STAKEHOLDER VIEWS ON GRIZZLY BEAR MANAGEMENT IN THE BANFF-BOW VALLEY: A BEFORE–AFTER Q METHODOLOGY STUDY

by

Jutta Katariina Kölhi
B.Sc., University of Victoria, 2007

PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF RESOURCE MANAGEMENT
(PLANNING)

In the
School of Resource and Environmental Management
Project No. 493

© Jutta Katariina Kölhi 2010

SIMON FRASER UNIVERSITY

Spring 2010

All rights reserved. However, in accordance with the *Copyright Act of Canada*, this work may be reproduced, without authorization, under the conditions for *Fair Dealing*. Therefore, limited reproduction of this work for the purposes of private study, research, criticism, review and news reporting is likely to be in accordance with the law, particularly if cited appropriately.

APPROVAL

Name: **Jutta Katariina Kölhi**

Degree: **Master of Resource Management (Planning)**

Title of Thesis: **Stakeholder Views on Grizzly Bear Management in the Banff-Bow Valley: A Before–After Q Methodology Study**

Project Number: **493**

Examining Committee:

Chair: **Megan Dickinson**
Master of Resource Management
School of Resource and Environmental Management
Simon Fraser University

_____

Dr. **Murray B. Rutherford**
Senior Supervisor
Associate Professor
School of Resource and Environmental Management
Simon Fraser University

_____

Dr. **Michael L. Gibeau**
Committee Member
Adjunct Professor
Department of Geography
University of Calgary

Date Defended/Approved: _____

ABSTRACT

Understanding stakeholder views is essential for successful wildlife management. This study used Q methodology with a before–after approach to explore stakeholder views about the problems and solutions related to grizzly bear management in the Banff-Bow Valley of Alberta, Canada. This research, conducted in 2008, followed up on a previous Q study conducted in 2004. A meta-analysis of the before and after factors revealed that some changes in views had occurred between the summers of 2004 and 2008. Interviews also supported the finding that the views of the participants had changed and revealed that the factors most frequently identified by participants as having influenced their views between the before and after Q studies were: research about grizzly bears; the occurrence of grizzly bear mortalities; and a series of "interdisciplinary problem solving" stakeholder workshops and meetings about grizzly bear management.

Keywords: grizzly bears; stakeholder views; wildlife management; decision making; policy; Banff National Park, Alberta, Canada; Q methodology; before-after study

Isolle,

Kiitos kaikesta rakkaudestasi ja tuestasi.

Ilman sinua tämä ei olisi ollut mahdollista.

Rakkaudella,

Jutta

For Grandma,

Thank you for all your love and support.

I couldn't have done this without you.

Love,

Jutta

ACKNOWLEDGEMENTS

I am deeply grateful to Dr. Murray Rutherford, my senior supervisor, for all the support and guidance I've received during this research project and throughout my entire degree. Thank you for teaching me so much about Q, policy, law, research, the social sciences, and the list goes on. Thank you for challenging me to do my best and to improve my skills and knowledge. And thank you for all your help and dedication throughout this project. I truly admire your intelligence, integrity, respect, and patience. You have been an amazing mentor to me.

My sincerest thanks to Dr. Michael Gibeau for initiating this research and for helping me so much during this project. Thank you for all your assistance and hospitality during my stay in the Rockies. Thank you for your commitment to the conservation of grizzly bears and to collaborative decision making. And thank you for sharing your expertise and knowledge with me. It has been a privilege to work with you.

Special thanks to Emily Chamberlain for conducting the Q study that this research is based on, for writing such an excellent thesis for me to learn from and to model my study after, and for generously helping me during this project. Thank you also to Meaghan Hennessy and Vicky Weekes for providing examples of high-quality Q studies that helped me to understand Q methodology and to write about my methods.

Many thanks to all the participants of this study for your time, for your willingness to participate and to share your views, and for giving me the pleasure of meeting you. Without your participation, this research would not have been possible.

Thank you to Parks Canada, Simon Fraser University, and the School of Resource and Environmental Management for providing funding for this project and for my studies. Without all that financial support, I could not have completed this degree.

Thanks to all the faculty, staff, and students at the School of Resource and Environmental Management for creating such a wonderful program and for supporting me in so many ways. You've made my experience at REM very special.

Thank you to my dear Grandma for always supporting me and believing in me.

And, last but not least, thanks to all my friends for your support and encouragement and for all the fun times we've had together.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

ACA	Alberta Conservation Association
ASRD	Alberta Sustainable Resource Development
BBV	Banff-Bow Valley
BNP	Banff National Park
BRW	Bow River Watershed
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRE	Central Rockies Ecosystem
ESCC	Endangered Species Conservation Committee
ESGBP	Eastern Slopes Grizzly Bear Project
IPS	Interdisciplinary Problem Solving
SARA	*Species at Risk Act* (S.C. 2002, c. 29)
UNESCO	United Nations Educational, Scientific and Cultural Organization

CHAPTER 1: INTRODUCTION

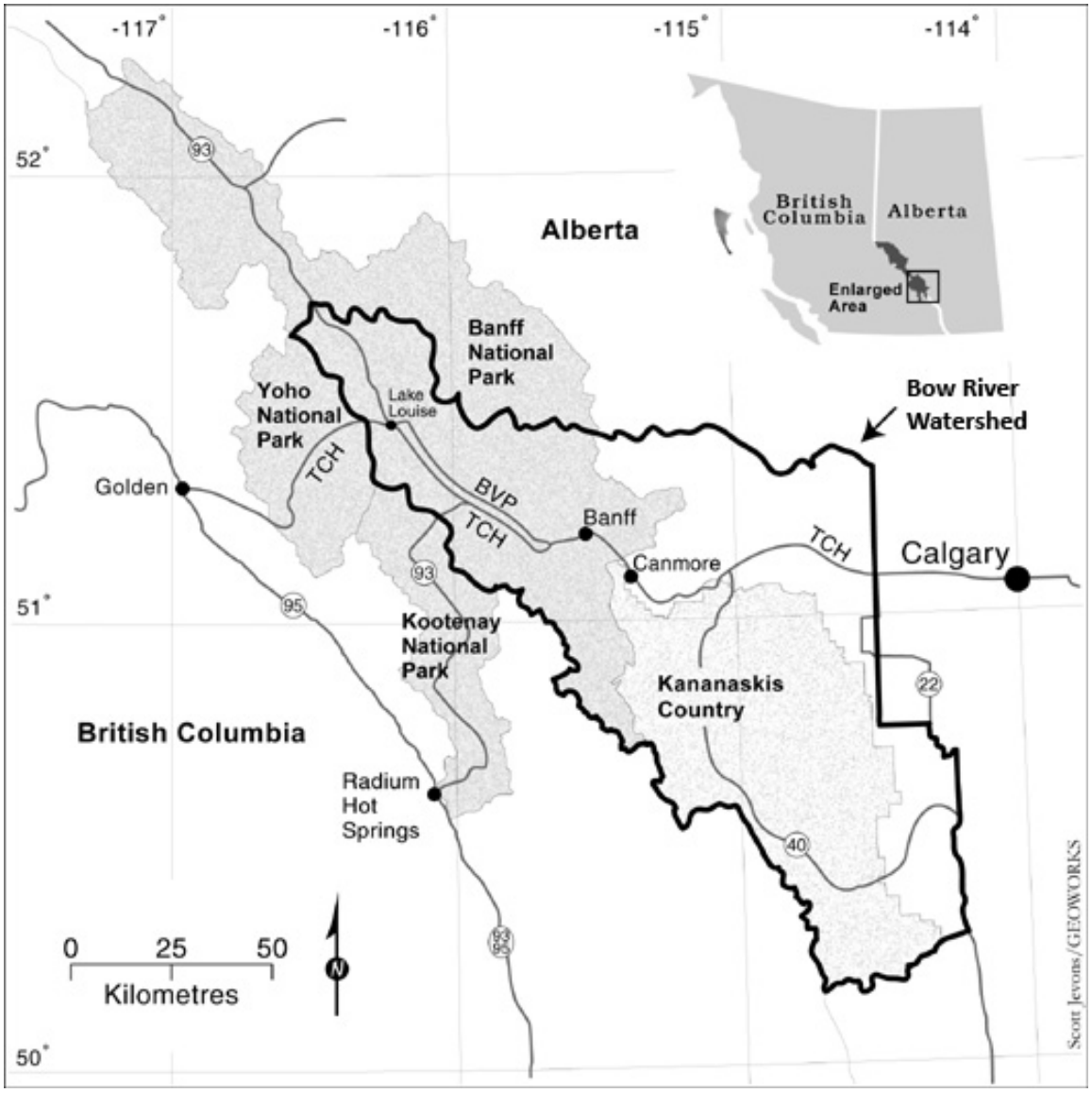
1.1 Rationale for Research

Grizzly bears (*Ursus arctos*) have disappeared from a large part of their original range in North America due to human influence and they are highly vulnerable to environmental disturbance (Mattson and Merrill 2002; Weaver, Paquet, and Ruggiero 1996). In Canada, grizzly bears are considered a species of special concern (COSEWIC 2002). The goal of both the federal government of Canada and the province of Alberta is to maintain a sustainable population of grizzly bears in Alberta (Parks Canada 2007; Alberta Grizzly Bear Recovery Team 2008). However, competing socio-economic goals and conflicting public views complicate decision making and the management of grizzly bears (Parks Canada 2007; Chamberlain 2006).

A small population of grizzly bears exists in the Banff-Bow Valley (BBV) region of Alberta, which includes Banff National Park (BNP) and the Bow River Watershed (BRW) (Gibeau 2000) (Figure 1.1). The BBV is one of the most developed landscapes in the world where grizzly bears still survive (Garshelis, Gibeau, and Herrero 2005a; Gibeau 2000). Humans are the major cause of grizzly bear mortality in the BBV, and the long-term sustainability of the population is uncertain (Garshelis, Gibeau, and Herrero 2005a; Garshelis, Gibeau, and Herrero 2005b; Gibeau 2005).

Figure 1.1 Map of the Banff-Bow Valley

Adapted from Gibeau (2000) with permission.



Grizzly bear management in the BBV has been controversial and problematic due to acrimonious debates and divergent views among stakeholders. Conflicting views on the status of the grizzly bear population and the need for restrictions on human use have complicated decision making in the region and created tensions among interest groups (Chamberlain 2006).

In a democratic society, the survival of large carnivores is largely dependent on the goals and values of the public. Therefore, understanding the views of stakeholders is essential for the successful conservation of large carnivores. In order to develop effective management strategies, decision-makers need to understand the views of their constituents and foster public support for conservation policies (Clark, Rutherford, and Casey 2005; Kellert et al. 1996).

This research builds on a previous study about stakeholder perspectives on grizzly bear management in the BBV (Chamberlain 2006). The goals of this study are to provide a better understanding of the views of stakeholders on grizzly bear management in the BBV in the summer of 2008, to explore changes in views since the previous study was conducted in the summer of 2004, and to examine factors that may have influenced stakeholder views between the two studies. This research aims to provide useful information for decision-makers about the views of their constituents and about the potential for improving grizzly bear management in the BBV.

1.2 Research Context

In the summer of 2004, a previous study explored stakeholder perspectives on grizzly bear management in the BBV (Chamberlain 2006). The research used Q methodology, which is a method for examining the subjective viewpoints of participants, and revealed several distinct viewpoints about the problems and possible solutions related to grizzly bear management in the BBV. After the completion of the Q study, a group of stakeholders took part in a series of training workshops on interdisciplinary problem solving (IPS), which aimed to build dialogue and reduce conflict over grizzly bear management in the BBV. The workshops were structured according to the policy sciences framework, which is a framework for interdisciplinary problem solving (Rutherford et al. 2009; Chamberlain 2006; Lasswell 1971). After the training workshops, an IPS group of stakeholders was established to discuss grizzly bear management in the BBV, and the group met regularly until March 2009 (Rutherford et al. 2009; Chamberlain 2006; Michael Gibeau, pers. comm.).

1.3 Research Objectives

The objectives of this research were to explore stakeholder views on grizzly bear management in the BBV in the summer of 2008 with Q methodology, to examine possible changes in those views between the summers of 2004 and 2008 with a before–after approach, and to explore factors, such as the IPS process, that may have affected the views between the summers of 2004 and 2008.

In this study, I aimed to answer the following research questions:

1. What are the views on grizzly bear management in the BBV in the summer of 2008?
2. What are the possible changes in views between the summers of 2004 and 2008?
3. What factors may have affected the possible changes in views?

1.4 Report Outline

In this report, Chapter 2 provides background information on the BBV, grizzly bears and their management, the policy sciences framework, standpoint clarification, and the previous research on perspectives on grizzly bear management in the BBV. Chapter 2 also presents the findings of the background research on the context of grizzly bear management in the BBV. Chapter 3 discusses the after Q study about stakeholder views on grizzly bear management in the BBV in the summer of 2008. Chapter 4 examines changes in views through comparisons of the before and after Q studies and interviews about changes in views. In Chapter 5, the discussion includes a synthesis of the findings of this study, an update about the IPS process, the limitations and implications of this research, areas of further research, and the conclusion.

CHAPTER 2: BACKGROUND

2.1 Banff-Bow Valley

The Banff-Bow Valley (BBV) is located in the Canadian Rocky Mountains in southwestern Alberta, on the southeastern slopes of the Central Rockies Ecosystem (CRE). The CRE is centred around the continental divide and covers 42,000 km^2 from the Columbia Trench in the west to the Alberta foothills in the east and from the northern end of Banff National Park (BNP) to south of Kananaskis Country. The landscape in the CRE is generally characterized by the montane, subalpine, and alpine ecoregions. The CRE is managed by four major governmental jurisdictions and includes federal lands in Banff, Yoho, and Kootenay National Parks, provincial lands in Alberta's Kananaskis Country, provincial lands in Alberta, and provincial lands in British Columbia (Gibeau and Stevens 2005). All of the jurisdictions have multiple land-use mandates, including settlement, industry, tourism, recreation, and protection. In addition, the CRE includes private land and First Nations treaty land (Gibeau 2000). In the CRE, 35% of the region is protected through either national or provincial parks (Parks Canada 2003).

The BBV includes BNP and the Bow River Watershed (BRW) (Gibeau 2000). BNP was established in 1885, becoming the first national park in Canada and the third in the world. BNP has an area of 6,641 km^2, and almost 60% of the park borders other protected areas (Parks Canada 2008). In 1984, the United Nations Educational, Scientific and Cultural Organization (UNESCO) declared the Canadian Rocky Mountain Parks a World Heritage Site (UNESCO 2010). The BRW covers 11,400 km^2 of mountainous terrain and is located 50-180 km west of Calgary (Gibeau and Stevens 2005). The BRW includes approximately half of BNP, all of Kananaskis Country, and other provincial lands in Alberta. The area known as Kananaskis Country is provincial multiple-use land adjacent to BNP. About half of Kananaskis Country is comprised of provincial parks and the other half is designated as forest lands and recreational areas (Garshelis, Gibeau, and Herrero 2005a).

The BBV encompasses various human activities and developments and an extensive transportation network (Gibeau 2000). The transportation infrastructure includes the Trans-Canada Highway, several other high-speed and high-volume highways, and a transcontinental railway. The extent of the transportation network is unparalleled in occupied grizzly bear habitat in North America (Gibeau and Stevens 2005). The BBV includes the towns of Banff (8,300 residents) and Canmore (12,000 permanent and 5,600 non-permanent residents) and the hamlet of Lake Louise (1,500 winter and 1,900 summer residents) and has a total population ranging from about 22,000 to 28,000 residents (Parks Canada 2008; Town of Canmore n.d.). Also, the rapidly growing and nearby city of Calgary has a population of over a million residents and is a source of visitors to the BBV (Gibeau and Stevens 2005; City of Calgary 2009). In addition, the BBV is an internationally renowned tourist destination and attracts approximately four million visitors a year (Gibeau and Stevens 2005). The various human developments in the BBV include tourism and industry, numerous hotels, several golf courses and ski resorts, campgrounds and picnic areas, and an extensive network of hiking, biking, and equestrian trails (Gibeau and Stevens 2005).

Grizzly bear management is a contentious topic in the BBV, largely because of conflicting demands for grizzly bear conservation and for human use and development. Recent research showed that fundamental controversies still remain about grizzly bear management in the BBV, although some areas of virtual consensus also exist (Chamberlain 2006).

2.2 Grizzly Bears

Grizzly bears (*Ursus arctos*) have been extirpated from a large part of their historical range in North America due to human influence (Mattson and Merrill 2002; Ross 2002). Historically, the grizzly bear population in North America numbered over 100,000 and ranged from the Arctic to central Mexico and from the Pacific Ocean to Hudson Bay in the north east and Texas in the south east (British Columbia Ministry of Environment, Lands and Parks 1995a). The current distribution of grizzly bears in North America includes parts of British Columbia, Alberta, Yukon, Northwest Territories, Nunavut, and Alaska, with a few small populations in the northern contiguous United States (Proctor et al. 2005).

In the contiguous United States, the grizzly bear is considered a "threatened"[1] species under the *Endangered Species Act, 1973* (16 U.S.C. 1531 et seq.). In the contiguous United States, grizzly bears have been eliminated from 98% of their range occupied in 1800 (Servheen 1999), and the population currently numbers only about 750–1,000 (Blood 2002; British Columbia Ministry of Environment, Lands and Parks 1995b). In Alaska, the number of grizzly bears totals about 30,000 (Blood 2002).

In Canada, the range of grizzly bears has declined by 24% from its original extent, partly due to the extirpation of grizzly bears from the prairies and from the boreal lowlands of Alberta, Saskatchewan, Manitoba, and the Northwest Territories (British Columbia Ministry of Environment, Lands, and Parks 1995b). The current distribution of grizzly bears in Canada includes parts of British Columbia, Alberta, Yukon, Northwest Territories, and Nunavut (Proctor et al. 2005). The grizzly bear population in Canada is estimated to number about 27,000–29,000 (Ross 2002).

[1] In the *Endangered Species Act, 1973*, a "threatened species" is defined as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

The grizzly bear habitat along the southern edge of the Canadian distribution of grizzly bears is becoming increasingly fragmented due to the combined impact of highways, human settlement, and human-caused grizzly bear mortality (Proctor, McLellan, and Strobeck 2002; Proctor 2003; Proctor and Paetkau 2004). The grizzly bear population in Alberta is on the southeastern periphery of the range of the species in Canada (McLellan 1998). The most serious threats to the grizzly bear population in Alberta are human-caused mortality, resulting from human access and activity, and habitat loss and fragmentation (ASRD and ACA 2010; Fish and Wildlife Division 2004; Kansas 2002).

According to historical estimates, the population of grizzly bears in Alberta at the time of European settlement probably numbered between a few thousand and six thousand (ASRD and ACA 2010; Herrero 1992). The government of Alberta estimated the size of the grizzly bear population in Alberta to be 790 in 1988 and 1,016–1,026 in 2000 (Kansas 2002). The total number of grizzly bears in Banff, Jasper, and Waterton Lakes National Parks was estimated to be 215 in 1988 and 175–185 in 2000 (Kansas 2002). Estimates for each national park suggest that the number of grizzly bears totals approximately 60 in BNP, 80–100 in Jasper National Park, and 15 in Waterton Lakes National Park (Bertch and Gibeau 2009; Kansas 2002; Herrero, Roulet, and Gibeau 2001; Mowat, Russell, and Strobeck 1998; Gibeau et al. 1996; Michael Gibeau, pers. comm.).

