rank
1	I like being able to go up into the high county and fish for trout, I don't want to lose those trout fishing opportunities in the wilderness.	+3
3	Wildlife makes wilderness worth preserving. People love to see animals, that is an important part of the whole experience. Think about what it feels like to see a bear. Seeing an animal make it tangible and connects people to their environment.	0
5	We should be planting all of the resources that we have been blessed with. We need to generate all the resources that we are capable of.	+3
10	It is not possible to bring out wilderness back to pre-European contact.	+3
11	I am anxious to take my children to catch their first fish in the wilderness.	+2
12	High mountain lakes in wilderness or national parks are pristine and can be viewed as reserves for native species.	-1
13	We don't expect to like all Agency decisions, but we would like to be engaged in the decision-making process and know that our concerns are being carefully considered. Management in wilderness areas must have public support or it will not be successful. The people who value wildlife should be consulted in an open and transparent process. Seeming covert biological control erodes the public's trust and disenfranchises wildlife supporters who are critical to the Department's long-term success.	+1
15	It is important for fisheries managers to properly consult constituents and stakeholder in eradication efforts to prevent unnecessary conflicts. Public input will help managers determine future management of our ecosystems.	-1

16	The California Department of Fish and Wildlife is a schizophrenic agency.	+2
23	I find it hard to accept [ALL] people's opinions as equal, when they know little of the subjects at hand. For them to be taken seriously, education is key to inform the public before they discuss a topic they know very little about.	+1
24	If I am spending the time and effort to fish, I want to catch something pristine, let the other folks that want to keep everything catch the hatchery fish.	+1
25	I want to leave my children with a pristine landscape they can explore that is free of human manipulations.	0
30	Hatchery fish are easier to catch, and because so many people want to catch and keep all the fish they can, having fish to supplement the wild populations is very beneficial.	+2
31	It is horrifying that we have to fight our own government to save the environment.	+1
32	The best way for students to recognize that their actions can make a difference in our wilderness is to have projects organized by the school or community on which the students can have hands on participation.	+1
33	We need to focus on education, because that is what it is all about. Education and communication are vitally important in order to show individuals of their responsibility for the health and future of the Earth. People need to know and understand why management is changing so they can understand the actions that will be taken.	0
37	Wilderness advocacy, natural environments, aesthetic values and many resource concerns draw me to enjoy and participate in our public lands. Wilderness has a high intrinsic and sociological value to add to our culture.	-2
38	Healthy waterways and the lakes belong to all of the people. These playgrounds have been set aside for reasons of health and recreation, and also for our own well-being and enjoyment to be experienced forever and a day. It is now time to save our lands, the waterways, and our fish before it's too late.	+2
39	Recreational fishing is a traditional and important use of wilderness. The removal of fish would detract from people's wilderness experiences.	+2
40	A reasonable goal for fisheries management in wilderness is to provide fishing opportunities consistent with wilderness values. If we compromise, we can restore a few lakes to pristine condition, and there will only be minimal negative effects on the trout fisheries.	0

Items Ranked Lower in Factor 4 Array than in Other Factor Arrays		
No.	Statement	Rank
4	Fish stocking is not an appropriate use of wilderness. I support managing lakes in a fishless condition.	-1
7	Every person in California needs to write their Congressman before it is too late as these stocking programs need to be defunded and shelved immediately before there is an ecological meltdown in the entire state.	0
8	Even if there was enough funding to do ecosystem restoration, restoration projects are a potential waste of money. It is technically difficult to execute and it just takes one person to reintroduce trout.	+1
9	User groups are naïve when it comes to management and how invasive species affect wilderness ecosystems. Most people are very unaware of the complex environmental issues.	-2
14	Agencies shouldn't let the public know about restoration projects because they will try to go into the study area and mess it up.	-1
17	Unfounded fear of the government is a recognizable mental illness, closely related to paranoid schizophrenia.	-2