In 2010, Alberta Sustainable Resource Development (ASRD) and Alberta Conservation Association (ACA) published an updated report on the status of the grizzly bear in Alberta (ASRD and ACA 2010). According to the report, a total of 691 grizzly bears is estimated to occur in Alberta on lands under provincial jurisdiction and on federal lands in Waterton Lakes National Park and in parts of Jasper and Banff National Parks (ASRD and ACA 2010). The most recent population estimate of 691 grizzly bears in Alberta is much lower than the previous estimate of 1,016–1,026 grizzly bears from 2000 (ASRD and ACA 2010; Kansas 2002).

The 2010 report on the status of the grizzly bear in Alberta also revealed that human activities in grizzly bear habitat are resulting in unsustainable rates of grizzly bear mortality, especially due to the proliferation of road networks (ASRD and ACA 2010). According to the report, some populations of grizzly bears are declining in areas with a high level of habitat alteration. The assessment indicated that the population trends of grizzly bears are largely unknown, but that significant variation in trends is likely in different areas of Alberta. The report found that a large area of grizzly bear habitat south of Highway 16, including a part of the BBV, appears to have a declining population of grizzly bears, but that the area could maintain a sustainable population if the rate of human-caused mortality of grizzly bears decreased. The report emphasized the need to reduce grizzly bear mortality by minimizing motorized access to grizzly bear habitat and mitigating the impacts of human activities that lead to conflicts between humans and grizzly bears (ASRD and ACA 2010).

The grizzly bears in the BBV are highly affected by human-caused mortality, and the long-term viability of the population is uncertain (Garshelis, Gibeau, and Herrero 2005b; Gibeau 2005; Herrero, Roulet, and Gibeau 2001). Garshelis, Gibeau, and Herrero (2005a) found that the grizzly bears in the BRW had the slowest reproductive rate of any studied grizzly bear population, but that their rate of survival was high. Their research indicated that the grizzly bear population in the BRW was close to equilibrium during the study period from 1994 to 2002, but that the population was vulnerable to anthropogenic impacts and environmental stochasticity due to its small size (Garshelis, Gibeau, and Herrero 2005a). In 2003 and 2004, the mortality rates of both males and females increased, causing the survival rate to fall below the minimum level needed to sustain the population (Garshelis, Gibeau, and Herrero 2005b). According to the *Banff National Park of Canada State of the Park Report*, the condition of the grizzly bear population in BNP is poor and of significant concern (Parks Canada 2008).

The fundamental causes of the difficulty in maintaining grizzly bear populations in many regions in the world include the species characteristics of grizzly bears and the tendency of humans to kill grizzly bears and to occupy and use their habitat (Herrero 2005b). The life history traits of grizzly bears include slow rates of population growth and grizzly bear populations have low resilience[2] to disturbance, causing the persistence of the species in human-dominated landscapes to be uncertain (Herrero 2005b; Weaver, Paquet, and Ruggiero 1996). The species characteristics of grizzly bears and the behaviour of humans affect the probability of encounters between humans and grizzly bears and the rate of human-caused mortality of grizzly bears (Mattson et al. 1996). In Banff and Yoho National Parks, a large proportion of human-caused mortalities of grizzly bears occur in areas of high human activity and near roads and trails (Benn and Herrero 2002). Humans are the primary cause of grizzly bear mortality and the greatest threat to the survival of grizzly bears in the Rocky Mountains (ASRD and ACA 2010; Garshelis, Gibeau, and Herrero 2005a; McLellan 1998; Mattson et al. 1996). Due to extensive loss and fragmentation of grizzly bear habitat, small populations of grizzly bears are at risk of being extirpated from the Rocky Mountains (McLellan 1998).

[2] Resilience is the ability of systems to absorb disturbance and still maintain the same relationships between populations or state variables (Holling 1973).

2.3 Grizzly Bear Management

2.3.1 Jurisdiction over Grizzly Bear Management

In Canada, the jurisdiction over wildlife management is shared among the federal and provincial governments (Boyd 2003; Francis 2000). Under the *Constitution Act, 1867* ((U.K.), 30 & 31 Victoria, c. 3), the federal government has jurisdiction over wildlife on federal lands, such as in national parks, as well as over aquatic species and migratory birds. The provincial governments have jurisdiction over wildlife on provincial lands, with the exception of aquatic species and migratory birds (Boyd 2003; Francis 2000).

In the BBV, Parks Canada, a federal agency, is responsible for grizzly bear management in BNP, whereas ASRD, a provincial department, has jurisdiction over grizzly bear management on provincial lands (Parks Canada 2007; ASRD and ACA 2010). The federal and provincial governments and agencies responsible for grizzly bear management in the Central Rockies Ecosystem agree with the goal of maintaining a non-declining grizzly bear population (Parks Canada 2007).

2.3.2 Canada

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is an independent committee of experts that is responsible for assessing and designating which wildlife species are in some danger of disappearing from Canada (COSEWIC 2009a). COSEWIC reports the results of its assessment to the Canadian government, which may or may not decide to legally protect the species designated by COSEWIC under the federal *Species at Risk Act* (S.C. 2002, c. 29) (*SARA*) (COSEWIC 2009b). SARA applies to all aquatic species and migratory birds, but for other species, it only applies on federal lands, unless the federal government determines that provincial or territorial laws are failing to effectively protect species at risk or their critical habitat. Endangered species on provincial lands may also be protected under provincial legislation (Boyd 2003).

In 1991, COSEWIC decided that for the purposes of assessment it would treat grizzly bears in Canada as two distinct populations: 1) the prairie population in the prairie regions of Alberta, Saskatchewan, and Manitoba, and 2) the northwestern population in Yukon, Northwest Territories, Nunavut, British Columbia, and western Alberta. The prairie population of grizzly bears was designated as "extirpated"[3], and the northwestern population was designated as a species of "special concern"[4] (COSEWIC 2002). The designations were reviewed in 2002 and have remained unchanged since 1991 (COSEWIC 2009c). The prairie population of the grizzly bear is also listed as extirpated under *SARA*, but the northwestern population is not listed under the *Act* (Species at Risk Public Registry 2008). *SARA* mandates the development of recovery plans for threatened and endangered species and management plans for species of special concern.

2.3.3 Alberta

In Alberta, wildlife and endangered species are managed through the provincial *Wildlife Act* (R.S.A. 2000, c. W-10). In 1996, the federal, provincial, and territorial ministers responsible for wildlife committed to a national approach for the protection of species at risk by signing the *National Accord for the Protection of Species at Risk* (Species at Risk Public Registry n.d.). In the *Accord*, the different jurisdictions committed to establishing "legislation and programs that provide for effective protection of species at risk throughout Canada" (Species at Risk Public Registry 2009). Although the province of Alberta has not enacted legislation specific to species at risk, endangered species are managed under the provincial *Wildlife Act* (Boyd 2003).

In 1997, the Alberta Fish and Wildlife Division published *A Strategy for the Management of Species at Risk in Alberta*, which provided direction for the status evaluation and listing of species and recovery planning in Alberta. Building on the 1997 strategy, in 2008, the Fish and Wildlife Division released *Alberta's Strategy for the Management of Species at Risk 2009-2014*. The report describes the species at risk

[3] An "extirpated" species is defined by COSEWIC as "a wildlife species that no longer exists in the wild in Canada, but exits elsewhere" (COSEWIC 2010).

[4] A species of "special concern" is defined by COSEWIC as "a wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats" (COSEWIC 2010).

program of the province and provides guidance for the future (Fish and Wildlife Division 2008a).

In Alberta, the grizzly bear is designated as a big game species under the *Wildlife Act* and is considered "may be at risk"[5] (ASRD 2007, 2001). In 2002, Alberta's Endangered Species Conservation Committee (ESCC) recommended that the grizzly bear be listed as a "threatened"[6] species in Alberta, but the government of Alberta continues to designate it as a big game species (ASRD 2008; Fish and Wildlife Division 2004). The legal designation of the grizzly bear is currently under review in Alberta (Fish and Wildlife Division 2004).

In Alberta, grizzly bears are managed through the *Wildlife Act* by the Fish and Wildlife Division of ASRD (ASRD and ACA 2010). However, other pieces of provincial legislation may also have an impact on grizzly bear management in the BBV. In Alberta, the Ministry of Community Development is responsible for the management of provincial protected areas, including Kananaskis Country. Provincial protected areas are managed through the *Provincial Parks Act* (R.S.A. 2000, c. P-35) and the *Wilderness Areas, Ecological Reserves, Natural Areas, and Heritage Rangelands Act* (R.S.A. 2000, c. W-9). In the BBV, a number of provincial agencies are responsible for the management of various land uses and industries, including tourism, recreation, forestry, oil and gas extraction, mining, and stock grazing. Management in the area is further complicated by the diversity of other jurisdictions and land owners involved, including First Nations, towns and municipalities, commercial developers, and private land owners (Gibeau and Stevens 2005).

[5] The ranking "may be at risk" is defined by ASRD as "any species that 'may be at risk' of extinction or extirpation, and is therefore a candidate for detailed risk assessment" (ASRD 2007).

[6] A "threatened" species is defined by the ESCC as "a species likely to become endangered if limiting factors are not reversed" (Fish and Wildlife Division 2008b).

In 1990, the Alberta Fish and Wildlife Division published a *Management Plan for Grizzly Bears in Alberta*. The major goals of the management plan included 1) maintaining a viable grizzly bear population; 2) maximizing benefits to Albertans by optimizing aesthetic, recreational, and commercial uses; 3) minimizing property damage and other problems caused by grizzly bears; and 4) promoting and encouraging scientific and educational activities. The management objectives of the plan included increasing the number of grizzly bears in Alberta to 1,000 and reducing annual human-caused mortality of grizzly bears to 6% of the population (Alberta Forestry, Lands and Wildlife 1990).

In 2002, the government of Alberta assessed the status of the grizzly bear in Alberta (Kansas 2002). The ESCC reviewed the status report and recommended that the grizzly bear be listed as a "threatened" species in Alberta (ASRD 2008). The rationale for recommending threatened status for grizzly bears included the small size of the population, restricted dispersal from surrounding jurisdictions, and the expectation that current and future land use and human activity will result in declines in the population (Fish and Wildlife Division 2004). The recommendations of the ESCC included closing the grizzly bear hunt in Alberta and developing and implementing a recovery plan for grizzly bears (ASRD 2008).

In 2002, in response to the recommendations of the ESCC, the provincial government established the Alberta Grizzly Bear Recovery Team to develop a recovery plan and initiated a review of Alberta's grizzly bear hunt. In Alberta, grizzly bears were hunted on provincial lands outside of protected areas until 2006 when the provincial government suspended the sport hunt. According to the provincial government, the moratorium on grizzly bear hunting will stay in place until the results of a DNA-based research project become available to provide a reassessment of the status of the grizzly bear population in Alberta (ASRD 2008). However, according to treaty agreements, First Nations are allowed to hunt grizzly bears, except in national parks (Garshelis, Gibeau, and Herrero 2005a).

In 2008, ASRD published the *Alberta Grizzly Bear Recovery Plan 2008-2013*. The goal of the recovery plan is to achieve a sustainable population of grizzly bears over the long term. According to the recovery plan, recent estimates of mortality rates suggest that the grizzly bear population in Alberta may be in decline. Based on the amount of habitat in Alberta, the recovery team believes that the grizzly bear population could be increased. The recovery plan identified 11 key recommendations related to grizzly bear management in Alberta (Table 2.1). The recovery plan recognizes that "societal considerations are an integral part of grizzly bear recovery, not only because the root cause of grizzly bear mortality is human activity, but because people's views of grizzly bears will ultimately play a large role in determining the success of grizzly bear recovery" (Alberta Grizzly Bear Recovery Team 2008).

In 2010, ASRD and ACA published an updated report on the status of the grizzly bear in Alberta (ASRD and ACA 2010). Based on the report, the ESCC reiterated its recommendation to list grizzly bears as "threatened" in Alberta (Henton 2010). The ESCC has proposed the change in status since 2002 (ASRD 2008).

Table 2.1 Key Recommendations of the Alberta Grizzly Bear Recovery Plan
(Alberta Grizzly Bear Recovery Team 2008)

Key Recommendations

• Reduce human-caused mortality of grizzly bears by changing human use of the landscape
  • Control access development and use and other human activities in grizzly bear habitat
  • Temporarily suspend hunting while other recovery actions are implemented
• Determine the size of the grizzly bear population and continue data collection and monitoring
• Create priority areas for grizzly bears to protect high quality habitat and reduce risk from humans
• Reduce conflicts between humans and bears
• Develop an education program directed at the general public and target audiences
• Maintain the current distribution of grizzly bears and track and enhance habitat
• Establish regional grizzly bear recovery implementation teams to address regional issues
• Improve interjurisdictional coordination and grizzly bear data management
• Improve regulations and/or legislation to support recovery actions
• Acquire new funding to support additional government staff
• Involve land users and stakeholders in the implementation of the recovery plan

2.3.4 Banff National Park

In BNP, grizzly bears are managed by Parks Canada through the *Canada National Parks Act*, S.C. 2000, c. 32. According to section 4(1) of the Act, national parks are dedicated to the people of Canada for their benefit, education, and enjoyment, and the parks shall be maintained and used in a way that leaves them unimpaired for the enjoyment of future generations. In section 8(2), the *Act* also mandates that the maintenance or restoration of ecological integrity shall be the first priority in all aspects of the management of parks. In section 2(1) of the *Act*, ecological integrity, in the context of a national park, is defined as "a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes."

Section 11(1) of the *Canada National Parks Act* mandates the preparation of a park management plan that provides a long-term ecological vision and a strategy for achieving management goals. The current management plan for BNP was approved in 1997 and amended in 2004 and 2007. Parks Canada is currently preparing an updated management plan for BNP, and a draft of the plan has already undergone a public review. According to the current management plan, the strategic goal of Parks Canada's *Framework for the Conservation of Grizzly Bears* is (Parks Canada 2007):

> To maintain a non-declining and viable population of grizzly bears within a regional landscape through collaborative management of human-caused grizzly bear mortality, human land use and landscape conditions. Parks Canada's actions will contribute to the long-term persistence of a healthy population of grizzly bears.

The objectives related to grizzly bear management are (Parks Canada 2007):

- To minimize bear/human interactions that may lead to habituation of bears
- To prevent human-caused displacement of bears from prime food sources
- To minimize the risk of human-caused mortality and human injury inflicted by bears
- To demonstrate leadership and work collaboratively with managers of lands within the CRE, for the ongoing protection of grizzly bears and a functional ecosystem.

The management plan includes a goal of reducing the number of grizzly bears killed as a result of human activity to less than 1% of the population annually (Parks Canada 2007). A more specific mortality target has since been proposed by the IPS group of stakeholders and adopted by Parks Canada. The revised mortality target states that the annual known human-caused mortality of independent female grizzly bears shall not exceed 1.2% of the entire grizzly bear population, based on a 4-year running average. During the 7-year period from 2002 to 2008, the mortality of independent female grizzly bears exceeded the target in every year (Bertch and Gibeau 2009).

Various efforts have been carried out in order to reduce human-caused grizzly bear mortality in the BBV (Garshelis, Gibeau, and Herrero 2005a). Mitigation measures related to highway mortalities involved the construction of fencing and wildlife overpasses and underpasses, the spacing of opposing lanes of traffic, and the lowering of speed limits (Garshelis, Gibeau, and Herrero 2005a; Clevenger and Waltho 2000, 2005). Other actions included aversive conditioning, educational programs, garbage management, restrictions on human access, and the rejection or modification of proposed developments (Garshelis, Gibeau, and Herrero 2005a; Gibeau et al. 2002; Benn and Herrero 2002).

Hunting of grizzly bears is prohibited in national parks and in the Kananaskis Country area adjacent to BNP (Garshelis, Gibeau, and Herrero 2005a; Herrero 2005b). However, Parks Canada may destroy problem bears in national parks and First Nations are allowed to hunt grizzly bears outside of national parks under treaty agreements (Garshelis, Gibeau, and Herrero 2005a; Herrero 2005b).

2.3.5 Management Considerations

Wildlife management is often problematic due to the complexity of the systems involved, the diversity of human views and values, and the uncertainty about the future (Clark 1992). The problems surrounding wildlife conservation are largely political in nature and stem from the conflicting values of stakeholders (Clark 1992; Heinz and Youmans 1985). Constructive problem solving and decision making are crucial for developing effective management policies. Successful management of grizzly bears depends on the appropriate integration of biological, social, and economic knowledge and needs in decision-making processes (Rutherford and Clark 2005). Thus, information about the values and opinions of stakeholders is necessary to foster public support for management policies (Kellert et al. 1996).

Kellert (1994) has developed a typology of views about wildlife and applied it to bears. The typology includes the following attitudes: aesthetic, dominionistic, ecologistic, humanistic, moralistic, naturalistic, negativistic, scientistic, and utilitarian (Kellert 1994). Public views about grizzly bears appear to be generally positive in many regions. In the Rocky Mountains of the United States and Canada, perceptions of grizzly bears were found to range from positive to negative (Kellert et al. 1996). According to a study in west-central Alberta, public attitudes toward grizzly bears were positive among all participant groups (Strumpf-Allen, McFarlane, and Watson 2004). Similarly, attitudes toward grizzly bears were positive among the general public and hunters in Slovenia (Kaczensky, Blazic, and Gossow 2004) and among the general public in Latvia (Andersone and Ozolins 2004). Also, views about bears were highly ecologistic among recreationists in Montana (McCool and Braithwaite 1989). However, negative attitudes toward bears also exist among some groups, such as among ranchers, farmers, and rural populations (Kaczensky, Blazic, and Gossow 2004; Kellert et al. 1996; Kellert 1994). Studies have also revealed diverse and contrasting perspectives on the management of large carnivores (Mattson et al. 2006) and grizzly bears (Chamberlain 2006) in the Rocky Mountains. Furthermore, an evaluation of education programs on bear management in the Kootenay region of British Columbia found that well designed and properly implemented education programs have the potential to influence overall attitudes in communities (Newell 2009).

2.4 Policy Sciences Framework

The policy sciences provide the theoretical framework for this research. Policy can be defined as a strategy for achieving goals (Brewer and deLeon 1983). The fundamentals of the policy sciences were developed by Harold D. Lasswell (1971, 1970), and the discipline has since been the subject of much discussion (Clark 2002, 1992; deLeon 1999, 1994, 1988, 1981; Lasswell and McDougal 1992; Brunner 1991, 1984, 1982; Ascher 1986; Torgenson 1986; Brewer and deLeon 1983; Brewer 1974).

The policy sciences are interested in policy and policy making and aim to improve knowledge of and in the policy process (Lasswell 1971). In the policy sciences analytical framework, the policy process includes seven decision functions: intelligence, promotion, prescription, invocation, application, appraisal, and termination (Clark 2002; Lasswell 1971). The policy sciences framework also provides tools for clarifying the policy analyst's standpoint, orienting to problems, and mapping the social process (Clark 2002).

The policy sciences provide a useful approach for dealing with complex problems (Clark 1992). The problem-solving approach of the policy sciences involves contextual analysis, problem orientation, and synthesis of technique (Lasswell 1971). Contextual analysis involves a broad and in-depth exploration of all the factors related to the problem (Clark 1992). Problem orientation focuses on defining and solving problems through five intellectual tasks: 1) goal clarification, 2) trend description, 3) analysis of conditions, 4) projection of developments, and 5) invention, evaluation, and selection of alternatives (Lasswell 1971). Synthesis of technique involves employing multiple methods to gain a comprehensive understanding of both the content and the procedural aspects of the problem (Clark 1992).

The policy sciences provide a framework for examining environmental perspectives and decision-making processes. In order to solve problems in natural resource management, managers need both substantive knowledge of the resources in question and process knowledge about the decision and policy processes of the management structure. The problem-solving framework of the policy sciences can help wildlife managers to improve the effectiveness of management programs and policies and to understand and participate meaningfully in the policy-making process (Clark 1992).

2.5 Standpoint Clarification

The stakeholders and professionals involved in the conservation and management of wildlife may hold various standpoints about the task and their role in the process. For example, wildlife management may be perceived as a purely biological-technical task or a multifaceted task with both biological-technical and social dimensions (Clark and Wallace 2002). The standpoint of an individual consists of value orientations and biases, which stem from various factors, such as personality, education, experiences, epistemological assumptions, organizational affiliations, and professional identifications (Clark and Willard 2000). Standpoint clarification among the involved parties can facilitate successful collaboration and management (Clark and Wallace 2002; Clark and Willard 2000).

Here, I will briefly clarify my background and personal standpoint as it relates to grizzly bear management in the BBV. My lifelong interest in the natural world led me to study biology. After completing an undergraduate degree in biology, I realized that I wanted to gain a more interdisciplinary and integrative understanding of the environment and the societal dimensions of resource management. As a result, I decided to pursue a graduate degree in resource and environmental management. During my studies, I have gained a better understanding of the complexities involved in environmental management and become more aware of the importance of the social side of conservation and management. This research project is part of the requirements for my graduate degree.

During this study, my roles related to grizzly bear management in the BBV included student and researcher, and I acted as a collector, spectator, interviewer, and participant observer. As a result of exploring the diversity of problem orientations of the stakeholders in the BBV, I learned a great deal about grizzly bear management and about the various approaches to problem solving. As an individual, my personal experiences and biases inevitably affect my worldview. However, in my role as a researcher in this study, I have strived to be as objective and unbiased as possible in the collection, analysis, and interpretation of the data. My main goal in this study has been to describe the various viewpoints about grizzly bear management in the BBV, rather than to prescribe or promote any particular problem definitions or solutions. However, I am

personally very concerned about the sustainability of the grizzly bear population in the BBV. I hope that this research will contribute to improving grizzly bear management and public participation in decision making in the BBV and, ultimately, to improving the health of the grizzly bear population in the region. In my view, collaboration and stakeholder participation in decision-making processes are essential for achieving effective and lasting solutions for grizzly bear management in the BBV.

2.6 Previous Research

This research builds on a previous study, which used Q methodology to explore stakeholder perspectives on grizzly bear management in the BBV in the summer of 2004. In this report, I refer to this previous Q study by Chamberlain (2006) as the "before Q study". The before Q study involved 29 stakeholders with diverse interests and views, and the Q sorts were conducted in August 2004. The before Q study identified four factors related to the problems of grizzly bear management in the BBV and three factors related to the solutions to those problems (Chamberlain 2006) (Table 2.2).

Table 2.2 Problems and Solutions Factors of the Before Q Study (Chamberlain 2006)

Q Sort	Factor ID	Factor Name
Problems	PB1	Deficient Directives
	PB2	Exaggerated Problems
	PB3	Problematic Institutions
	PB4	Politicized Management
Solutions	SB1	Bear Conservation Advocates
	SB2	Process Reformers
	SB3	Habitat Modifiers

The before Q study provided the context for three training workshops on interdisciplinary problem solving (IPS) for stakeholders in the BBV, which took place in May 2005, October 2005, and March 2006 (Rutherford et al. 2009; Chamberlain 2006). The IPS training workshops followed the policy sciences framework for problem solving by focusing on standpoint clarification, problem orientation, social process mapping, and decision process mapping. The number of stakeholders who attended the IPS training workshops ranged from 18 to 22, depending on the workshop. Of the participants involved in the IPS training workshops, 13 had taken part in the before Q study. The workshops aimed to involve stakeholders in grizzly bear management and to encourage participatory decision making in the BBV (Rutherford et al. 2009; Chamberlain 2006).

After the IPS training workshops, an IPS group was established in order to discuss and influence grizzly bear management in the BBV on an ongoing basis. The IPS group started meeting in June 2006 and continued to meet regularly until March 2009. In May 2008, the IPS group had 21 members, of which 11 had taken part in the before Q study.

2.7 Background Research

2.7.1 Overview

In order to explore factors that may have affected the views of the participants between the before and after Q studies, I conducted background research on the context of grizzly bear management in the BBV. The Q sort interviews for the before and after Q studies took place in August 2004 and May and June 2008, respectively. Therefore, in conducting the background research, I considered factors that occurred between August 2004 and June 2008. If month-specific data were not available, I included the yearly data from 2004 to 2008. I also provided some additional information that was relevant to the context of the topics. The factors that I explored included 1) human fatalities, maulings, and encounters with grizzly bears, 2) grizzly bear mortalities, 3) scientific research related to grizzly bears, and 4) changes in grizzly bear management.

2.7.2 Human Fatalities, Maulings, and Encounters with Grizzly Bears

2.7.2.1 Results

Mountain National Parks

The Mountain National Parks include Banff, Jasper, Kootenay, Yoho, Waterton Lakes, Mount Revelstoke, and Glacier National Parks. There were no human fatalities caused by grizzly bears in the Mountain National Parks between 2004 and 2008. Between 2004 and 2008, there was a total of 67 threatening encounters between humans and grizzly bears in the Mountain National Parks, of which 49% occurred in BNP (Table 2.3). Of the 67 encounters, 7% were contact encounters, 70% were no contact charge encounters, and 22% were threat encounters (see Table 2.3 for the definitions of these categories). The five contact encounters resulted in injuries to four people (Bertch and Gibeau 2009).

In the long-term context, there were 334 threatening encounters between humans and grizzly bears in the Mountain National Parks between 1990 and 2008. Of the 334 encounters, 5% were contact encounters, 62% were no contact charge encounters, and 33% were threat encounters. The 17 contact encounters led to one human fatality and 20

injured people. The fatality occurred in Jasper National Park in 1992 (Bertch and Gibeau 2009).

Table 2.3 Encounters between Humans and Grizzly Bears in the Mountain National Parks, 2004–2008

Only threatening encounters are included.
(Bertch and Gibeau 2009)

Encounter		BNP	All Mountain National Parks
Type	**Definition**		
Contact Encounter	An interaction between a bear and a human wherein the bear purposely makes physical contact	4	5
No Contact Charge Encounter	An interaction between a bear and a human wherein the bear charges toward the human but stops short of the human or veers away before making physical contact	19	47
Threat Encounter	An interaction between a bear and a human wherein the bear either growls, huffs, slaps, paws, pops its jaws, or shows other signs of aggressive intent	10	15
Total		**33**	**67**

Alberta

Between August 2004 and June 2008, there were two human fatalities caused by grizzly bears on provincial lands in Alberta (Fish and Wildlife Division 2010). The first fatality occurred on June 5, 2005, when a woman was killed by a grizzly bear in Canmore (Remington 2005). She was the first person killed by a bear in Alberta since 1998, and the bear that killed her was a 4-year-old male identified as No. 99 (CTV News 2005; Remington 2005). The second fatality occurred on November 25, 2007, when a man was killed by a grizzly bear near Sundre, more than 175 km northwest of Calgary (CBC News 2007; Fish and Wildlife Division 2010).

Between August 2004 and June 2008, there were altogether 331 recorded encounters between humans and grizzly bears on provincial lands in Alberta (Table 2.4). Of the 331 encounters, 0.6% involved human fatalities, 2% were maulings, 45% were

encounters where bears caused nuisances, and 52% were other types of encounters, including incidents that were threatening but did not result in human injuries (Fish and Wildlife Division 2010).

In the long-term context, there were 641 recorded encounters between humans and grizzly bears on provincial lands in Alberta between 1999 and June 2008. Of the 641 encounters, 0.3% involved human fatalities, 2% were maulings, 37% were encounters where bears caused nuisances, and 60% were other types of encounters (Fish and Wildlife Division 2010).

Table 2.4 Encounters between Humans and Grizzly Bears on Provincial Lands in Alberta, August 2004 – June 2008

(Fish and Wildlife Division 2010)

Type of Encounter	No. of Encounters
Fatality	2
Mauling	8
Nuisance	148
Other	173
Total	**331**

2.7.2.2 Discussion

The two human fatalities caused by grizzly bears in Alberta between August 2004 and June 2008 were very high-profile and rare incidents. The first incident was particularly relevant because it occurred in Canmore within the BBV. In comparison to the number of threatening encounters between humans and grizzly bears in Alberta, human fatalities and maulings are very rare (Bertch and Gibeau 2009; Fish and Wildlife Division 2010). Furthermore, most encounters between humans and grizzly bears are non-threat encounters where the bears do not threaten the humans.

2.7.3 Grizzly Bear Mortalities

2.7.3.1 Results

Mountain National Parks

Between August 2004 and June 2008, 18 grizzly bears were killed in the Mountain National Parks, of which 72% were killed in BNP (Table 2.5). Of the 18 grizzly bear mortalities, 67% were human-caused. The leading causes of mortality were the railway (33%), the highways (22%), and natural (22%) (Bertch and Gibeau 2009).

In the long-term context, there were 63 grizzly bear mortalities in the Mountain National Parks between 1990 and 2008, of which 60% occurred in BNP. Of the 63 grizzly bear mortalities, 76% were human-caused. The leading causes of mortality were the railway (24%) and the highways (22%) (Bertch and Gibeau 2009).

Table 2.5 Grizzly Bear Mortalities in the Mountain National Parks, August 2004 – June 2008

(Bertch and Gibeau 2009)

Mortality Category			BNP	All Mountain National Parks
Human-caused	Accidental	Highway	2	4
		Railway	5	6
	Government Action	Garbage	0	1
		Safety	1	1
Natural			4	4
Unknown			1	2
Total			**13**	**18**

Alberta

Between 2004 and 2008, a total of 80 grizzly bears were killed on provincial lands in Alberta (Table 2.6). Of the 80 mortalities, 93% were human-caused. The leading causes of mortality were self defense (24%), legal hunting (20%), illegal killing (16%), and the destruction of problem bears (16%) (ASRD 2009).

In the long-term context, there were 456 grizzly bear mortalities on provincial lands in Alberta between 1990 and 2008. Of the 456 grizzly bear mortalities, 92% were human-caused. The leading causes of mortality were legal hunting (48%), illegal killing (16%), self defense (12%), and killing of problem bears (7%) (Bertch and Gibeau 2009).

Table 2.6 Grizzly Bear Mortalities on Provincial Lands in Alberta, 2004–2008 (ASRD 2009)

Mortality Category		No. of Mortalities
Human-caused	Legal Hunting	16
	First Nations Subsistence Harvest	3
	Illegal Killing	13
	Mistaken for Black Bear	2
	Self Defence	19
	Accidental	5
	Research-related	3
	Destruction of Problem Bears	13
Predation		2
Unknown		4
Total		**80**

2.7.3.2 Discussion

The majority of grizzly bear mortalities during the periods studied were human-caused, both in the Mountain National Parks and on provincial lands in Alberta. In the Mountain National Parks, the leading cause of grizzly bear mortality was transportation, which accounted for 55% of grizzly bear mortalities in 2004-2008 and for 46% in 1990-2008. On provincial lands in Alberta, the leading causes of mortality were legal hunting, illegal killing, self defense, and the destruction of problem bears, which accounted for 76% of grizzly bear mortalities in 2004-2008 and for 83% in 1990-2008 (Bertch and Gibeau 2009). Since 2006, the sport hunt of grizzly bears has been suspended in Alberta. However, the illegal killing of grizzly bears has continued and First Nations are still entitled to hunt grizzly bears outside of the national parks (ASRD 2009).

2.7.4 Research Related to Grizzly Bears

2.7.4.1 Results

The Eastern Slopes Grizzly Bear Project

The Eastern Slopes Grizzly Bear Project (ESGBP) was an 11-year-long research project that was conducted by an independent research group based at the University of Calgary from 1994 to 2005 (Herrero 2005a). The goals of the project were to improve the scientific understanding of grizzly bears and to inform the management, planning, and policy decisions that affect grizzly bears. The research focused on the biology, ecology, and demography of grizzly bears in the Central Rockies Ecosystem (CRE) and on the effects of human activities on grizzly bears (Herrero 2005b). The final report of the ESGBP was published in 2005, and it included both research that had already been published elsewhere and previously unpublished results (Herrero 2005a). Published studies in the ESGBP final report included Garshelis, Gibeau, and Herrero (2005a) and Nielsen, Herrero, et al. (2004).

Population Estimates for Grizzly Bears in Alberta

ASRD conducted DNA-based studies from 2004 to 2008 in order to assess the size of the grizzly bear population in Alberta (Alberta Grizzly Bear Inventory Team 2009, 2007; Grizzly Bear Inventory Team 2008; Boulanger, Stenhouse, MacHutchon, et al. 2005; Boulanger, Stenhouse, Proctor, et al. 2005) (Table 2.7). The research provided an estimate of 582 grizzly bears, with a 95% confidence interval of 498–732, in the study area from south of Grand Prairie to the United States border, including parts of Jasper and Banff National Parks and all of Waterton Lakes National Park (ASRD and ACA 2010). The first results of the research were released in 2005 for the Yellowhead study area (Boulanger, Stenhouse, Proctor, et al. 2005). Parts of the BBV fall under the Clearwater and Livingstone study areas, and the population estimates for those areas were published in 2005 and 2007, respectively (Alberta Grizzly Bear Inventory Team 2007; Boulanger, Stenhouse, MacHutchon, et al. 2005). However, the results for the Castle and Grande Cache study areas were published after June 2008 (Alberta Grizzly Bear Inventory Team 2009; Grizzly Bear Inventory Team 2008).

Table 2.7 Population Estimates for Grizzly Bears in Alberta from DNA-based Studies

The studies published between August 2004 and June 2008 are identified with grey shading.
(ASRD and ACA 2010)

Study Area	Year of Sampling	Estimated Number of Grizzly Bears	95% Confidence Interval	Density (Number of grizzly bears per 1,000 km^2)
Castle	2007	51.2	34–87	18.1
Livingstone	2006	89.9	75–116	11.8
Clearwater	2005	45.4	41–52	5.2
Yellowhead	2004	42.0	36–55	4.8
Grande Cache	2008	353.3	288–516	18.1
Total		**581.8**		

Grizzly Bear Mortalities and Encounters in the Mountain National Parks

In May 2008, Parks Canada produced a report about grizzly bear mortalities and encounters between humans and grizzly bears in the Mountain National Parks. The report is a summary of a multi-year project and includes data from 1990 to 2007. The report revealed that 75% of known grizzly bear mortalities in the Mountain National Parks in 1990–2007 were caused by humans and that the highest individual source of human-caused mortality of grizzly bears was the railway, which accounted for 33% of the human-caused mortalities (Bertch and Gibeau 2008).

Banff National Park of Canada State of the Park Report

In May 2008, Parks Canada published the second *Banff National Park of Canada State of the Park Report*, which was promoted as an objective and evidence-based assessment of the condition of Banff National Park. The report found that the overall condition of ecological integrity indicators in Banff National Park was fair with varying trends. The assessment revealed that the condition of the grizzly bear population was poor and that the stability of the population was one of the individual measures of most concern. Specifically, grizzly bear mortality was rated as poor, with a trend toward

decreasing population viability, and grizzly bear habitat security was rated as fair and stable (Parks Canada 2008).

Grizzly Bear Demography and Population Persistence

Research on the demography and the persistence of grizzly bear populations suggests that small populations of grizzly bears are vulnerable and face an uncertain future. Garshelis, Gibeau and Herrero (2005a) studied grizzly bear demographics in the BRW and found that the grizzly bear population had the lowest reproductive rate yet recorded for the species but that the survival rate of the population was high. Brodie and Gibeau (2007) used demographic and monitoring-based estimators to assess population trends of grizzly bears in the Bow River Watershed (BRW) and concluded that the long-term persistence of the grizzly bear population may be dependent on slight changes in the rate of population growth and on environmental stochasticity. Carroll et al. (2004) evaluated the ability of existing park systems in the Rocky Mountains of Canada and the United States to sustain populations of mammalian carnivores and found that the relatively small combined area of parks may fall below the threshold for species persistence if the connectivity among parks is lost.

Proctor et al. (2005) used genetic analysis to examine demographic linkages among grizzly bear populations along the border between Canada and the United States and found that the populations are vulnerable due to fragmentation by a highway and human development and the small size of populations. Proctor et al. (2004) analyzed management options for grizzly bear conservation in the trans-border area of Canada and the United States and found that population augmentation, enhanced population interchange, and mortality reduction through management actions could be used to increase the growth rates and reduce the extinction probabilities of small populations. Johnson, Boyce, Schwartz, et al. (2004) modelled the survival of grizzly bears in the Greater Yellowstone region and found that mortality rates were highest for bears that were subjected to repeated management actions and for bears that inhabited areas with high road densities outside Yellowstone National Park.

Grizzly Bear Habitat

Studies on grizzly bear habitat and resource selection provide strong evidence of the negative effect of human development and activities on grizzly bears. Nielsen, Herrero, et al. (2004) modelled the spatial distribution of human-caused grizzly bear mortalities in the CRE and found that mortality risk was positively associated with human access, water, and edge features and negatively associated with terrain ruggedness and greenness indices. Nielsen, Stenhouse, and Boyce (2006) combined occurrence and mortality risk models into a habitat framework for grizzly bears in Alberta and discovered that sink habitats were associated with forest edges with industrial activities and that primary or safe habitats were associated with protected areas at higher elevations. Mowat et al. (2005) estimated the density of grizzly bears in the interior mountains of North America and found that grizzly bear density was lowest in the plateaus of boreal and sub-boreal areas, moderate in the east slopes of the Rocky Mountains, and highest in the west slopes of the Rocky Mountains. Gillies et al. (2006) reviewed random-effects models and their application to resource selection modelling with a case study of grizzly bears in the foothills of the Canadian Rocky Mountains and suggested that including random effects in resource selection models can assist in interpretation and address difficult assumptions.

Ciarniello, Boyce, Heard, et al. (2007) used resource selection functions to estimate grizzly bear use in areas with high and low human influence in British Columbia and discovered that the density of grizzly bears on a plateau with a high level of human activity was less than 25% of the density in the mountains that were largely inaccessible to humans. Ciarniello, Boyce, Seip, et al. (2007) applied resource selection functions at varying scales of observation in British Columbia and showed that habitat selection of grizzly bears is scale dependent. Nams, Mowat and Panian (2006) analyzed grizzly bear habitat selection at different spatial scales in British Columbia and suggested comparing hierarchical to non-hierarchical selection in order to determine the spatial scale for conservation guidelines. Johnson et al. (2005) developed resource selection models for wildlife in the Canadian Arctic and found that grizzly bears and wolves demonstrated the strongest response to disturbance and a corresponding reduction in habitat effectiveness.

Suring et al. (2007) studied the landscape use of grizzly bears in Alaska and showed that grizzly bears were positively associated with low densities of human developments and roads and with riparian areas that were close to cover. Rode, Farley, and Robbins (2006) examined resource use by grizzly bears in Alaska and found that both sexual dimorphism and differing reproductive strategies led to sexual segregation in habitat use by grizzly bears. Graves et al. (2007) identified functional corridors with movement characteristics of grizzly bears in Alaska and discovered that the time between bear locations and scale of analysis influenced the number and size of corridors identified. Nellemann et al. (2007) analyzed the habitat use of brown bears in Sweden and found that bear use increased substantially with increasing distance to towns and resorts for comparable habitat and terrain types.

Effects of Transportation on Grizzly Bears

The research involving transportation suggests that grizzly bears avoid highways and prefer overpasses out of various highway crossing structures. Clevenger and Waltho (2005) evaluated the performance of highway crossing structures in BNP and found that grizzly bears favoured overpasses over underpasses as they preferred to use crossing structures that were high, wide, and short in length. In BNP, a ten-year monitoring study of wildlife crossing structures along the Trans-Canada Highway recorded 86,123 wildlife crossings from 1996 to 2006, of which 13,222 were by carnivores. There are no wildlife crossing structures along the railway tracks, and the rate of wildlife mortality on the railway continues to be unacceptably high (Parks Canada 2008).