18	Ecosystem restoration means to bring a system back to pre-human contact. With that said, fish removals should be taking place if the species aren't native to that area.	-3
19	The inherent value of wilderness is what makes it worth preserving. It is also the setting, and the lack of civilization that is important. Having the native plants and animals is important too. We need to keep everything and save it because that is what makes it.	-2
21	I am concerned with the effects of stocked fish on the biological diversity of native species and the clash of social values associated with wilderness.	-3
27	If voting made any difference they wouldn't let us do it.	+1
28	Wilderness is pristine and untrammled by man. It is the one place in our increasingly human-dominated world that is specifically designated to be left untouched and not manipulated by human desires. You can go to the wilderness to get away from it all, and to me there is great comfort in that.	-3
29	Since a faction of society has a general distrust of land managers, management issues are beyond the science.	-1
34	We need to have outreach, but only to core respectable user groups. Education won't make a difference with some people; you can't change who people are.	-2

Items Ranked at -4		
No.	Statement	Rank
22	The treatment and removal of the invasive, non-native trout will have long lasting benefits. There will be greatly reduced impacts on native aquatic ecology leading to improved or wider biodiversity value to the water bodies.	-4
26	Stocking fish compromises wilderness by manipulating the wildness and the naturalness of the lakes both directly and indirectly, and has especially contributed to the decline of native amphibians worldwide.	-4

Table 17 Crib sheet for Factor 1: Pro-Restoration

Items Ranked at +4		
No.	Statement	Rank
22	The treatment and removal of the invasive, non-native trout will have long lasting benefits. There will be greatly reduced impacts on native aquatic ecology leading to improved or wider biodiversity value to the water bodies.	+4
35	The fact that an issue may be controversial is not an excuse to make decisions behind closed doors. It makes it even more important for management agencies to see out the input of all its constituents through a transparent and open public process.	+4

Items Ranked Higher in Factor 1 Array than in Other Factor Arrays		
No.	Statement	Rank
4	Fish stocking is not an appropriate use of wilderness. I support managing lakes in a fishless condition.	+1
5	We should be planting all of the resources that we have been blessed with. We need to generate all the resources that we are capable of.	-1
15	It is important for fisheries managers to properly consult constituents and stakeholder in eradication efforts to prevent unnecessary conflicts. Public input will help managers determine future management of our ecosystems.	+2
16	The California Department of Fish and Wildlife is a schizophrenic agency.	0
21	I am concerned with the effects of stocked fish on the biological diversity of native	-1

	species and the clash of social values associated with wilderness.	
23	I find it hard to accept [ALL] people's opinions as equal, when they know little of the subjects at hand. For them to be taken seriously, education is key to inform the public before they discuss a topic they know very little about.	+2
27	If voting made any difference they wouldn't let us do it.	-1
37	Wilderness advocacy, natural environments, aesthetic values and many resource concerns draw me to enjoy and participate in our public lands. Wilderness has a high intrinsic and sociological value to add to our culture.	+3
40	A reasonable goal for fisheries management in wilderness is to provide fishing opportunities consistent with wilderness values. If we compromise, we can restore a few lakes to pristine condition, and there will only be minimal negative effects on the trout fisheries.	+2

Items Ranked Lower in Factor 1 Array than in Other Factor Arrays

No.	Statement	Rank
6	Wilderness is manicured, and strategically designed by management authorities. Ultimately, all wildlands will become "gardenified."	-3
9	User groups are naïve when it comes to management and how invasive species affect wilderness ecosystems. Most people are very unaware of the complex environmental issues.	+1
12	High mountain lakes in wilderness or national parks are pristine and can be viewed as reserves for native species.	+1
24	If I am spending the time and effort to fish, I want to catch something pristine, let the other folks that want to keep everything catch the hatchery fish.	-2
29	Since a faction of society has a general distrust of land managers, management issues are beyond the science.	-2
30	Hatchery fish are easier to catch, and because so many people want to catch and keep all the fish they can, having fish to supplement the wild populations is very beneficial.	-2
39	Recreational fishing is a traditional and important use of wilderness. The removal of fish would detract from people's wilderness experiences.	-2

Items Ranked at -4

No.	Statement	Rank
20	There is no such thing as "native."	-4
36	A high-elevation lake without fish just becomes a big, barren puddle.	-4