Waller and Servheen (2005) studied the effects of transportation infrastructure on grizzly bears in northwestern Montana and discovered that the crossing frequency of grizzly bears was negatively and exponentially related to highway traffic volume and that grizzly bears strongly avoided areas within 500 metres of a highway. Graves, Farley, and Servheen (2006) analyzed radiotelemetry data to determine the frequency and distribution of highway crossing by grizzly bears in Alaska and showed that grizzly bears moved rapidly during highway crossings and were more likely to cross the highway during nighttime than daytime.

Effects of Industrial Activities on Grizzly Bears

Studies on the effects of industrial activities indicate that grizzly bears are negatively affected by oil and gas exploration and exhibit varying responses to clearcuts. Linke et al. (2005) assessed the effects of seismic cutlines from oil and gas exploration on grizzly bears in the foothills of the Rocky Mountains of Alberta and found that the secondary effects of cutlines on landscape structure negatively affected the landscape use of grizzly bears. Nielsen, Boyce, and Stenhouse (2004) examined the use of clearcuts by grizzly bears in west-central Alberta and discovered that the use of clearcuts by grizzly bears varied with season and also depended on landscape metrics, site preparation, and terrain. Nielsen, Munro, et al. (2004) assessed the occurrence and fruit production of grizzly bear foods in clearcuts in west-central Alberta and found that clearcuts provided diverse food resources for grizzly bears.

Behaviour of Grizzly Bears and Conflicts between Humans and Grizzly Bears

Research on the behaviour of grizzly bears discovered that human activity could have a negative impact on the social interactions of grizzly bears and that agricultural conflicts between humans and grizzly bears are concentrated in hotspots. Stenhouse et al. (2005) used telemetry data to examine grizzly bear associations along the eastern slopes of Alberta and suggested that human activity could disrupt the social behaviour and, ultimately, the reproduction of grizzly bears. Wilson et al. (2005, 2006) examined conflicts between humans and grizzly bears on agricultural lands in Montana and found that the majority of conflicts occurred in a small portion of the study area where concentrations of attractants overlapped with bear habitat.

Stakeholder Views Related to Grizzly Bears

Studies on stakeholder views revealed positive public attitudes toward bears and several distinct perspectives on grizzly bear management and large carnivore conservation. Chamberlain (2006) used Q methodology to examine views of stakeholders concerning grizzly bear management in the BBV and discovered four distinct views about the problems with grizzly bear management and three views about possible solutions. Mattson et al. (2006) also employed Q methodology to explore perspectives on large carnivore conservation in the Rocky Mountains of the northern United States and

identified four general perspectives for both the problems and solutions related to large carnivore conservation. Kaczensky, Blazic, and Gossow (2004) examined public attitudes toward brown bears in Slovenia and discovered very positive attitudes toward bears both among locals and hunters.

Other Research Related to Grizzly Bears

Other research related to grizzly bears involved resource selection (Moe et al. 2007; Johnson, Boyce, Mulders, et al. 2004), home ranges (Katajisto and Moilanen 2006), shelter areas (Garcia et al. 2007), risk avoidance (Nevin and Gilbert 2005), diet and foraging activity (Mowat and Heard 2006; Munro et al. 2006; Pengelly and Hamer 2006; Robbins, Schwartz, and Felicetti 2004), denning behaviour (Ciarniello et al. 2005), interspecific competition (Apps, McLellan, and Woods 2006), predator-prey relationships (Berger 2007; Zager and Beecham 2006), females with cubs (Ordiz et al. 2007), sexually selected infanticide (McLellan 2005), courtship (Fernandez-Gil, Naves, and Delibes 2006), sampling methods (Garshelis 2006), and Global Positioning System collars (Graves and Waller 2006; Heard, Ciarniello, and Seip 2006; Gau et al. 2004).

In addition to the research published between August 2004 and June 2008, an issue of the journal *Ursus* that was published in April 2004 contained many articles that may be relevant to grizzly bear management in the BBV (Austin 2004; Gunther et al. 2004; Mace 2004; Mattson and Merrill 2004; Miller and France 2004; Morgan et al. 2004; Mueller, Herrero, and Gibeau 2004; Primm and Wilson 2004; Singleton, Gaines, and Lehmkuhl 2004; Summerfield, Johnson, and Roberts 2004; Wakkinen and Kasworm 2004).

2.7.4.2 Discussion

A substantial amount of research relevant for grizzly bear management in the BBV was published between the before and after Q studies. Overall, the research emphasized the negative impact of human activities and developments on grizzly bears and the vulnerability of small grizzly bear populations.

The final report of the ESGBP (Herrero 2005a) was probably one of the most important pieces of research related to grizzly bear management in the BBV due to the abundant and comprehensive information it provided about the local grizzly bear population . Similarly, the population estimates for grizzly bears in Alberta provided critical information about the status of the provincial grizzly bear population and were highly relevant for the management of grizzly bears in the BBV. However, the overall population estimate for Alberta was unknown at the time of the after Q study because the results for only three out of the five study areas were published between the before and after Q studies (Alberta Grizzly Bear Inventory Team 2007; Boulanger, Stenhouse, MacHutchon, et al. 2005; Boulanger, Stenhouse, Proctor, et al. 2005). Also, the report about grizzly bear mortalities and encounters provided important long-term data on the grizzly bear populations in the Mountain National Parks (Bertch and Gibeau 2008). However, the participants may not have been familiar with the report at the time of the after Q sort interviews as it was published in the same month that the interviews for the after Q study began.

In addition, the ability to access research may differ among the participants as much of the research in peer-reviewed journals is only available to individuals with subscriptions or access through universities. Nevertheless, involvement in the IPS process provided many of the participants with information about relevant research. Also, the level of interest in research and the degree of expertise in the subject matter may vary substantially among the participants. Therefore, the effect of research on views may be more substantial for some participants than others.

Furthermore, evaluating the effect of research over a specific time interval is complicated by the fact that some research may have been available to participants before formal publication, whereas some research may have been published but not available or familiar to participants. For example, it is possible that research published prior to the Q sort interviews could have affected the views of the participants between the before and after Q studies if the participants became familiar with the research only after the before Q sorts were conducted. Therefore, the research review included the highly relevant issue of the journal *Ursus* from April 2004 even though it was published a few months before the Q sort interviews for the before Q study took place.

2.7.5 Changes in Grizzly Bear Management

2.7.5.1 Results

The current management plan for BNP was approved in 1997 and amended in May 2004 and July 2007. In 2004, a human use management strategy was added to the management plan. In 2007, the management plan was amended to include an environmental assessment of the amendment and a section under the human use management strategy about the lands adjacent to the town of Banff. The goals with respect to the lands adjacent to the town of Banff included 1) maintaining and restoring ecological integrity in the montane ecoregion and 2) making the area a showcase for meaningful experiences, appreciation, and understanding for all visitors (Parks Canada 2007).

In addition, the Mountain National Parks experienced important changes in management positions when the superintendents of BNP, Jasper National Park, and the Lake Louise, Yoho, and Kootenay Field Unit all changed between the fall of 2007 and the spring of 2008.

In March 2006, the Government of Alberta implemented a three-year moratorium on the grizzly bear hunt in response to concerns about the status of the grizzly bear population in Alberta (D'Aliesio 2006; ASRD 2010). In April 2008, the province extended the suspension of the hunt to include the 2009 hunting season in order to obtain the results of the DNA-based population estimate before reassessing the status of the population (Lillebuen 2008; ASRD 2008).

In February 2005, the Alberta Grizzly Bear Recovery Team submitted the first comprehensive draft of the grizzly bear recovery plan. The draft underwent an internal review by ASRD and an external peer review, after which it was revised. After final reviews and edits by ASRD, the final *Alberta Grizzly Bear Recovery Plan 2008-2013* was published in April 2008. The goal of the recovery plan is to achieve a self-sustaining population of grizzly bears over the long term, and the plan includes 11 key recommendations (Table 2.1). ASRD does not currently endorse three aspects of the recovery plan, which concern the rate of natural mortality, the compensation for livestock

depredation, and the establishment of multi-stakeholder regional implementation teams (ASRD 2008).

The three training workshops about the IPS process were held in May 2005, October 2005, and March 2006 (Rutherford et al. 2009; Chamberlain 2006). The subsequent meetings of the IPS group began in June 2006, and the group met, on average, every two to three months. Of the 20 participants in the after Q study, 19 were involved in the IPS group. There were 11 IPS group meetings between June 2006 and June 2008. During that time, the IPS group reached agreement on three issues, which included 1) a target for grizzly bear mortality in BNP, 2) guidelines for trail use in the Bryant Creek area, and 3) a requirement concerning the minimum size of hiking groups in specific areas of the park where encounters with grizzly bears are likely. These decisions of the IPS group were subsequently adopted by Parks Canada. The IPS group also discussed habitat security for grizzly bears but did not reach agreement on the issue. Discussions about the management of the Bow Valley Parkway were ongoing in June 2008.

The twinning of the Trans-Canada Highway in BNP has occurred in stages since 1981 and is still ongoing (Parks Canada 2010). Construction on the 9-km Phase IIIB-1 from Lake Louise to Moraine Creek began in 2004 and was completed in 2009 (Parks Canada 2010, 2009). In addition to twinning the Trans-Canada Highway from two to four lanes, the Phase IIIB-1 also included fencing the highway and constructing two wildlife overpasses and six wildlife underpasses. The Trans-Canada Highway in BNP currently has a total of 31 wildlife crossing structures, including four overpasses and 27 underpasses. In addition, seven crossing structures are planned for Phase IIIB-2 of the twinning project, which is currently underway. The Trans-Canada Highway twinning project in BNP is the first large-scale complex of highway mitigation measures for wildlife in the world (Clevenger, Ford, and Sawaya 2009). The genetic connectivity of the grizzly bear population is currently being assessed through DNA-based research at the crossing structures (Parks Canada 2008).

2.7.5.2 Discussion

In Alberta, the implementation of the moratorium on grizzly bear hunting in 2006 and the publication of the grizzly bear recovery plan in 2008 were high-profile events that emphasized the vulnerable status of the provincial grizzly bear population.

In the BBV, the initiation of the IPS group was a major change in the approach to grizzly bear management and provided evidence that Parks Canada was committed to increasing stakeholder involvement in decision making and problem solving. The agreements reached by the IPS group indicated that a diverse group of stakeholders can work together and reach joint and creative decisions to complex problems. However, a failure to reach agreement about habitat security for grizzly bears showed that sometimes collaborative processes can get gridlocked when faced with challenging and controversial issues. An important event also occurred in the management of Parks Canada when the superintendent of BNP changed in 2008. In addition, the construction of new wildlife crossing structures along the Trans-Canada Highway demonstrated considerable efforts to mitigate the negative impacts of the highway on the grizzly bear population.

CHAPTER 3: AFTER Q STUDY

3.1 Introduction

The goal of the after Q study was to explore stakeholder views on grizzly bear management in the Banff-Bow Valley (BBV) in the summer of 2008. The stakeholder perspectives in the summer of 2008 represent the views after the three IPS training workshops and two years of IPS group meetings had taken place. The following sections provide the methods, results, and discussion of the after Q study.

3.2 Methods

3.2.1 Methods for Studying Views

Public perceptions and attitudes are often studied with quantitative R-based methods, such as questionnaires and surveys (Addams 2000). Participants are commonly asked to respond to questions or statements structured in accordance with predetermined measures, such as in Likert, Guttman, or Thurstone scales. The scales are typically used to describe views according to bipolar dimensions defined by the researcher (Fishbein and Ajzen 1975). The advantages of quantitative methods include statistical rigour and easy replication and comparison. In addition, R-based methods are useful for obtaining data from large populations and have the ability to estimate the prevalence of views within a population. However, these methods are influenced by the subjective assumptions of the researcher in structuring and analyzing the results, which may prevent the emergence of alternative perspectives (Addams 2000; Brunner 1982; Brown 1980). Therefore, R-based methods may not result in an accurate representation of the subjective views of participants or the extent of variability in perspectives that is actually present (McKeown and Thomas 1988; Brunner 1982).

Qualitative methods, such as focus groups and interviews, offer other means of studying perspectives. These methods allow detailed and in-depth investigations of the

views of the participants and are particularly useful for exploratory research. However, the potential disadvantages of qualitative techniques include weaknesses in systematic data collection as well as difficulties in statistical analysis and comparison (Babbie and Benaquisto 2002; Addams 2000; Keeney, von Winterfeldt, and Eppel 1990). Intensive qualitative methods are also not practical in studies with a large number of participants.

Q methodology provides an alternative approach for exploring views by combining qualitative and quantitative methods (Addams 2000). In studies applying Q methodology, participants map their viewpoints by ranking statements about a particular issue (or by ranking other stimuli) according to a condition of instruction (McKeown and Thomas 1988; Brown 1980). Q methodology enables the examination of subjective viewpoints without the use of predetermined scales or categories, while also employing quantitative factor analysis to statistically analyze the results (McKeown and Thomas 1988; Brown 1980). Therefore, Q methodology allows unexpected views to emerge and reveals the relationships among the various perspectives (Brown 1980).

3.2.2 Q Methodology

3.2.2.1 History

Q methodology was developed in the 1930s by William Stephenson (1902–1989) who was a British psychologist and physicist (Brown 1980; Stephenson 1953). Q methodology employs correlation and factor analysis to explore subjective viewpoints. The foundations of statistical methods using correlation and factor analysis are largely attributed to Karl Pearson and Charles Spearman. Factor analysis has most commonly been applied in R methodology to study the relationships among traits. R methodology measures traits and their distributions in populations and is widely used in survey research. However, it depends on the preconceptions of the researcher by employing predetermined scales or categories (Brown 1980).

In contrast, Q methodology involves correlating and factor analyzing people, as opposed to the traits analyzed in R methodology. The idea of correlating persons instead of traits was independently proposed by both William Stephenson (1935a, 1935b) and Sir Godfrey Thomson (1935) in 1935, but only Stephenson further developed the technique

into Q methodology. Q methodology minimizes the role of the researcher and allows unexpected views and patterns to emerge (Brown 1980). Stephenson (1953) developed and presented the fundamentals of Q methodology, and Brown (1980) and McKeown and Thomas (1988) provided a detailed discussion of the method and its applications.

3.2.2.2 Core Concepts

Q methodology is a technique for studying subjective viewpoints and for exploring relationships among patterns of opinions (Robbins 2005). The Q sorting technique allows individuals to map their internal viewpoints by rank-ordering statements of opinion (or other stimuli) without using predetermined measures. Q methodology focuses on operant subjectivity, meaning that it measures subjective viewpoints that are not dependent on constructed scales or categories. The method examines the viewpoint of the respondent as a whole and maintains the relationships among opinions (Brown 1980). Q methodology combines qualitative approaches for developing the set of statements with quantitative techniques for analyzing the data. The method involves correlating and factor analyzing the Q sorts to identify distinct viewpoints, called factors, about the issue examined (McKeown and Thomas 1988; Brown 1980). Typical steps in Q methodology research involve selecting the participants, developing the statements, administering the Q sorts, conducting follow-up interviews, correlating and factor analyzing the data, and interpreting the results (McKeown and Thomas 1988).

3.2.2.3 Application of Q Methodology

The use of Q methodology is becoming more common in political science, sociology, and psychology (Robbins 2005; Brown 1980). The method has also been employed in many other fields, such as health, education, the environment, and natural resource management (Eden, Donaldson, and Walker 2005). Various studies have applied Q methodology to examine perspectives on environmental issues (Kangas et al. 2010; Hennessy 2009; Weekes 2008; Burns and Cheng 2007; Ellis, Barry, and Robinson 2007; Chamberlain 2006; Colorado Institute of Public Policy 2006; Mattson et al. 2006; Martin and Steelman 2004; Webler et al. 2003; Byrd 2002; Focht 2002; van Eeten 2001; Webler

and Tuler 2001; Webler, Tuler, and Krueger 2001; Addams and Proops 2000; Robbins 2000; Woolley and McGinnis 2000; Steelman and Maguire 1999).

Previous research on large carnivore management employing Q methodology includes studies exploring perspectives on large carnivore conservation (Mattson et al. 2006; Byrd 2002) and grizzly bear management (Chamberlain 2006). Before–after studies using Q methodology have explored various topics, including bioenergy (Cuppen 2009), groundwater and flood management (Raadgever 2009), deliberative democracy (Niemeyer 2004; Pelletier et al. 1999), political participation (Freie 1997), political imagery (Brown 1977), and conference learning (Rodenbaugh 2001; Lipgar, Bair, and Fichtner 2000).

3.2.3 Q Methodology Applied to Grizzly Bear Management in the Banff-Bow Valley

3.2.3.1 Rationale for Methodological Choices

In this study, I used Q methodology to explore current views on grizzly bear management in the BBV in 2008 and possible changes in views between the summers of 2004 and 2008. Q methodology was appropriate for this research because it allowed for the examination and comparison of subjective viewpoints with minimal influence by the researcher (Brown 1980). By employing Q methodology, I was able to explore changes in views by directly comparing the results of this research with the findings of the previous study on this topic (Chamberlain 2006).

3.2.3.2 P Sample

I identified 39 potential participants for the after Q study, including the participants of the before Q study and the members participating in the IPS group in May 2008. Of these 39 potential participants, 27 were still actively involved in grizzly bear management in the BBV in May 2008, as identified by Parks Canada carnivore specialist Michael Gibeau.

Those 27 potential participants who were involved in grizzly bear management in the BBV in May 2008 were invited to participate in the after Q study. I contacted the

potential participants by email or by phone. I interviewed and conducted Q sorts with the people who were willing to participate in the after Q study and who were available for an interview. The interviews and Q sorts took place between May 26 and June 12, 2008.

Of the 27 potential participants who were actively involved in grizzly bear management in May 2008, 20 were willing and available to participate in the after Q study (Table 3.1).

Table 3.1 Potential Participants

<table>
<tr><th colspan="3">Group</th><th colspan="3">Number of Potential Participants</th></tr>
<tr><td rowspan="2">Before Q Study
+
IPS Group</td><td rowspan="2">Still Actively Involved in Grizzly Bear Management in the BBV</td><td>Willing and Available to Participate</td><td>11</td><td rowspan="2">13</td><td rowspan="6">39</td></tr>
<tr><td>Not Willing or Available to Participate</td><td>2</td></tr>
<tr><td rowspan="3">Before Q Study Only</td><td rowspan="2">Still Actively Involved in Grizzly Bear Management in the BBV</td><td>Willing and Available to Participate</td><td>1</td><td rowspan="2">4</td><td rowspan="3">16</td></tr>
<tr><td>Not Willing or Available to Participate</td><td>3</td></tr>
<tr><td colspan="2">No Longer Actively Involved in Grizzly Bear Management in the BBV</td><td colspan="2">12</td></tr>
<tr><td rowspan="2">IPS Group Only</td><td rowspan="2">Still Actively Involved in Grizzly Bear Management in the BBV</td><td>Willing and Available to Participate</td><td>8</td><td rowspan="2" colspan="2">10</td></tr>
<tr><td>Not Willing or Available to Participate</td><td>2</td></tr>
</table>

Of the 20 participants in the after Q study, 11 had participated in both the before Q study and the IPS group, 1 had participated only in the before Q study, and 8 had participated only in the IPS group (Table 3.2). Of the 19 participants who were involved in the IPS group, 14 were involved in at least one of the three IPS training workshops that took place before the IPS group began ongoing meetings. A description of the three IPS training workshops is provided by Rutherford et al. (2009).

Table 3.2 Participant Groups

Participant ID	Group		
	Before Q Study	IPS Training Workshops	IPS Group
01	X	X	X
02	X	X	X
07	X	X	X
08	X	X	X
11	X	X	X
12	X	X	X
14	X	X	X
16	X	X	X
17	X	X	X
18	X	X	X
20	X	X	X
09	X		
05		X	X
10		X	X
15		X	X
03			X
04			X
06			X
13			X
19			X

Since my research involved human participants, I applied for approval from the Simon Fraser University Office of Research Ethics, and my application was approved. Before taking part in the study, the participants were asked to sign an informed consent form, which assured confidentiality within the limits of existing laws unless they consented otherwise. The participants also indicated on the consent form how they wanted to be identified in this study. They could choose to identify themselves as an employee, member, or affiliate of their specific company or other organization; an employee, member, or affiliate of a type of company or organization (for example, a

"federal agency"); a local community member; an anonymous participant; or other, which the participant could specify.

The participants were affiliated with federal and provincial agencies, environmental and outdoor recreation organizations, commercial businesses, and local community members, or remained anonymous (Table 3.3).

Table 3.3 Participant Affiliations

Participants may be affiliated with more than one category.

Participant Affiliation	Number of Participants
Federal Agency	4
Provincial Agency	2
Environmental Organization	4
Outdoor Recreation Organization	2
Commercial Business	3
Local Community Member	4
Anonymous Participant	3

3.2.3.3 Q Sample

In order to facilitate comparisons between the before and after Q sorts, I used the same sets of statements, called Q samples, as were used in the before Q sorts. Chamberlain (2006) developed the Q samples from semi-structured interviews with participants in the before Q study, and included separate sets of statements about problems and solutions related to grizzly bear management in the BBV. To ensure a comprehensive representation of various viewpoints, the problems and solutions Q samples included statements from several focus (issue) and dimension (sub-issue) categories, which were developed using an inductive variance design. For the problems Q sort, the five foci included aspects of the decision-making process (special interests/common interest, geographic scope, and other) and the decision outcomes (bear population and human use levels) (Table 3.4). For the solutions Q sort, the six foci included participation in decision making, goals for management, human use, interjurisdictional coordination, science, habitat, and human values (Table 3.5). There were 38 statements in the problems Q sample and 30 statements in the solutions Q sample (Chamberlain 2006). All of the statements in the two Q samples are listed in Appendix A.

Table 3.4 Categories of Problems Statements

Dimensions are the sub-categories of each focus.
Adapted from Chamberlain (2006) with permission.

Focus	Dimension
A. Decision-making Process – Special Interests / Common Interest	1. Special Interests (Non-specific) versus Common Interest 2. Human Use versus Common Interest 3. Environmentalists versus Common Interest 4. Special Interests versus Science
B. Decision-making Process – Geographic Scope	1. Banff Park Alone 2. Banff and Surrounding Ecosystem 3. Banff and Much Broader Geographical Context
C. Decision-making Process – Other	1. Vision / Goals 2. Funding 3. Fragmented Authority and Control 4. Precautionary Principle 5. Celebrate Successes
D. Decision Outcomes – Bear Population	1. Healthy 2. Acceptable Given the Circumstances 3. Not Acceptable (for Bears) 4. Not Acceptable (for Human Use)
E. Decision Outcomes – Human Use Levels	1. Acceptable 2. Not Acceptable (for Bears) 3. Not Acceptable (for Human Use)

Table 3.5 Categories of Solutions Statements

Dimensions are the sub-categories of each focus.
Adapted from Chamberlain (2006) with permission.

Focus	Dimension
A. Participation in Decision Making	1. Broaden Participation
B. Goals for Management	1. Bear Conservation Goals 2. Other Goals
C. Human Use	1. Restrict 2. No Further Restrictions
D. Interjurisdictional Coordination	1. Improve Coordination
E. Science	1. Science and Policy 2. Bear Research Methods
F. Habitat	1. Actively Manage
G. Human Values	1. Change Values

3.2.3.4 Q Sorts

I met with each participant individually to administer the Q sorts, and I used the same protocol and sorting templates as Chamberlain (2006) did in the before Q study. The statement template for the problems Q sort is shown in Figure 3.1, and the statement template for the solutions Q sort is shown in Figure 3.2.

Figure 3.1 Statement Template for the Problems Q Sort

The template shows the ranking scale for the statements (-4 to +4). The number of statements allowed in each column is shown in brackets.
Adapted from Chamberlain (2006) with permission.

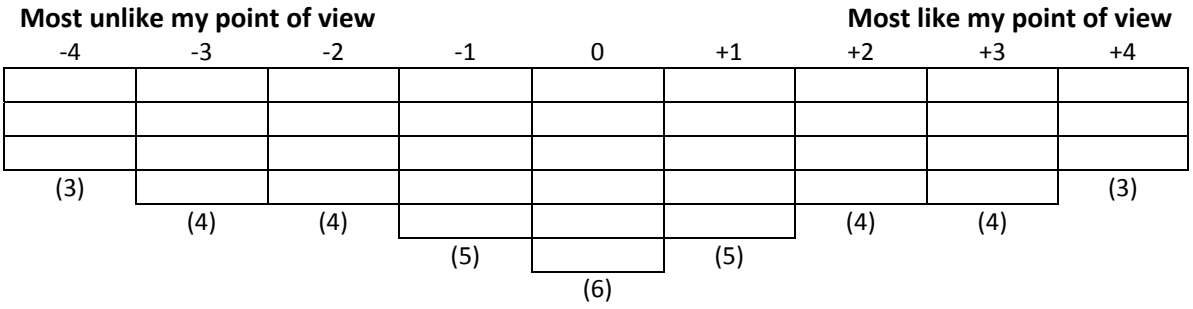
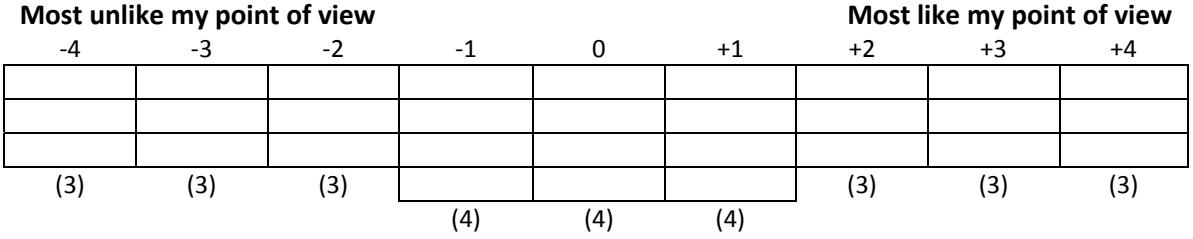


Figure 3.2 Statement Template for the Solutions Q Sort

The template shows the ranking scale for the statements (-4 to +4). The number of statements allowed in each column is shown in brackets.
Adapted from Chamberlain (2006) with permission.



The participants first sorted the problems Q sample and then the solutions Q sample, according to the following protocol. Before giving the statement cards to the participants, I showed them the statement template. For the problems Q sort, I asked the participants to sort the statements from those "most like my point of view" (+4) to those "most unlike my point of view" (-4) about the problems related to grizzly bear

management in the BBV. For the solutions Q sort, I asked the participants to sort the statements from those "most like my point of view" (+4) to those "most unlike my point of view" (-4) about the possible solutions to the problems related to grizzly bear management in the BBV. I asked the participants to try to match the template, but explained that they could modify the arrangement of the cards slightly, if needed, in order to accurately represent their point of view.

Then, I shuffled the cards with the printed statements and handed them to the participants for Q sorting. I asked the participants first to read through all of the statements to get an overview of the content of the statements, and then to sort the cards into three groups: 1) those that were more like their point of view; 2) those that were more unlike their point of view; and 3) the rest – statements that they felt were unclear, contradictory, or neutral, or that they were uncertain about.

I then instructed the participants to begin to sort the statements according to the ranking scale from –4 to +4. I suggested that they place the statements most and least similar to their viewpoint at the extremes of the distribution and the relatively neutral statements towards the centre. I asked them to start with the cards that were more like their view, to read through them again, and to choose the three statements that were the most like their view to place in the +4 column. They were then to follow the same process with the cards that were more unlike their view to fill the -4 column. I asked them to continue the sorting by alternating between the positive and the negative sides until they had also placed the more neutral cards and completed sorting all the statements. However, if the participants started to sort the cards in a different order, I let them continue the sorting in a way that was most comfortable for them.

After the sorting, I asked the participants to review their Q sort and, if needed, to make any changes to the arrangement to ensure that it represented their point of view accurately.

3.2.3.5 Post-Q-Sort Interviews

Following each Q sort, I conducted a post-Q-sort interview with each participant to clarify the meaning of their Q sort and allow them to provide comments and explanation. I asked the participants the following questions:

1. Why did you place the statements that you did at each of the extremes (+4, +3, -4, and -3)?
2. Are there any particular statements that you wish to comment on, such as statements that you found particularly accurate or particularly confusing?
3. Are there any additional statements that you would have included that are not here? (If yes) Why?

I also asked the participants a series of questions about whether their views had changed since the summer of 2004, and if so, how and why they had changed. These questions are described in Chapter 4.

With the permission of the participants, the post-Q-sort interviews were recorded with a digital voice recorder. After the post-Q-sort interview, I turned over the statement cards and recorded the statement numbers on a response sheet.

3.2.3.6 Analysis

I statistically analyzed the Q sort data by correlation, factor analysis (Principal Components method), rotation (Varimax method), and computation of factor scores (McKeown and Thomas 1988). I used the software program PQMethod (2.11) (Schmolck and Atkinson 2002) to conduct the analysis. Factor analysis is a statistical technique for data reduction, which reveals similarities and differences among the Q sorts by identifying groups of similar Q sorts as distinct viewpoints, called factors. Each factor represents a group of respondents who sorted the statements in a similar way (McKeown and Thomas 1988). Factor rotation changes the vantage point from which the data are examined in order to clarify the structure of the data (Robbins 2005). Factor loadings are correlation coefficients, which indicate the degree of similarity of a particular individual's Q sort with a particular factor (McKeown and Thomas 1988). PQMethod

also constructs a model Q sort (called a factor array) for each factor, based on a weighted composite of those sorts identified as highly correlated with the factor and not highly correlated with any other factor (Schmolck 2002).

In order to choose the number of distinct factors to be extracted from the data, I considered seven statistical criteria: 1) the eigenvalue criterion (Kaiser 1960); 2) Cattell's Scree Test (Cattell 1966); 3) the number of significant loadings at the 0.01 level[7] (Brown 1980); 4) the number of flagged sorts (see Table 3.9 for the criteria used for flagging sorts); 5) the number of confounded sorts (sorts that were significantly loaded on more than one factor at the 0.01 level); 6) the number of unloaded sorts (sorts that were not significantly loaded on any factor at the 0.01 level); and 7) the correlations between the factors (Table 3.6).

Out of the statistical criteria, I placed the most weight on the number of flagged, confounded, and unloaded sorts and the correlations between the factors. I did not emphasize the eigenvalue criterion because it is less relevant in Q studies than in R studies (Brown 1980) and it was not helpful in selecting the number of factors as all of the considered factor solutions met the criterion. Similarly, Cattell's Scree Test was not a strong criterion because it is based on eigenvalues. Also, I considered the number of flagged sorts on a factor to be a more meaningful criterion than the number of significant loadings because a significant loading is a prerequisite to flagging and confounded sorts are excluded in flagging.

In addition to the statistical criteria, I considered the theoretical significance of the various possible factor solutions. For both the problems and the solutions Q sorts, I considered a range of factor solutions from two factors to five factors. The unrotated factor matrices and Cattell's Scree Tests for the problems and solutions Q sorts are shown in Appendix A.

[7] Significance at the 0.01 level = $2.58(1/\sqrt{N})$, where N is the number of statements in the Q sample (McKeown and Thomas 1988). Therefore, Q sorts with factor loadings above $2.58(1/\sqrt{38}) = 0.4185$ are significant at $p<0.01$ for the problems Q sort, and Q sorts with factor loadings above $2.58(1/\sqrt{30}) = 0.4710$ are significant at $p<0.01$ for the solutions Q sort.

Table 3.6 Statistical Criteria for Evaluating Factor Solutions

Criterion	Description
Eigenvalue	Eigenvalue is greater or equal to 1.00 (Kaiser 1960).
Cattell's Scree Test	Eigenvalue is above or at the break in the slope of a graph of eigenvalues against factors (Cattell 1966).
Significant Loadings	At least two significant loadings at the 0.01 level on each factor (Brown 1980).
Flagged Sorts	At least two sorts flagged on each factor.
Confounded Sorts	Minimize the number of participants that are significantly loaded on more than one factor.
Unloaded Sorts	Minimize the number of participants that are not significantly loaded on any factor.
Correlations	Minimize the correlations between factors.

For the problems Q sort, I chose the two-factor solution, which was supported by all of the considered statistical criteria and provided what I considered to be the most meaningful interpretation of the Q sorts (Table 3.7). In this solution, Factor 2 was bipolar, meaning that it had both positive and negative significant loadings. I split the negative loadings from the positive loadings so they could be interpreted separately (see the discussion below). All of the other considered factor solutions had at least one factor with only one flagged sort, thereby failing the flagged sorts criterion. Also, they had higher correlations between the factors and more confounded sorts than the two-factor solution. My judgemental review of the alternative solutions supported this statistical choice, as the potential solutions with three or more factors did not appear to reveal additional viewpoints that were substantially different from those presented by the two-factor solution.

As mentioned above, in the selected two-factor solution for the problems Q sort, Factor 2 was bipolar. Two sorts were negatively and significantly loaded on Factor 2 and not significantly loaded on Factor 1. In order to capture the views of those participants with negative significant loadings on Factor 2, I split Factor 2 into two factors, which represent the positive and negative dimensions of Factor 2. The positive dimension of Factor 2 remained as Factor 2, and the negative dimension of Factor 2 became Factor 3. In the remainder of this report, I refer to the three problems factors of the after Q sort as Factors PA1, PA2, and PA3.

For the solutions Q sort, I selected the four-factor solution, which was supported by all of the considered statistical criteria, except for Cattell's Scree Test, and provided the most meaningful interpretation of the data (Table 3.8). I rejected the two-factor solution because of a very high correlation between the factors. I also discarded the five-factor solution due to one factor with only one flagged sort, a high correlation between two factors, and a failure to provide an additional viewpoint distinct from those revealed by the four-factor solution. Both the three-factor and the four-factor solutions were possible in terms of the statistical criteria and their theoretical significance. However, I judged that the four-factor solution revealed a distinctly different viewpoint in addition to those provided by the three-factor solution. Also, all participants were significantly loaded on at least one factor in the four-factor solution, whereas the three-factor solution had three unloaded sorts. As a result, I chose the four-factor solution since it captured the views of the participants more comprehensively than the three-factor solution. In the remainder of this report, I refer to the four solutions factors of the after Q sort as Factors SA1, SA2, SA3, and SA4.

Table 3.7 Statistical Criteria for Evaluating the Factor Solutions for the Problems Q Sort

Factor solutions supported by the statistical criteria are indicated with a + sign. Factor solutions not supported by the statistical criteria are indicated with a - sign. The selected 2-factor solution is identified with grey shading.

Factor Solution	Eigenvalue	Cattell's Scree Test	Significant Loadings					Flagged Sorts					Confounded Sorts	Unloaded Sorts	Correlations < 0.3
			F1	F2	F3	F4	F5	F1	F2	F3	F4	F5			
2 Factors	+	+	14	10	—	—	—	10	4	—	—	—	4	0	+
3 Factors	+	+	14	9	3	—	—	10	2	1	—	—	6	0	+
4 Factors	+	-	12	3	5	6	—	9	1	3	2	—	5	0	+
5 Factors	+	-	4	3	6	12	2	1	1	3	8	1	6	0	-

Table 3.8 Statistical Criteria for Evaluating the Factor Solutions for the Solutions Q Sort

Factor solutions supported by the statistical criteria are indicated with a + sign. Factor solutions not supported by the statistical criteria are indicated with a - sign. The selected 4-factor solution is identified with grey shading.

Factor Solution	Eigenvalue	Cattell's Scree Test	Significant Loadings					Flagged Sorts					Confounded Sorts	Unloaded Sorts	Correlations < 0.3
			F1	F2	F3	F4	F5	F1	F2	F3	F4	F5			
2 Factors	+	+	10	8	—	—	—	6	7	—	—	—	1	3	-
3 Factors	+	+	12	4	2	—	—	11	3	2	—	—	1	3	+
4 Factors	+	-	12	5	2	3	—	10	4	2	2	—	2	0	+
5 Factors	+	-	11	4	2	3	2	9	3	2	2	1	2	0	-

I used the Principal Components method to factor analyze the data. I then rotated the factors using the Varimax method. I chose to use Varimax rotation because it is a more objective and statistically rigorous method than theoretical rotation, which depends on the subjective judgement of the researcher. The rotated factor matrices for the problems and solutions Q sorts are shown in Appendix A.

After factor rotation, the analyst selects and "flags" Q sorts for each factor that are relatively pure representations of that factor. The flagged sorts are used to define the prototype model factor arrays that characterize the factors. Accordingly, the sorts selected for flagging should be positively and significantly loaded on the factor they represent and not significantly loaded on any other factor (McKeown and Thomas 1988). In selecting the Q sorts for flagging, I followed the criteria described by Brown (2005, 2003a, 2003b) (Table 3.9).

Table 3.9 Criteria for Flagging Q Sorts

Step	Description
1	Identify only positively and significantly loaded sorts that are not significantly loaded on any other factor to be considered for flagging by excluding 1) confounded sorts; 2) unloaded sorts; and 3) negatively and significantly loaded sorts (Brown 2005).
2	Of the sorts identified in Step 1, flag those sorts where the difference between the two highest loadings is significant. Equation for calculating the significance of the difference between factor loadings: $(A - B) - 2.58((1 - A^2/\sqrt{N}) - (1 - B^2/\sqrt{N})) > 0$, where A = the highest loading; B = the second-highest loading; N = the number of statements in the Q sort. The difference between the factor loadings is significant if the calculation results in a positive number (Brown 2003b).
3	In addition to the sorts flagged in Step 2, flag sorts where the difference between the two highest loadings is non-significant, but the non-significant loadings are very close to zero (Brown 2003a).

I interpreted the factor arrays by examining the distinctive characteristics of each factor and by developing a narrative to describe each view (McKeown and Thomas 1988).

3.3 Results

3.3.1 Factor Loadings

Each factor is represented by a model Q sort, or prototype, called a factor array, which includes factor scores for all the statements in the Q sort. For example, for statement P15 in the problems sort, the factor scores are 3, -2, and 1, which means that in the model factor array this statement is ranked 3 on Factor PA1, -2 on Factor PA2, and 1 on Factor PA3. The factor array is based on a weighted composite of the sorts that were flagged for that factor. The factor arrays for the problems and solutions factors are shown in Appendix A.

Factor loadings are correlation coefficients that represent the level of agreement between actual individual Q sorts and the factors. The factor loadings for the problems and solutions Q sorts are shown in Table 3.10. Participants who are highly loaded on the same factor generally have a similar understanding of the problems or solutions related to grizzly bear management in the BBV. Some participants are significantly loaded on more than one factor, which means that their views include components of two or more factors. Participants who are not affiliated with any factor have views that are distinct from the factors discussed in this study. Due to the fact that the sample of participants for this study was selective rather than statistically representative of the broader population, the number of participants significantly loaded on each factor cannot be used to predict the proportion of the general population in support of each view.

Table 3.10 Factor Loadings for the Problems and Solutions Q Sorts

Significant factor loadings (p<0.01) are identified in bold. Sorts that have significant loadings but are not flagged are identified with light grey shading. Flagged sorts are identified with dark grey shading. In addition to the reported participant affiliations, some participants may also be self-identified as local community members.