Table 18 Crib sheet for Factor 3: Legacy

Items Ranked at +4		
No.	Statement	Rank
11	I am anxious to take my children to catch their first fish in the wilderness.	+4
31	It is horrifying that we have to fight our own government to save the environment.	+4

Items Ranked Higher in Factor 3 Array than in Other Factor Arrays

No.	Statement	Rank
3	Wildlife makes wilderness worth preserving. People love to see animals, that is an important part of the whole experience. Think about what it feels like to see a bear. Seeing an animal make it tangible and connects people to their environment.	+3

5	We should be planting all of the resources that we have been blessed with. We need to generate all the resources that we are capable of.	-1
8	Even if there was enough funding to do ecosystem restoration, restoration projects are a potential waste of money. It is technically difficult to execute and it just takes one person to reintroduce trout.	-1
12	High mountain lakes in wilderness or national parks are pristine and can be viewed as reserves for native species.	+2
25	I want to leave my children with a pristine landscape they can explore that is free of human manipulations.	+2
32	The best way for students to recognize that their actions can make a difference in our wilderness is to have projects organized by the school or community on which the students can have hands on participation.	+3
36	A high-elevation lake without fish just becomes a big, barren puddle.	+3
39	Recreational fishing is a traditional and important use of wilderness. The removal of fish would detract from people's wilderness experiences.	+2

Items Ranked Lower in Factor 3 Array than in Other Factor Arrays		
No.	Statement	Rank
4	Fish stocking is not an appropriate use of wilderness. I support managing lakes in a fishless condition.	-3
6	Wilderness is manicured, and strategically designed by management authorities. Ultimately, all wildlands will become "gardenified."	-3
7	Every person in California needs to write their Congressman before it is too late as these stocking programs need to be defunded and shelved immediately before there is an ecological meltdown in the entire state.	-2
9	User groups are naïve when it comes to management and how invasive species affect wilderness ecosystems. Most people are very unaware of the complex environmental issues.	+1
10	It is not possible to bring out wilderness back to pre-European contact.	0
15	It is important for fisheries managers to properly consult constituents and stakeholder in eradication efforts to prevent unnecessary conflicts. Public input will help managers determine future management of our ecosystems.	+1
16	The California Department of Fish and Wildlife is a schizophrenic agency.	-2
17	Unfounded fear of the government is a recognizable mental illness, closely related to paranoid schizophrenia.	-2
19	The inherent value of wilderness is what makes it worth preserving. It is also the setting, and the lack of civilization that is important. Having the native plants and animals is important too. We need to keep everything and save it because that is what makes it.	0
21	I am concerned with the effects of stocked fish on the biological diversity of native species and the clash of social values associated with wilderness.	-3
26	Stocking fish compromises wilderness by manipulating the wildness and the naturalness of the lakes both directly and indirectly, and has especially contributed to the decline of native amphibians worldwide.	-2
29	Since a faction of society has a general distrust of land managers, management issues are beyond the science.	-2
35	The fact that an issue may be controversial is not an excuse to make decisions behind closed doors. It makes it even more important for management agencies to see out the input of all its constituents through a transparent and open public process.	-1
37	Wilderness advocacy, natural environments, aesthetic values and many resource concerns draw me to enjoy and participate in our public lands. Wilderness has a high intrinsic and	+2

	sociological value to add to our culture.	
Items Ranked at -4		
No.	Statement	Rank
20	There is no such thing as “native.”	-4
27	If voting made any difference they wouldn't let us do it.	-4