Participant Affiliation	ID	Problems Factors			Solutions Factors			
		PA1	PA2	PA3	SA1	SA2	SA3	SA4
Federal Agency	03	**0.83**	-0.08	0.08	0.06	0.35	0.00	**0.81**
	18	**0.74**	-0.17	0.17	**0.67**	**0.50**	-0.02	0.11
	13	**0.69**	-0.08	0.08	0.26	**0.55**	0.26	0.25
	17	**0.69**	-0.16	0.16	**0.74**	0.13	-0.10	-0.10
Provincial Agency	14	**0.56**	0.08	-0.08	**0.65**	-0.42	-0.19	-0.03
	02	**0.59**	-0.59	**0.59**	**0.68**	-0.23	-0.34	0.22
Environmental Organization	10	**0.73**	-0.31	0.31	**0.82**	-0.33	-0.09	-0.05
	09	**0.66**	-0.05	0.05	**0.69**	-0.11	0.08	**0.47**
	05	**0.70**	-0.50	**0.50**	**0.70**	-0.28	-0.27	0.17
	12	**0.61**	-0.59	**0.59**	**0.70**	-0.42	-0.09	0.42
Outdoor Recreation Organization	20	0.13	**0.73**	-0.73	-0.09	**0.79**	0.05	-0.11
	04	0.05	**0.52**	-0.52	-0.11	0.08	**0.86**	-0.17
Commercial Business	11	**0.52**	0.16	-0.16	0.01	**0.83**	0.08	-0.15
	08	-0.04	**0.83**	-0.83	-0.17	0.04	**0.84**	0.08
	06	0.14	-0.46	**0.46**	**0.64**	0.16	-0.30	-0.01
Local Community Member	16	0.11	**0.82**	-0.82	-0.27	**0.55**	-0.18	0.22
	15	**0.70**	-0.51	**0.51**	**0.82**	0.05	-0.21	-0.05
Anonymous Participant	07	**0.68**	-0.07	0.07	**0.82**	-0.04	0.23	0.09
	01	**0.59**	0.21	-0.21	**0.57**	0.28	0.18	0.06
	19	0.32	-0.66	**0.66**	0.23	-0.39	-0.13	**0.79**

3.3.2 Factor Correlations

The selected two-factor solution for the problems Q sort has a low correlation between Factors PA1 and PA2 (-0.07) (Table 3.11). The initially bipolar Factor 2 was split into its positive and negative dimensions represented by Factors PA2 and PA3, respectively. As a result, Factors PA2 and PA3 are strongly negatively correlated (-0.57). In contrast, Factors PA1 and PA3 have a moderate positive correlation (0.36).

Table 3.11 Correlations between the Problems Factors

Moderate correlations (0.3≤X<0.5 or -0.3≥X>-0.5) are identified in light grey shading.
High correlations (X≥0.5 or X≤-0.5) are identified in dark grey shading.

Factor	PA1	PA2	PA3
PA1	1.00	-0.07	0.36
PA2	-0.07	1.00	-0.57
PA3	0.36	-0.57	1.00

The selected four-factor solution for the solutions Q sort has low correlations between all the factors (Table 3.12). Factors SA1 and SA4 as well as Factors SA2 and SA3 have minor similarities. However, Factors SA1 and SA4 are slightly negatively correlated with Factors SA2 and SA3.

Table 3.12 Correlations between the Solutions Factors

Moderate correlations (0.3≤X<0.5 or -0.3≥X>-0.5) are identified in light grey shading.
High correlations (X≥0.5 or X≤-0.5) are identified in dark grey shading.

Factor	SA1	SA2	SA3	SA4
SA1	1.00	-0.17	-0.26	0.28
SA2	-0.17	1.00	0.19	-0.06
SA3	-0.26	0.19	1.00	-0.12
SA4	0.28	-0.06	-0.12	1.00

3.3.3 Factor Interpretation

Factor interpretation involves examining the factor arrays of all the factors in each Q sort (Appendix A) and discussing the statements characterizing each factor in order to describe the different views and to highlight the differences and similarities among the factors. The Q sample statements and factor scores for the problems and solutions Q sorts are shown in Appendix A.

Statements with factor scores greater or equal to 2 are generally considered to be supported by the factor, whereas statements that factors disagree with generally have factor scores less than or equal to -2. Statements that are less important, neutral or unclear commonly have rankings of -1, 0, or +1.

In interpreting the factors, I focused on statements that the factors most strongly support (+4 and +3) and oppose (-4 and -3). The discussion also includes statements with factor scores of +2 or -2 if they statistically distinguish one factor from the others ($p<0.05$).

The areas of agreement among all the factors are also discussed after the descriptions of individual factors. Statements of virtual consensus represent shared views among the factors or at least areas of no major disagreement. In this study, the definition of virtual consensus follows the criteria in Chamberlain (2006) in order to maintain consistency in analytic methods. Therefore, statements of virtual consensus on the positive side are defined as statements that have factor scores of greater than or equal to zero for all factors and at least one factor score of +3 or +4. Similarly, statements of virtual consensus on the negative side are defined as statements that have factor scores of less than or equal to zero for all factors and at least one factor score of -3 or -4. This definition of virtual consensus focuses on those statements that are strongly supported or opposed by at least one factor and excludes statements that all factors find less important, neutral, or unclear.

The participant affiliations associated with each factor are based on the affiliations reported in Table 3.10. In addition, some participants may also be self-identified as local community members.

3.3.4 Problems Factors

I identified three problems factors and named these factors to emphasize each group's overall view of the main problem with grizzly bear management in the BBV. These factors are entitled Problematic Status of Bears (Factor PA1), Exaggerated Problems (Factor PA2), and Inadequate Management (Factor PA3).

I called Factor PA1 Problematic Status of Bears because it was focused on the vulnerability of the grizzly bear population in the BBV. Factor PA1 resembled Factor PB3 and, to a lesser extent, Factor PB1 in the before Q study (see Chapter 4 for a detailed comparison of the before and after factors). I named Factor PA2 Exaggerated Problems because it generally considered the situation of bears in the BBV to be acceptable and it closely resembled Factor PB2 in the before Q study. I called Factor PA3 Inadequate Management due to its emphasis on the problems with management in the BBV. Factor PA3 shared similarities with Factor PB1 in the before Q study.

Each factor and the areas of agreement among all the factors are summarized in Table 3.13 and discussed in detail in the following sections.

Table 3.13 Summary of Factor Descriptions and Areas of Agreement for the Problems Factors

Factor	Summary
Factor PA1: Problematic Status of Bears	The grizzly bear population is vulnerable and not sustainable in the long term, bears have not been over-managed, and human activities have not been unnecessarily sacrificed in BNP for bear protection. The Bow Valley is an important linkage for the regional bear population, and there will be more challenges for residents with bear activity intruding into communities.
Factor PA2: Exaggerated Problems	The status of the grizzly bear population is acceptable, but achievements in bear management are not celebrated. A National Park should not be a bear factory to provide bears for other areas, and the Bow Valley does not need to be a regional source of bears. An overall conservation strategy for bears exists, and human use issues do not receive greater priority than bears in Parks management.
Factor PA3: Inadequate Management	There is no well organized management plan or conservation strategy for grizzly bears, management is largely reactive, and politics and special interest pleading have interfered with science and decision making. The bear population is vulnerable, human use issues receive greater priority than bears in Parks management, and people management has not been successful in BNP.
All Factors: Areas of Agreement	The grizzly bear population is vulnerable and not doing well, we are not on a trend to having too many bears in the area, and bear conservation is not taking up a disproportionate amount of resources. The Bow Valley is an important linkage for the regional bear population, but it does not need to be a source of bears for the region. Management is fragmented by jurisdiction and decision making is politicized.

3.3.4.1 Factor PA1: Problematic Status of Bears

Population Status

Factor PA1 strongly believes that the grizzly bear population is vulnerable (P04) and not sustainable in the long term (P15) and that the Bow Valley is an important linkage for the regional grizzly bear population (P16) (see Table 3.14 for the rankings of all of the statements that characterize Factor PA1). This group firmly opposes the statements that the bear population is doing very well (P38), that they are on a trend to having too many bears in the area (P25), and that the regional populations are healthy (P21).

Human Use

This factor clearly believes that increasing human use has resulted in increased mortality rates of grizzly bears (P13) and that human activities have not been unnecessarily sacrificed for bear protection in Banff National Park (BNP) (P24).

Politics and Interests

Unlike the other factors, Factor PA1 moderately agrees that the precautionary principle does not hold water in grizzly bear management (P17) and that the burden of proof is on the people defending wildlife rather than on developers if recreational opportunities are impacted (P35). This group is also distinct in that it clearly disagrees with the statement that the discourse associated with policy making has been hijacked by people whose views are short term and do not take into account the larger interests, sensibilities or history of this country (P34).

Institutions and Management

Factor PA1 strongly believes that there will be more challenges for residents with bear activity intruding into communities (P14) and that management is fragmented by jurisdiction (P18), but also firmly supports the view that achievements in grizzly bear management are not celebrated (P36). This factor strongly rejects statements that grizzly bears have been over-managed (P32) and that a disproportionate amount of resources is going into saving bears (P30).

Participant Affiliations

Ten participants are pure representations of Factor PA1. They are affiliated with federal agencies, environmental organizations, a provincial agency, and a commercial business, and they also include two anonymous participants. In addition, four participants are significantly loaded on both Factor PA1 and Factor PA3. They are affiliated with environmental organizations and a provincial agency, and they also include a local community member.

Table 3.14 Statements Characterizing Factor PA1: Problematic Status of Bears

Statements supported by Factor PA1 and the corresponding factor scores are identified with dark grey shading. Statements not supported by Factor PA1 and the corresponding factor scores are identified with light grey shading. Statistically distinguishing factor scores (p<0.05) for Factor PA1 are identified in bold.

No.	Statement	Factor		
		PA1	PA2	PA3
P04	The grizzly bear population is vulnerable.	4	0	4
P16	The Bow Valley is an important linkage for the regional grizzly bear population. If we lose the connections and opportunities in this area, then there is a high risk of the population being placed in jeopardy.	**4**	0	1
P14	There will be more challenges for residents with bear activity intruding in communities in the future.	**4**	-1	2
P15	The population status of grizzly bears is not sustainable in the long term. If we sit back today and call it acceptable, we won't make the improvements that need to be made to maintain the position we're in now.	**3**	-2	1
P13	Increasing human use of grizzly bear habitat, through recreational use, residential use, and tourism development, both inside and outside of the Park has resulted in increased mortality rates of grizzly bears.	3	-3	2
P36	Instead of celebrating our achievements in grizzly bear management, we continue to talk about our challenges.	**3**	4	-2
P18	Management is fragmented by jurisdiction. There are no system wide specific objectives that Parks Canada and the provincial agencies are trying to manage for.	3	1	2
P35	If something will impact recreational opportunities, the burden of proof is always on the bear, their habitat, and the people who defend their habitat, to show that harm is being done. This is wrong.	**2**	-2	-1
P17	The precautionary principle doesn't hold water in grizzly bear management. The onus of proof is still on those defending wildlife instead of on developers.	**2**	-3	-1
P34	Most of the discourse associated with policy making has been high-jacked by people whose views are short term and do not take into account the larger interests, sensibilities or history of this country.	**-3**	0	1
P21	We're taking our local situation with bears and extrapolating. In the regional context, grizzly bear populations are healthy.	**-3**	1	0
P30	A disproportionate amount of resources are going into saving bears when they're shot just outside Park borders.	-3	-1	-3
P32	Grizzly bears have been over managed. The trend of closing each area with a female grizzly in it is leading us to close Banff.	**-3**	1	0
P25	We are on a trend to having way too many bears in the area which means we'll be bound to have more problems between bears and people, and a huge proportion of habituated bears.	**-4**	-3	0
P24	We have unnecessarily sacrificed human activities in Banff National Park for grizzly bear protection.	-4	3	-3
P38	The grizzly bear population is doing very well, describing the population as just "stable" is the crisis version of what is happening.	-4	0	-4

3.3.4.2 Factor PA2: Exaggerated Problems

Population Status

Unlike the other two factors, Factor PA2 feels strongly that the population status of grizzly bears is acceptable (P26) and also moderately disagrees with the statement that the population status is not sustainable in the long term (P15) (see Table 3.15 for the rankings of all of the statements that characterize Factor PA2). However, this narrative clearly agrees with Factor PA1 that there is not a trend toward having too many bears in the area (P25). In contrast to the other factors, Factor PA2 firmly believes that it is not the role of a National Park to be a bear factory, but to have the right amount of bears for the park itself (P28), and that the Bow Valley does not need to be a source of bears for the regional populations in Alberta (P22).

Human Use

This factor differs from the other factors in that it strongly believes that people management in BNP has been successful (P06) and that human activities in BNP have been unnecessarily sacrificed for grizzly bear protection (P24). Also unlike the other factors, this group strictly rejects the statements that human use issues receive greater priority in Parks Management to the point where grizzly bears have been jeopardized (P31), that an unrelenting tide of humanity has descended on a place that has a finite capacity to accommodate human pressure (P08), and that increasing human use of grizzly bear habitat has resulted in increased mortality rates of grizzly bears (P13).

Politics and Interests

Factor PA2 moderately and uniquely agrees that there is a false crisis mentality spurred by interest groups that have more in line than the health and welfare of grizzly bears (P01). Differing from the other factors, this group strongly opposes the statement that the precautionary principle does not hold water in grizzly bear management and that the onus of proof is on those defending wildlife instead of developers (P17). Factor PA2 also moderately disagrees that politics and special interest pleading have interfered with science and organizational mandates (P27).

Institutions and Management

Similarly to Factor PA1, this factor strongly supports the view that achievements in grizzly bear management are not celebrated (P36). In contrast to the other factors, Factor PA2 firmly believes that people tend to get caught up in the chicken little syndrome and think that the sky is falling (P10), and that grizzly bears are managed from the perspective that they are an endangered species when they are not (P37). Also unlike the other factors, this group strongly rejects the statement that there is a lack of an overall conservation strategy for grizzly bears and a lack of clear goals, targets, and a bigger vision (P02).

Participant Affiliations

Four participants are pure representations of Factor PA2. These participants are affiliated with outdoor recreation organizations and a commercial business, and they also include a local community member.

Table 3.15 Statements Characterizing Factor PA2: Exaggerated Problems

Statements supported by Factor PA2 and the corresponding factor scores are identified with dark grey shading. Statements not supported by Factor PA2 and the corresponding factor scores are identified with light grey shading. Statistically distinguishing factor scores (p<0.05) for Factor PA2 are identified in bold.

No.	Statement	Factor		
		PA1	PA2	PA3
P36	Instead of celebrating our achievements in grizzly bear management, we continue to talk about our challenges.	3	**4**	-2
P28	It is not the role of a National Park to be a bear factory and produce bears, but instead to have the right amount of bears for the Park itself.	1	**4**	-2
P26	The population status of grizzly bears is acceptable as it is. We'll never achieve zero mortality of bears given the circumstances we're in and that's fine.	-2	**4**	-3
P10	We tend to get caught up in the chicken little syndrome – thinking that the sky is falling and we need to fix everything – without recognizing Parks Canada's successes in grizzly bear management.	1	**3**	-2
P37	Grizzlies are managed from the perspective that they're an endangered species when they're not. The Banff-Bow Valley is not the last stand of the grizzly bear.	-1	**3**	-2
P06	People management in Banff Park has been successful and has led to us cultivating bears not wiping them out.	1	**3**	-4
P24	We have unnecessarily sacrificed human activities in Banff National Park for grizzly bear protection.	-4	**3**	-3
P09	The grizzly bear population is at an equilibrium, it's neither dropping nor increasing. Management is doing a good job with what they're working with.	-1	**2**	-4
P01	There is a false crisis mentality spurred by interest groups who have more in line than the health and welfare of grizzly bears.	-2	**2**	-1
P15	The population status of grizzly bears is not sustainable in the long term. If we sit back today and call it acceptable, we won't make the improvements that need to be made to maintain the position we're in now.	3	**-2**	1
P27	Politics and special interest pleading have interfered with the essential scientific understanding of the fundamental established mandates of conservation organizations. We're no longer talking about science, we're talking about who can speak the loudest and who can get the most media coverage.	0	**-2**	3
P25	We are on a trend to having way too many bears in the area which means we'll be bound to have more problems between bears and people, and a huge proportion of habituated bears.	-4	**-3**	0
P13	Increasing human use of grizzly bear habitat, through recreational use, residential use, and tourism development, both inside and outside of the Park has resulted in increased mortality rates of grizzly bears.	3	**-3**	2
P08	An unrelenting tide of humanity has descended on a place that has a finite capacity to accommodate human pressure.	0	**-3**	2
P17	The precautionary principle doesn't hold water in grizzly bear management. The onus of proof is still on those defending wildlife instead of on developers.	2	**-3**	-1
P31	Human use issues receive greater priority in Parks Management to the point where grizzly bears have been jeopardized.	-1	**-4**	3
P02	There is a lack of an overall conservation strategy for grizzly bears, lack of clear goals, targets and a bigger vision.	0	**-4**	4
P22	Elsewhere in Alberta, grizzly bear populations are shrinking. The Bow Valley needs to be a source of bears to increase the regional population of bears.	0	**-4**	-1

3.3.4.3 Factor PA3: Inadequate Management

Population Status

Like Factor PA1, Factor PA3 strongly agrees that the grizzly bear population is vulnerable (P04) and firmly rejects the statements that the population is doing very well (P38) and that the population status is acceptable (P26) (see Table 3.16 for the rankings of all of the statements that characterize Factor PA3). In contrast to the other factors, this group strongly opposes the view that the bear population is at an equilibrium (P09) and somewhat disagrees that it is not the role of a National Park to produce bears (P28).

Human Use

This factor firmly disagrees with Factor PA2 in regard to human use issues. Factor PA3 feels strongly that human use issues receive greater priority in Parks Management to the point where grizzly bears have been jeopardized (P31). This group also strongly opposes the statements that people management in BNP has been successful (P06), that human activities in BNP have been unnecessarily sacrificed for grizzly bear protection (P24), and that people are having less of an impact on grizzly bears (P12).

Politics and Interests

Unlike the other factors, Factor PA3 strongly believes that politics and special interest pleading have interfered with science and the mandates of conservation organizations (P27) and that decision making is politicized (P33).

Institutions and Management

Factor PA3 is also distinct from the other factors in that it strongly agrees that there is a lack of an overall conservation strategy for grizzly bears and a lack of clear goals, targets, and a bigger vision (P02), that there is no well organized or visionary plan in place that outlines when success is achieved in management (P19), and that management is largely reactive and not entirely science-based (P29). Similarly to Factor PA1, Factor PA3 somewhat believes that there will be more challenges for residents with bear activity intruding into communities (P14) and clearly rejects the statement that a disproportionate amount of resources is going into saving bears (P30). In contrast to the other factors, however, Factor PA3 somewhat disagrees with the views that achievements in grizzly bear management are not celebrated (P36) and that people tend to get caught up in the chicken little syndrome and think that the sky is falling (P10).

Participant Affiliation

Two participants are pure representations of Factor PA3. One of the participants is affiliated with a commercial business, and the other is an anonymous participant. In addition, four participants are significantly loaded on both Factor PA1 and Factor PA3. They are affiliated with environmental organizations and a provincial agency, and they also include a local community member.

Table 3.16 Statements Characterizing Factor PA3: Inadequate Management

Statements supported by Factor PA3 and the corresponding factor scores are identified with dark grey shading. Statements not supported by Factor PA3 and the corresponding factor scores are identified with light grey shading. Statistically distinguishing factor scores (p<0.05) for Factor PA3 are identified in bold.

No.	Statement	Factor		
		PA1	PA2	PA3
P19	There is no well organized or visionary plan in place that outlines when success is achieved in management and when we've achieved a healthy population.	0	-1	**4**
P04	The grizzly bear population is vulnerable.	4	0	4
P02	There is a lack of an overall conservation strategy for grizzly bears, lack of clear goals, targets and a bigger vision.	0	-4	**4**
P27	Politics and special interest pleading have interfered with the essential scientific understanding of the fundamental established mandates of conservation organizations. We're no longer talking about science, we're talking about who can speak the loudest and who can get the most media coverage.	0	-2	**3**
P29	Management is largely reactive, it's based on the political bureaucratic mood of the day and is not entirely science based.	-2	-1	**3**
P31	Human use issues receive greater priority in Parks Management to the point where grizzly bears have been jeopardized.	-1	-4	**3**
P33	Political pressure lets people get what they want. Decision making is politicized.	1	0	3
P14	There will be more challenges for residents with bear activity intruding in communities in the future.	4	-1	**2**
P10	We tend to get caught up in the chicken little syndrome – thinking that the sky is falling and we need to fix everything – without recognizing Parks Canada's successes in grizzly bear management.	1	3	**-2**
P36	Instead of celebrating our achievements in grizzly bear management, we continue to talk about our challenges.	3	4	**-2**
P28	It is not the role of a National Park to be a bear factory and produce bears, but instead to have the right amount of bears for the Park itself.	1	4	**-2**
P30	A disproportionate amount of resources are going into saving bears when they're shot just outside Park borders.	-3	-1	-3
P26	The population status of grizzly bears is acceptable as it is. We'll never achieve zero mortality of bears given the circumstances we're in and that's fine.	-2	4	-3
P12	Although human use in Banff Park has increased, that use is more concentrated and people are better educated, so people are having less of an impact on grizzly bears.	1	2	**-3**
P24	We have unnecessarily sacrificed human activities in Banff National Park for grizzly bear protection.	-4	3	-3
P38	The grizzly bear population is doing very well, describing the population as just "stable" is the crisis version of what is happening.	-4	0	-4
P06	People management in Banff Park has been successful and has led to us cultivating bears not wiping them out.	1	3	**-4**
P09	The grizzly bear population is at an equilibrium, it's neither dropping nor increasing. Management is doing a good job with what they're working with.	-1	2	**-4**

3.3.4.4 Areas of Agreement

There are eight statements of virtual consensus among the problems factors (Table 3.17). All three factors somewhat agree with or are neutral about the statements that the grizzly bear population is vulnerable (P04) and that the Bow Valley is an important linkage for the regional bear population (P16). All problems factors also feel, to some extent, or are neutral about management being fragmented by jurisdiction (P18) and about decision making being politicized (P33). The problems factors all somewhat disagree with or are neutral about the statements that the grizzly bear population is doing very well (P38), that they are on a trend to having too many bears in the area (P25), that the Bow Valley needs to be source of bears to increase the regional population (P22), and that a disproportionate amount of resources is going into saving bears (P30).

Table 3.17 Statements of Virtual Consensus for the Problems Factors

Statements of virtual consensus on the positive side and the corresponding factor scores are identified with dark grey shading. Statements of virtual consensus on the negative side and the corresponding factor scores are identified with light grey shading.

No.	Statement	Factor		
		PA1	PA2	PA3
P04	The grizzly bear population is vulnerable.	4	0	4
P18	Management is fragmented by jurisdiction. There are no system wide specific objectives that Parks Canada and the provincial agencies are trying to manage for.	3	1	2
P16	The Bow Valley is an important linkage for the regional grizzly bear population. If we lose the connections and opportunities in this area, then there is a high risk of the population being placed in jeopardy.	4	0	1
P33	Political pressure lets people get what they want. Decision making is politicized.	1	0	3
P22	Elsewhere in Alberta, grizzly bear populations are shrinking. The Bow Valley needs to be a source of bears to increase the regional population of bears.	0	-4	-1
P25	We are on a trend to having way too many bears in the area which means we'll be bound to have more problems between bears and people, and a huge proportion of habituated bears.	-4	-3	0
P30	A disproportionate amount of resources are going into saving bears when they're shot just outside Park borders.	-3	-1	-3
P38	The grizzly bear population is doing very well, describing the population as just "stable" is the crisis version of what is happening.	-4	0	-4

3.3.5 Solutions Factors

I identified four solutions factors and named these factors to reflect each group's view of the preferred solutions to the problems with grizzly bear management in the BBV. The solutions factors are entitled Bear Conservation Advocates (Factor SA1), Anthropocentric Habitat Managers (Factor SA2), Anthropocentric Scientific Managers (Factor SA3), and Cohabitation Diplomats (Factor SA4).

I called Factor SA1 Bear Conservation Advocates due to its emphasis on prioritizing ecological integrity and bears in management and its close similarity with Factor SB1 in the before Q study. I named Factor SA2 Anthropocentric Habitat Managers because it focused on habitat modification and disagreed with restricting human use. I entitled Factor SA3 Anthropocentric Scientific Managers because it emphasized the integration of scientific management and research and opposed restrictions on human use. Factor SA3 shares similarities with Factor SB2 in the before Q study. I called Factor SA4 Cohabitation Diplomats due to its support for the cohabitation of bears and humans and for increased participation and communication.

Each factor and the areas of agreement among all the factors are summarized in Table 3.18 and discussed in detail in the following sections.

Table 3.18 Summary of Factor Descriptions and Areas of Agreement for the Solutions Factors

Factor	Summary
Factor SA1: Bear Conservation Advocates	Parks Canada must take a stronger stance towards prioritizing ecological integrity in BNP, bears need to be a higher priority in provincial management, and human use needs to be restricted. National Parks should not be managed for people over bears, and when one area of the park is closed for bear management, another one does not need to be opened for recreation.
Factor SA2: Anthropocentric Habitat Managers	The quality and configuration of bear habitat needs to be modified to keep bears and people separate and to reduce human-bear conflict. National Parks should be managed for people to see and learn things, managers should not overemphasize the conservation function of National Parks, and ecological integrity does not need to be a stronger priority in BNP. Human use and development should not be restricted further or designed around ecological constraints.
Factor SA3: Anthropocentric Scientific Managers	The integration of scientific management and research needs to be tightened, scientists and decision makers should be clearer about the implications of science for bears, and Banff's history for tourism and ecological integrity needs to be kept in mind. Our value system does not need to change, and growth on provincial lands adjacent to BNP and human use in BNP do not need to be restricted.
Factor SA4: Cohabitation Diplomats	We need to find ways to enable humans and grizzly bears to cohabit in the same ecosystem by minimizing bear habituation. We need to increase participation and communication with Park residents and emphasize the conservation function of National Parks. Bear habitat and its configuration need not be modified, and specific objectives need not be developed for habitat areas. There is no need to open areas for recreation when other areas are closed for grizzly bear management.
All Factors: Areas of Agreement	Build an appreciation for grizzly bears among recreational users and develop a more concerted management effort among agencies, industry, and other stakeholders. There is no need to open areas for recreational use when other areas are closed for grizzly bear management, and it is not necessary to increase habitat in the park to avoid bears coming into conflict with agricultural operations.

3.3.5.1 Factor SA1: Bear Conservation Advocates

Management and Participation

Unlike the other factors, Factor SA1 strongly supports making bears a higher priority in provincial management (S04) and firmly believes that Parks Canada should take a stronger stance towards prioritizing ecological integrity in BNP (S20) (see Table 3.19 for the rankings of all of the statements that characterize Factor SA1). This group emphasizes the need for a more formal process between Parks Canada and the provincial agencies for managing bears by developing a multiagency group (S15) and for a more concerted management effort among agencies, industry, and people who do things on the land (S21). This view also moderately agrees with improving the communication structure among various parties that have a role to play in grizzly bear protection (S27).

Human Use and Values

Factor SA1 strongly believes in designing human use around ecological constraints (S25). In stark contrast to the other factors, this group firmly rejects the views that National Parks are not game preserves and should be managed for people to see and learn things (S07) and that more restrictions on human use are not needed (S01). This factor also clearly disagrees that it is important to find ways for humans and grizzly bears to cohabit in the same ecosystem (S23) or to keep in mind BNP's history for tourism (S16). Factor SA1 firmly supports the view that we need to change our value system and value other things besides profit if we want bears on the landscape (S22).

Habitat and Research

Factor SA1 firmly opposes the view that when management closes one area of BNP for grizzly bear management, they have to open another area for recreational opportunity (S09). In contrast to the other factors, Factor SA1 also clearly rejects the statement that collaring and drugging bears should be kept to a minimum because these techniques completely change a bear's behaviour (S13).

Participant Affiliation

Ten participants are pure representations of Factor SA1. The participants are affiliated with environmental organizations, provincial agencies, a federal agency, and a commercial business, and they also include a local community member and anonymous participants. In addition, two participants are confounded. One of the confounded participants is significantly loaded on both Factor SA1 and Factor SA2 and affiliated with a federal agency, and the other one is significantly loaded on both Factor SA1 and Factor SA4 and affiliated with an environmental organization.

Table 3.19 Statements Characterizing Factor SA1: Bear Conservation Advocates

Statements supported by Factor SA1 and the corresponding factor scores are identified with dark grey shading. Statements not supported by Factor SA1 and the corresponding factor scores are identified with light grey shading. Statistically distinguishing factor scores (p<0.05) for Factor SA1 are identified in bold.

No.	Statement	Factor			
		SA1	SA2	SA3	SA4
S20	Parks Canada must take a stronger stance towards prioritizing ecological integrity in Banff National Park.	**4**	-4	-2	1
S04	Make bears a higher priority in provincial management. In Alberta, create bold, legally accountable legislation that makes government manage for the needs of grizzly bears.	**4**	0	-3	0
S22	We need to change our value system and value other things besides profit if we want bears on the landscape. We are compromising our long term well-being for short term material gains of wealth and power.	4	-2	-4	3
S15	Develop a more formal process between Parks Canada and the provincial agencies for managing bears by developing a multiagency group to deal with grizzly bear management that has some power to influence decisions.	3	2	0	-2
S25	Design human use around ecological constraints.	3	-3	-1	2
S21	We need a more concerted management effort between the province, Parks Canada, industry, and people who do things on the land.	3	3	1	2
S27	Improve the communication structure between various parties that have a role to play in grizzly bear protection. Develop a standardized protocol for information sharing between organizations.	**2**	0	0	-1
S23	Find ways so that humans and grizzly bears can co-habitate in the same ecosystem by minimizing bear habituation. Our biggest mistake in management has been to designate separate spaces for bears and humans.	-3	0	-3	4
S13	Keep collaring and drugging bears to a minimum because these techniques completely change a bear's behaviour and then you're no longer studying wild bears. This is the bear's National Park too.	**-3**	1	-1	0
S16	We need to keep in mind the historical context for ecological integrity. People think that Banff National Park is Eden, but in fact Banff history was for tourism.	**-3**	1	3	-1
S07	National Parks are not game preserves, they should be managed for people to come here to see and learn things.	**-4**	4	3	-1
S01	Restricting human use doesn't have to be the answer. Human use has already been restricted in the areas most important for grizzly bears and we don't need more restrictions.	**-4**	4	4	-1
S09	When management closes one area of the Park for grizzly bear management, they have to open another area for recreational opportunity.	-4	-1	-3	-4

3.3.5.2 Factor SA2: Anthropocentric Habitat Managers

Management and Participation

Factor SA2 feels strongly that a more concerted management effort is needed among the province, Parks Canada, industry, and other stakeholders (S21) (see Table 3.20 for the rankings of all of the statements that characterize Factor SA2). This group explicitly opposes the view that Parks Canada must take a stronger stance towards prioritizing ecological integrity in BNP (S20) and clearly supports increasing participation and communication with park residents (S08).

Human Use and Values

Factor SA2 strongly believes that human use has already been restricted sufficiently (S01), firmly opposes further restrictions in BNP (S14), and feels strongly that National Parks are not game preserves and should be managed for people to see and learn things (S07). Furthermore, this group firmly rejects the statement that managers should say outright that the function of a National Park is a conservation function and that someone should say no to the next round of development expansion (S24). Unlike the other factors, this narrative is firmly against designing human use around ecological constraints (S25). This factor also moderately disagrees with the view that we need to change our value system and value other things besides profit if we want bears on the landscape (S22).

Habitat and Research

In stark contrast to the other factors, Factor SA2 strongly supports creating bear habitat in the wilderness areas in the backcountry to keep bears and people separate (S10) and changing the configuration of habitat to reduce the potential for conflict between humans and bears, such as getting rid of high quality bear habitat near human development (S28). This group does not support using less invasive research on grizzly bears and questioning research as a mandate for National Parks (S05) nor does it support tightening the integration of scientific management and research (S02).

Participant Affiliation

Four participants are pure representations of Factor SA2. The participants are affiliated with a federal agency, an outdoor recreation organization, and a commercial business, and they also include a local community member. In addition, one participant is significantly loaded on both Factor SA1 and Factor SA2 and affiliated with a federal agency.

Table 3.20 Statements Characterizing Factor SA2: Anthropocentric Habitat Managers

Statements supported by Factor SA2 and the corresponding factor scores are identified with dark grey shading. Statements not supported by Factor SA2 and the corresponding factor scores are identified with light grey shading. Statistically distinguishing factor scores (p<0.05) for Factor SA2 are identified in bold.

No.	Statement	Factor			
		SA1	SA2	SA3	SA4
S10	Create bear habitat in wilderness areas in the backcountry, outside of communities and development areas, to keep bears and people separate.	-1	**4**	-1	-3
S07	National Parks are not game preserves, they should be managed for people to come here to see and learn things.	-4	4	3	-1
S01	Restricting human use doesn't have to be the answer. Human use has already been restricted in the areas most important for grizzly bears and we don't need more restrictions.	-4	4	4	-1
S21	We need a more concerted management effort between the province, Parks Canada, industry, and people who do things on the land.	3	3	1	2
S28	Change the configuration of habitat to reduce the potential for conflict between humans and bears, such as getting rid of high quality bear habitat near human development.	1	**3**	0	-4
S08	Increase participation and communication with park residents.	-1	3	1	4
S22	We need to change our value system and value other things besides profit if we want bears on the landscape. We are compromising our long term well-being for short term material gains of wealth and power.	4	**-2**	-4	3
S02	Tighten the integration of scientific management and research. Management actions should be directly coupled to the outcomes of research.	0	-3	4	-2
S25	Design human use around ecological constraints.	3	**-3**	-1	2
S05	Use less invasive research on grizzly bears and strictly monitor the population. Research is not a mandate for National Parks, and parks are not a lab.	-2	-3	1	-3
S14	Restrict human use in the Park, create areas where bears can live on the landscape and meet their year round needs.	0	-4	-4	1
S20	Parks Canada must take a stronger stance towards prioritizing ecological integrity in Banff National Park.	4	**-4**	-2	1
S24	Managers should say outright that the function of a National Park is a conservation function. Someone needs to say no to the next round of development expansion.	-1	**-4**	-2	4

3.3.5.3 Factor SA3: Anthropocentric Scientific Managers

Management and Participation

Unlike the other factors, Factor SA3 strongly opposes making bears a higher priority in provincial management (S04) (see Table 3.21 for the rankings of all of the statements that characterize Factor SA3). This narrative also moderately disagrees with the view that Parks Canada must take a stronger stance towards prioritizing ecological integrity in BNP (S20). Similarly to Factors SA1 and SA4, this group clearly supports building an appreciation for grizzly bears among recreational users (S12).

Human Use and Values

Like Factor SA2, this view strongly opposes restricting human use in BNP (S01) and creating areas where bears can meet their year-round needs (S14), and feels strongly that National Parks should be managed for people to see and learn things (S07). Factor SA3 agrees even more strongly than Factor SA2 that people need to keep in mind Banff's historical context and tourism (S16). In contrast to all of the other factors, however, Factor SA3 firmly rejects limiting growth on provincial lands adjacent to BNP (S03). This factor strongly disagrees that it is important to find ways for humans and grizzly bears to cohabit in the same ecosystem (S23), and also firmly disagrees that people need to change their value system to value other things besides profit if they want bears on the landscape (S22).

Habitat and Research

Similarly to Factors SA1 and SA4, Factor SA3 clearly opposes the view that when management closes one area of BNP for grizzly bear management, they have to open another area for recreational opportunity (S09). Unlike the other factors, this group distinctly supports tightening the integration of scientific management and research (S02) and feels strongly that scientists and decision-makers should be clearer about what the science indicates is in the interest of bears (S17).

Participant Affiliation

Two participants are pure representations of Factor SA3, and they are affiliated with an outdoor recreation organization and a commercial business.

Table 3.21 Statements Characterizing Factor SA3: Anthropocentric Scientific Managers

Statements supported by Factor SA3 and the corresponding factor scores are identified with dark grey shading. Statements not supported by Factor SA3 and the corresponding factor scores are identified with light grey shading. Statistically distinguishing factor scores (p<0.05) for Factor SA3 are identified in bold.

No.	Statement	Factor			
		SA1	SA2	SA3	SA4
S02	Tighten the integration of scientific management and research. Management actions should be directly coupled to the outcomes of research.	0	-3	**4**	-2
S01	Restricting human use doesn't have to be the answer. Human use has already been restricted in the areas most important for grizzly bears and we don't need more restrictions.	-4	4	4	-1
S12	Build an appreciation for grizzly bears among recreational users. The issue of management comes down to managing people.	2	1	4	3
S07	National Parks are not game preserves, they should be managed for people to come here to see and learn things.	-4	4	3	-1
S17	Scientists and decision makers should be clearer about what the science indicates is in the interest of bears.	-1	-2	**3**	-1
S16	We need to keep in mind the historical context for ecological integrity. People think that Banff National Park is Eden, but in fact Banff history was for tourism.	-3	1	**3**	-1
S20	Parks Canada must take a stronger stance towards prioritizing ecological integrity in Banff National Park.	4	-4	**-2**	1
S09	When management closes one area of the Park for grizzly bear management, they have to open another area for recreational opportunity.	-4	-1	-3	-4
S04	Make bears a higher priority in provincial management. In Alberta, create bold, legally accountable legislation that makes government manage for the needs of grizzly bears.	4	0	-3	0
S23	Find ways so that humans and grizzly bears can co-habitate in the same ecosystem by minimizing bear habituation. Our biggest mistake in management has been to designate separate spaces for bears and humans.	-3	0	-3	4
S14	Restrict human use in the Park, create areas where bears can live on the landscape and meet their year round needs.	0	-4	-4	1
S22	We need to change our value system and value other things besides profit if we want bears on the landscape. We are compromising our long term well-being for short term material gains of wealth and power.	4	-2	**-4**	3
S03	Limit growth on provincial lands adjacent to the Park.	2	2	**-4**	2

3.3.5.4 Factor SA4: Cohabitation Diplomats

Management and Participation

Unlike the other factors, Factor SA4 does not have strong views about the structure and functioning of management (S21, S20, S04 and S15) (see Table 3.22 for the rankings of all of the statements that characterize Factor SA4). However, this group clearly supports increasing participation and communication with park residents (S08) and building an appreciation for grizzly bears among recreational users (S12).

Human Use and Values

In contrast to the other three factors, this narrative strongly and uniquely supports finding ways for humans and grizzly bears to cohabit in the same ecosystem by minimizing bear habituation (S23) and feels that managers should say outright that the function of a National Park is a conservation function (S24). This group clearly agrees with Factor SA1 in that they need to change their value system and value other things besides profit if they want bears on the landscape (S22).