Table 19 Crib sheet for Factor 2: Collaborators

Items Ranked at +4		
No.	Statement	Rank
33	We need to focus on education, because that is what it is all about. Education and communication are vitally important in order to show individuals of their responsibility for the health and future of the Earth. People need to know and understand why management is changing so they can understand the actions that will be taken.	+4
1	I like being able to go up into the high county and fish for trout, I don't want to lose those trout fishing opportunities in the wilderness.	+4
Items Ranked Higher in Factor 2 Array than in Other Factor Arrays		
No.	Statement	Rank
2	I do not believe that fish stocking in wilderness lakes has been a major cause for the decline of amphibians. Those who blame stocking programs for amphibian decline are not fully aware of habitat requirements and life cycles of fish and amphibians. I think we're just seeing some biologists get frustrated about what they can influence and pointing at fish stocking as a scapegoat.	+1
6	Wilderness is manicured, and strategically designed by management authorities. Ultimately, all wildlands will become “gardenified.”	-2
10	It is not possible to bring out wilderness back to pre-European contact.	+2
13	We don't expect to like all Agency decisions, but we would like to be engaged in the decision-making process and know that our concerns are being carefully considered. Management in wilderness areas must have public support or it will not be successful. The people who value wildlife should be consulted in an open and transparent process. Seeming covert biological control erodes the public's trust and disenfranchises wildlife supporters who are critical to the Department's long-term success.	+2
20	There is no such thing as “native.”	+1
23	I find it hard to accept [ALL] people's opinions as equal, when they know little of the subjects at hand. For them to be taken seriously, education is key to inform the public before they discuss a topic they know very little about.	+2
30	Hatchery fish are easier to catch, and because so many people want to catch and keep all the fish they can, having fish to supplement the wild populations is very beneficial.	0
32	The best way for students to recognize that their actions can make a difference in our wilderness is to have projects organized by the school or community on which the students can have hands on participation.	+3
38	Healthy waterways and the lakes belong to all of the people. These playgrounds have been set aside for reasons of health and recreation, and also for our own well-being and enjoyment to be experienced forever and a day. It is now time to save our lands, the waterways, and our fish before it's too late.	+3
39	Recreational fishing is a traditional and important use of wilderness. The removal of fish would detract from people's wilderness experiences.	+2

40	A reasonable goal for fisheries management in wilderness is to provide fishing opportunities consistent with wilderness values. If we compromise, we can restore a few lakes to pristine condition, and there will only be minimal negative effects on the trout fisheries.	+2
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Items Ranked Lower in Factor 2 Array than in Other Factor Arrays		
No.	Statement	Rank
7	Every person in California needs to write their Congressman before it is too late as these stocking programs need to be defunded and shelved immediately before there is an ecological meltdown in the entire state.	-2
9	User groups are naïve when it comes to management and how invasive species affect wilderness ecosystems. Most people are very unaware of the complex environmental issues.	+1
12	High mountain lakes in wilderness or national parks are pristine and can be viewed as reserves for native species.	+1
15	It is important for fisheries managers to properly consult constituents and stakeholder in eradication efforts to prevent unnecessary conflicts. Public input will help managers determine future management of our ecosystems.	+1
17	Unfounded fear of the government is a recognizable mental illness, closely related to paranoid schizophrenia.	-2
18	Ecosystem restoration means to bring a system back to pre-human contact. With that said, fish removals should be taking place if the species aren't native to that area.	-3
19	The inherent value of wilderness is what makes it worth preserving. It is also the setting, and the lack of civilization that is important. Having the native plants and animals is important too. We need to keep everything and save it because that is what makes it.	0
22	The treatment and removal of the invasive, non-native trout will have long lasting benefits. There will be greatly reduced impacts on native aquatic ecology leading to improved or wider biodiversity value to the water bodies.	-1
25	I want to leave my children with a pristine landscape they can explore that is free of human manipulations.	0
28	Wilderness is pristine and untrammled by man. It is the one place in our increasingly human-dominated world that is specifically designated to be left untouched and not manipulated by human desires. You can go to the wilderness to get away from it all, and to me there is great comfort in that.	0
34	We need to have outreach, but only to core respectable user groups. Education won't make a difference with some people; you can't change who people are.	-3
37	Wilderness advocacy, natural environments, aesthetic values and many resource concerns draw me to enjoy and participate in our public lands. Wilderness has a high intrinsic and sociological value to add to our culture.	+2

Items Ranked at -4		
No.	Statement	Rank
8	Even if there was enough funding to do ecosystem restoration, restoration projects are a potential waste of money. It is technically difficult to execute and it just takes one person to reintroduce trout.	-4
14	Agencies shouldn't let the public know about restoration projects because they will try to go into the study area and mess it up.	-4

APPENDIX E: DEMOGRAPHIC DATA FIGURES

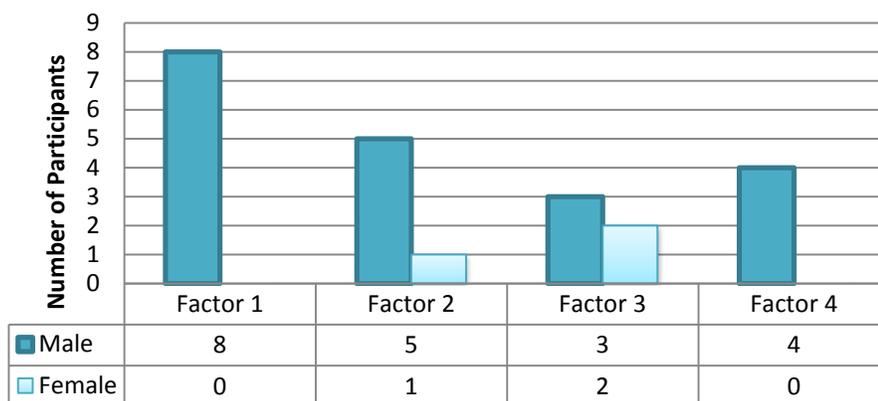
Participants' Gender by Factor

Figure 6 Participants sorted gender by Factor (1 - 4): 18 of 19 individuals participated in the Q sort

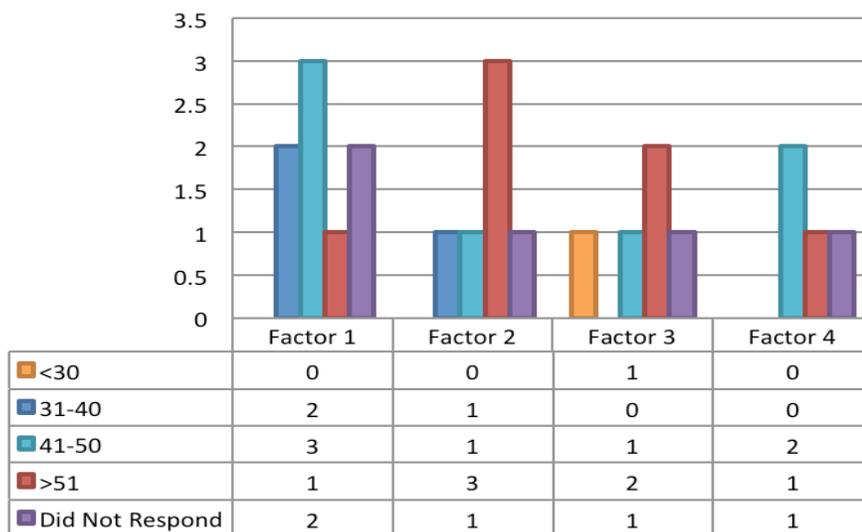
Age of Participants by Factor

Figure 7 Age of participants by factor (1-4)

Participant Political Affiliation

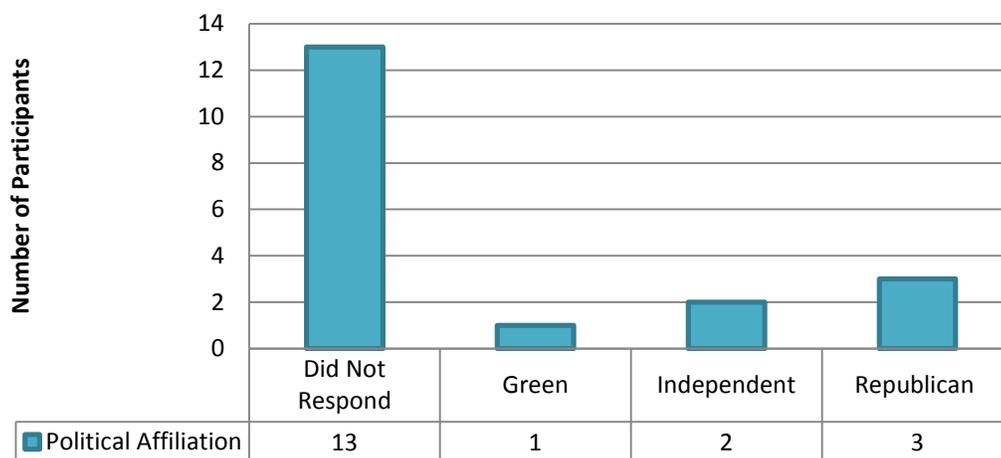


Figure 8 Total study participant political affiliations

Political Affiliation by Factor

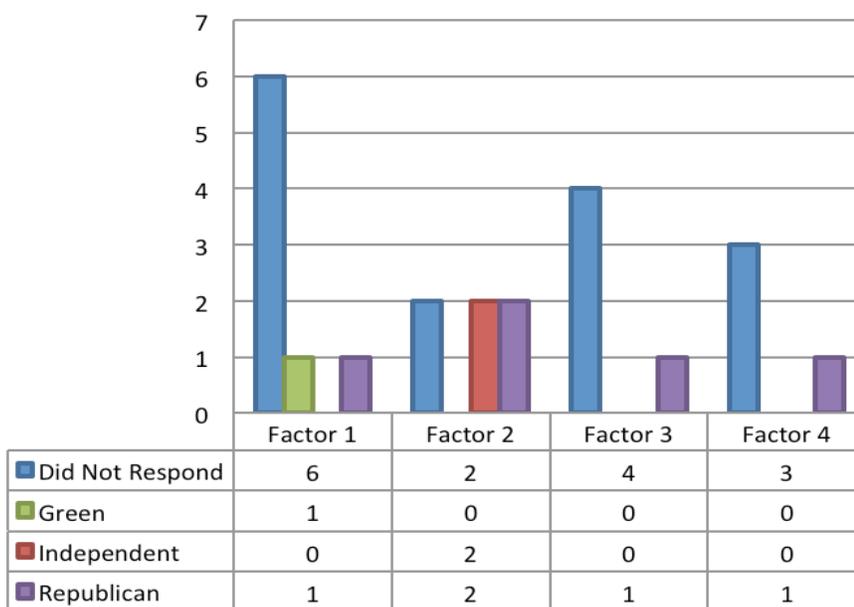


Figure 9 Total study participant political affiliations by factor (1-4)

Participants Self-description by Factor

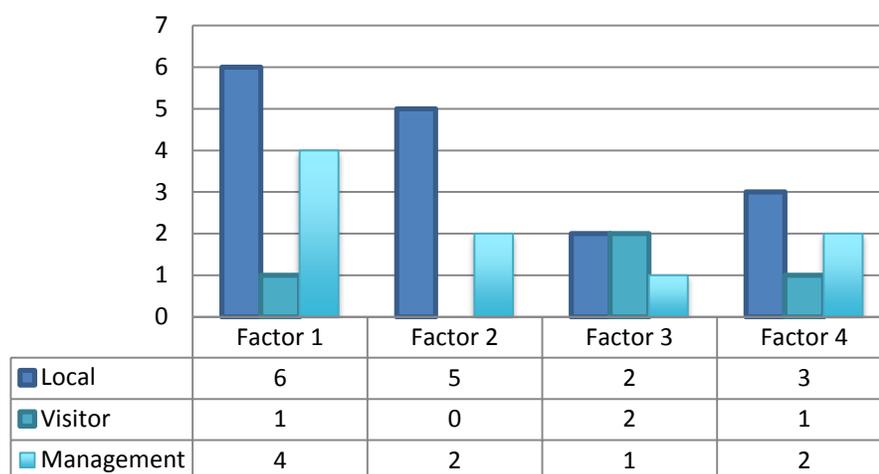


Figure 10 Participants self-identified as local, visitor, or management and are sorted by factor (1-4). Individuals were able to select as many categories as were relevant.

Participant Education by Factor

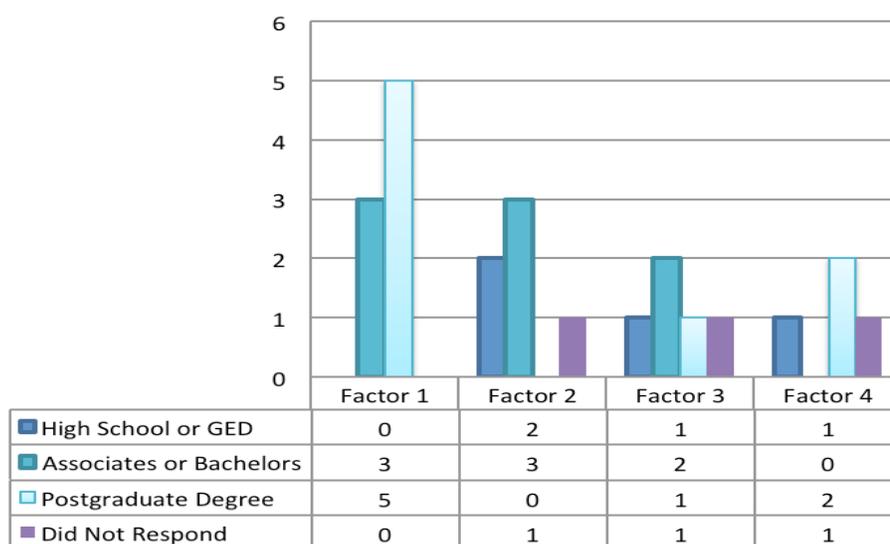


Figure 11 Participants' education levels sorted by factor.

APPENDIX F: SEMI-STRUCTURED INTERVIEW QUESTIONS

Overview:

Each semi-structured interview will consist of a series of questions that will be constructed as a conversation. Listed below are sample questions from eight possible topic categories.

Personal:

- Are you from California?
- If regional manager, how large is your management jurisdiction?
- Are you a member of any groups or organizations that frequent the Trinity Alps?
- What was your first experience in the Trinity Alps?
- How many trips have you taken?
- What activities do you participate in when you are in the mountains?

Fishing/Fish Stocking/Restoration

- In your opinion, are there ecological drawbacks to fish species in the Trinity Alps?
- Have you seen any ecological changes over your time in the Alps?
- Have you fished in the backcountry? If so, how often?
- How long have you been fishing? And how did you get introduced to fishing?
- Do people a lot of people you know fish in the wilderness areas?
- Do people ask about fishing in the backcountry?
- Can you tell me about your most memorable fishing experience in the Trinity Alps?
- Why do you fish?
- How many lakes have you fished at?
- What is your opinion on hatcheries and stocking?
- Does your opinion change based on species stocked?
- Does your opinion change based on stocking location?
 - For instance, what is your opinion on wilderness stocking?
- What is your opinion on wilderness stocking?
- In your opinion, does wilderness stocking conflict with the Wilderness Act?
- Manager: Have your management techniques changed over the last 15 years? If so, how?
- What is your opinion on ecosystem restoration?
- Do you think fish removals would cause local resistance?
- Would you consider fish removal as restoration?

- In your opinion, does wilderness stocking conflict with your values of wilderness?
- What is your favorite fish to catch?
- What fish do you usually catch?

Management:

- How do you feel about land management agencies?
- If you were to make a suggestion to improve management, what would it be?
- How do you feel about current communication between agencies and communities?
- What do you think is the most controversial issue with wilderness fisheries management?
 - Do you think these issues can be avoided?
- Do you think there could be any improvements in the relationship between management agencies and the people?

Wilderness:

- How has this area changed during the time you have lived here? Has management changed?
- In your opinion, should the wilderness be managed? Why, or why not?
- In your opinion, do you think fish stocking and other management practices allow a wilderness to still be wild?
- In your opinion, what is the purpose of wilderness?
- What is your opinion on the statement that, “wildlife makes wilderness worth preserving.”
- Do you think fishing in the wilderness area impacts your business?
- Do you spend a lot of time in the backcountry?

Outreach:

- Have you ever attended a management outreach presentation? Why, or why not? If so, what was the subject matter?
- Have you ever picked up an informational pamphlet? If so, was it useful?
- Do you regularly hear about management plans? If so, how do you receive news of new regulations? Or of new management plans?

APPENDIX G: Q SORT PHOTOGRAPHS



Figure 12 Participant completing a Q sort in the Trinity Alps Wilderness



Figure 13 Completed Q sort with randomly assigned number on the back of statement cards showing