Habitat and Research

Unlike Factor SA2, this view is clearly against habitat modification. Factor SA4 strongly opposes changing the configuration of habitat (S28), increasing habitat in BNP so that less bears move onto the plains (S26), and creating bear habitat in wilderness areas in the backcountry to keep bears and people separate (S10). This factor also firmly resists developing specific objectives for each habitat area (S11) and opening areas for recreational opportunity when other areas are closed for grizzly bear management (S09). Factor SA4 also strongly rejects the view that research should be less invasive on bears and that research is not a mandate for National Parks (S05).

Participant Affiliation

Two participants are pure representations of Factor SA4. One of the participants is affiliated with a federal agency, and the other one is an anonymous participant. In addition, one participant is significantly loaded on both Factor SA1 and Factor SA4 and affiliated with an environmental organization.

Table 3.22 Statements Characterizing Factor SA4: Cohabitation Diplomats

Statements supported by Factor SA4 and the corresponding factor scores are identified with dark grey shading. Statements not supported by Factor SA4 and the corresponding factor scores are identified with light grey shading. Statistically distinguishing factor scores (p<0.05) for Factor SA4 are identified in bold.

No.	Statement	Factor			
		SA1	SA2	SA3	SA4
S23	Find ways so that humans and grizzly bears can co-habitate in the same ecosystem by minimizing bear habituation. Our biggest mistake in management has been to designate separate spaces for bears and humans.	-3	0	-3	**4**
S08	Increase participation and communication with park residents.	-1	3	1	4
S24	Managers should say outright that the function of a National Park is a conservation function. Someone needs to say no to the next round of development expansion.	-1	-4	-2	**4**
S12	Build an appreciation for grizzly bears among recreational users. The issue of management comes down to managing people.	2	1	4	3
S22	We need to change our value system and value other things besides profit if we want bears on the landscape. We are compromising our long term well-being for short term material gains of wealth and power.	4	-2	-4	3
S26	Increase habitat in the Park for bears so that less bears move onto the plains and come into conflict with agricultural operations.	-2	-1	-2	-3
S05	Use less invasive research on grizzly bears and strictly monitor the population. Research is not a mandate for National Parks, and parks are not a lab.	-2	-3	1	-3
S10	Create bear habitat in wilderness areas in the backcountry, outside of communities and development areas, to keep bears and people separate.	-1	4	-1	-3
S11	Develop specific objectives for each habitat area. Figure out how many bear deaths can be tolerated in each area (demographic target), and how much habitat change is acceptable.	1	-1	-1	**-4**
S28	Change the configuration of habitat to reduce the potential for conflict between humans and bears, such as getting rid of high quality bear habitat near human development.	1	3	0	**-4**
S09	When management closes one area of the Park for grizzly bear management, they have to open another area for recreational opportunity.	-4	-1	-3	-4

3.3.5.5 Areas of Agreement

There are four statements of virtual consensus among the solutions factors (Table 3.23). All four factors support, to some extent, or are neutral about building an appreciation for grizzly bears among recreational users (S12) and developing a more concerted management effort among agencies, industry, and other stakeholders (S21). All factors oppose, to some extent, or are neutral about opening areas for recreational opportunity when other areas are closed for grizzly bear management (S09) and increasing habitat in BNP for bears so that less bears move onto the plains and come into contact with agricultural operations (S26).

Table 3.23 Statements of Virtual Consensus for the Solutions Factors

Statements of virtual consensus on the positive side and the corresponding factor scores are identified with dark grey shading. Statements of virtual consensus on the negative side and the corresponding factor scores are identified with light grey shading.

No.	Statement	Factor			
		SA1	SA2	SA3	SA4
S12	Build an appreciation for grizzly bears among recreational users. The issue of management comes down to managing people.	2	1	4	3
S21	We need a more concerted management effort between the province, Parks Canada, industry, and people who do things on the land.	3	3	1	2
S26	Increase habitat in the Park for bears so that less bears move onto the plains and come into conflict with agricultural operations.	-2	-1	-2	-3
S09	When management closes one area of the Park for grizzly bear management, they have to open another area for recreational opportunity.	-4	-1	-3	-4

3.3.6 Post-Q-Sort Interviews

In the post-Q-sort interviews, I asked the participants to comment on the statements in the problems and solutions Q sorts. The comments of the participants about the statements that were most like and most unlike their point of view predominantly reflected the factors with which the participants were most strongly affiliated. As a result, the post-Q-sort interviews provided additional support for the various viewpoints that emerged in the analysis of the Q sorts.

The participants found a number of statements in the Q samples to be unclear, contradictory, or irrelevant (Appendix A). Many participants had difficulty sorting statements that consisted of two sentences as they sometimes agreed with one part of the statement but disagreed with another or considered the issues to be unconnected. Sometimes the participants found the wording of the statements to be problematic, such as when they did not understand the meaning of a word in the statement or when the wording was perceived as unclear or inappropriate. Also, the topic of some statements was seen as irrelevant. For example, many participants felt that issues related to agriculture were not applicable to the Banff-Bow Valley.

The participants also brought up additional issues that they felt were not adequately represented by the statements in the Q samples (Appendix A). Some of the suggested additional themes included education and communication, the values and behaviour of people, human use and development, the IPS process and stakeholder involvement, decision making, Parks Canada, and transportation, among others. In particular, many participants commented on the lack of statements regarding the IPS process and the impacts of the railway and highway on grizzly bear mortality.

3.4 Discussion

3.4.1 Relationships between Problems and Solutions Factors

The way people define problems is often related to the solutions they support (Clark, Curlee, and Reading 1996; Dery 1984). In the policy sciences framework, the intellectual tasks of problem orientation are to clarify goals, assess trends, identify conditions, make projections, and create and evaluate alternatives (Rutherford et al. 2009; Chamberlain 2006). The problems Q sort included statements about goals, trends, conditions, and projections, whereas the solutions Q sort explored goals and alternatives (Chamberlain 2006). As in the before Q study, the after Q study revealed clear relationships between the problems and solutions factors related to grizzly bear management in the BBV (Figure 3.3).

All of the participants significantly associated with solutions factor SA1 were significantly affiliated with either problems factor PA1 or PA3. Of the 16 participants significantly associated with solutions factor SA1, 11 were significantly affiliated with problems factor PA1 and five with problems factor PA3. There is a moderate positive correlation between Factors PA1 and PA3 (0.36), which may partly explain why both of these problems factors are linked with solutions factor SA1.

All of the participants significantly associated with solutions factor SA2 were significantly affiliated with either problems factor PA1 or PA2. Of the five participants significantly associated with solutions factor SA2, three were significantly affiliated with problems factor PA1 and two with problems factor PA2. Factors PA1 and PA2 have a low negative correlation (-0.07).

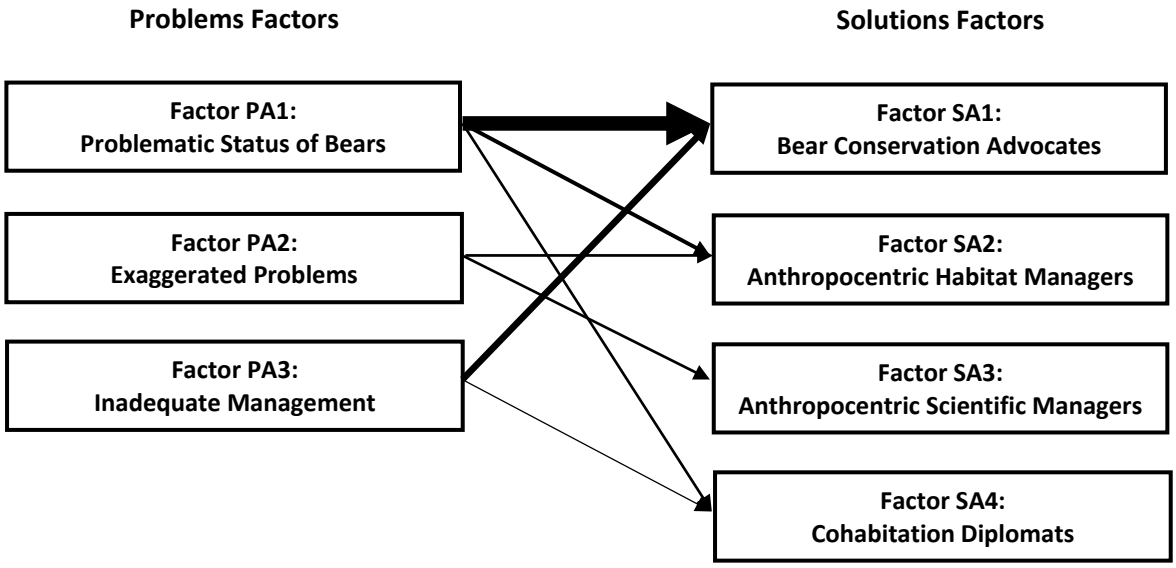
Both of the participants significantly associated with solutions factor SA3 were significantly affiliated with problems factor PA2.

All of the participants significantly associated with solutions factor SA4 were significantly affiliated with either problems factor PA1 or PA3. Of the three participants significantly associated with solutions factor SA4, two were significantly affiliated with problems factor PA1 and one was significantly affiliated with problems factor PA3.

There is a moderate positive correlation between Factors PA1 and PA3 (0.36), which may partly explain why both of these problems factors are linked with solutions factor SA4.

Figure 3.3 Relationships between the Problems and Solutions Factors

The weights of the arrows are approximately proportional to the number of significant connections between the problems and solutions factors.



3.4.2 Narratives

The linked problems and solutions factors form narratives that describe the different problem orientations of the participants (Table 3.24). The narratives represent all the connections involving a significant loading on a problems factor and on a solutions factor.

Table 3.24 Narratives

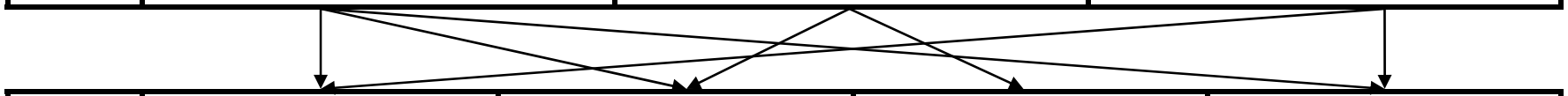
The narratives represent all the connections involving a significant loading on a problems factor and on a solutions factor. (Some participants were significantly loaded on more than one problems or solutions factor.)

Narrative			No. of Significant Connections		
Code	Problems Factor	Solutions Factor	Per Narrative	Per Solutions Factor	Total
A11	PA1	SA1	11	16	26
A31	PA3	SA1	5		
A12	PA1	SA2	3	5	
A22	PA2	SA2	2		
A23	PA2	SA3	2	2	
A14	PA1	SA4	2	3	
A34	PA3	SA4	1		

The problem orientations of the narratives are summarized in Figure 3.4 and described in the following sections.

Figure 3.4 Problem Orientations of the Narratives

Problem Orientation	Narratives A11, A12, and A14	Narratives A22 and A23	Narratives A31 and A34
Goals	• Shared management objectives (P18)	• Right number of bears for National Park (P28)	• Overall conservation strategy and management plan for grizzly bears (P02 and P19)
Trends	• Grizzly bear population vulnerable and not sustainable in the long term (P04 and P15) • BBV an important linkage (P16)	• Population status of grizzly bears acceptable (P26)	• Grizzly bear population vulnerable (P04)
Conditions	• Increased human use resulted in increased grizzly bear mortality (P13) • Management fragmented by jurisdiction (P18) • Achievements not celebrated (P36)	• Achievements not recognized or celebrated (P10 and P36) • Successful people management (P06) • Human activities unnecessarily sacrificed (P24) • Grizzly bears managed as endangered species (P37)	• Human use issues prioritized and grizzly bears jeopardized (P31) • Management is largely reactive (P29) • Interference from politics and special interest groups (P27) • Politicized decision making (P33)
Projections	• More challenges for residents due to bear activity (P14) • High risk of grizzly bear population being jeopardized (P16) • Improvements needed to maintain current population status (P15)		



Problem Orientation	Narratives A11 and A31	Narratives A12 and A22	Narrative A23	Narratives A14 and A34
Alternatives	• Change value system (S22) • Prioritize ecological integrity (S20) • Design human use around ecological constraints (S25) • Prioritize bears in provincial management (S04) • Develop multiagency management group (S15) • Develop more concerted management effort among stakeholders (S21)	• Stop restricting human use (S01) • Focus on human use in management of national parks (S07) • Increase participation and communication with park residents (S08) • Develop more concerted management effort among stakeholders (S21) • Change configuration of habitat (S28) • Create bear habitat in backcountry (S10)	• Stop restricting human use (S01) • Focus on human use in management of national parks (S07) • Build appreciation for grizzly bears among recreational users (S12) • Keep in mind historical context of BNP (S16) • Tighten integration of scientific management and research (S02) • Demand clearer communication from scientists and decision makers (S17)	• Change value system (S22) • Focus on conservation as function of National Parks (S24) • Find ways for humans and grizzly bears to cohabit (S23) • Increase participation and communication with park residents (S08) • Build appreciation for grizzly bears among recreational users (S12)

3.4.2.1 Narrative A11

Goals

Narrative A11 firmly believes that people need to change their value system if they want bears on the landscape (S22) and that the priority in national parks should be ecological integrity instead of human use (S07, S16, and S20). In addition, this group strongly agrees that the responsible agencies are lacking system-wide objectives for grizzly bear management (P18).

Trends

This narrative strongly agrees that the grizzly bear population is vulnerable (P04) and not doing well (P38). In addition, this group firmly believes that the grizzly bear population is not sustainable in the long term (P15) and that they are not on a trend to having too many bears in the area (P25). Furthermore, this narrative feels strongly that the regional grizzly bear populations are not healthy (P21) and that the Bow Valley is an important linkage for them (P16).

Conditions

Narrative A11 feels strongly that increasing human use has resulted in increased mortality rates of grizzly bears (P13) and that human activities have not been unnecessarily sacrificed for bear protection (P24). In addition, this group firmly believes that the policy discourse has not been hijacked by people with short-term views (P34). Furthermore, this narrative moderately agrees that the precautionary principle does not hold water in grizzly bear management (P17) and that the burden of proof is on the people defending wildlife rather than on developers if recreational opportunities are impacted (P35).

This narrative clearly thinks that management is fragmented by jurisdiction (P18) and that grizzly bear conservation is not taking up an excessive amount of resources (P30). Also, this group feels strongly that grizzly bears have not been over-managed (P32) and that the focus is still on talking about the challenges instead of celebrating the achievements in grizzly bear management (P36).

Projections

This group strongly agrees that there will be more challenges for residents with bear activity intruding into communities in the future (P14), that there is a high risk of the grizzly bear population being placed in jeopardy if they lose the connections and opportunities in that area (P16), and that the current population status will not be maintained without improvements (P15). Furthermore, this narrative firmly disagrees that they are bound to have more problems because of a trend to having too many bears in the area (P25) and that the trend of closing each area with a female grizzly in it is leading them to close Banff (P32).

Alternatives

Narrative A11 strongly supports building a more concerted management effort among federal and provincial agencies, industry, and other stakeholders (S21) and developing a multi-agency group to deal with grizzly bear management (S15). This group also moderately agrees with improving the communication structure among various parties that have a role to play in grizzly bear management (S27). Furthermore, this narratives feels strongly that Parks Canada must take a stronger stance towards prioritizing ecological integrity in BNP (S20) and that bears must become a higher priority in provincial management (S04).

This group firmly believes that people need to change their value system to appreciate other things besides profit and material gains (S22) and that human use needs to be designed around ecological constraints (S25). In addition, this narrative feels strongly that human use is not the main focus in the management of national parks (S07) and clearly opposes finding ways for humans and grizzly bears to cohabit in the same ecosystem (S23). Also, this group strongly prefers restricting human use (S01) instead of focusing on Banff's history for tourism (S16). Furthermore, this narrative firmly rejects opening areas for recreational opportunity when other areas are closed for grizzly bear management (S09) and does not oppose collaring and drugging bears (S13).

3.4.2.2 Narrative A31

Goals

Narrative A31 firmly believes that people need to change their value system if they want bears on the landscape (S22) and that the priority in national parks should be ecological integrity instead of human use (S07, S16, and S20). This group also feels strongly that the absence of an overall conservation strategy and a visionary plan for grizzly bear management is a serious problem (P02 and P19). In addition, this narrative moderately disagrees that it is not the role of a National Park to produce bears (P28).

Trends

This group strongly agrees that the grizzly bear population is vulnerable (P04) and not doing well (P38) and that the status and the mortality rate of the population are not acceptable (P26). This narrative also firmly rejects the claim that the population is at an equilibrium (P09).

Conditions

This narrative feels strongly that human activities have not been unnecessarily sacrificed for bear protection (P24). Furthermore, this group emphasizes that people management in BNP has not been successful (P06), that people are not having less of an impact on grizzly bears (P12), and that prioritizing human use issues in parks management has placed grizzly bears in jeopardy (P31). In addition, this narrative clearly agrees that decision making is politicized (P33) and that politics and special interest pleading have interfered with science and the mandates of conservation organizations (P27).

This group feels strongly that grizzly bear conservation is not taking up an excessive amount of resources (P30). Furthermore, this narrative firmly believes that management is largely reactive (P29). This group also somewhat disagrees with the views that achievements in grizzly bear management are not celebrated (P36) and that people tend to get caught up in the chicken little syndrome and think that the sky is falling (P10).

Projections

This narrative moderately agrees that there will be more challenges for residents with bear activity intruding into communities in the future (P14).

Alternatives

Narrative A31 strongly supports building a more concerted management effort among federal and provincial agencies, industry, and other stakeholders (S21) and developing a multi-agency group to deal with grizzly bear management (S15). This group also moderately agrees with improving the communication structure among various parties that have a role to play in grizzly bear management (S27). Furthermore, this narrative feels strongly that Parks Canada must take a stronger stance towards prioritizing ecological integrity in BNP (S20) and that bears must become a higher priority in provincial management (S04).

This narrative strongly believes that people need to change their value system to appreciate other things besides profit and material gains (S22) and that human use needs to be designed around ecological constraints (S25). This group also firmly agrees that human use is not the main focus in the management of national parks (S07) and clearly opposes finding ways for humans and grizzly bears to cohabit in the same ecosystem (S23). In addition, this narrative strongly prefers restricting human use (S01) instead of focusing on Banff's history for tourism (S16). Furthermore, this group firmly rejects opening areas for recreational opportunity when other areas are closed for grizzly bear management (S09) and does not oppose collaring and drugging bears (S13).

3.4.2.3 Narrative A12

Goals

Narrative A12 strongly believes that national parks should be managed for people to see and learn things (S07), firmly opposes prioritizing ecological integrity and conservation in national parks (S20 and S24), and moderately rejects the need to alter values (S22). In addition, this group clearly disagrees with directly coupling management actions to the outcomes of research (S02) but nonetheless supports research in national parks (S05). Furthermore, this narrative feels strongly that the responsible agencies are lacking system-wide objectives for grizzly bear management (P18).

Trends

This group feels strongly that the grizzly bear population is vulnerable (P04), not doing well (P38), and not sustainable in the long term (P15). Furthermore, this narrative firmly believes that they are not on a trend to having too many bears in the area (P25) and that the regional populations are not healthy (P21). In addition, this group strongly agrees that the Bow Valley is an important linkage for the regional population (P16).

Conditions

Narrative A12 feels strongly that increasing human use has resulted in increased mortality rates of grizzly bears (P13) and that human activities in BNP have not been unnecessarily sacrificed for grizzly bear protection (P24). In addition, this group firmly believes that the policy discourse has not been hijacked by people with short-term views (P34). Furthermore, this narrative moderately agrees that the precautionary principle does not hold water in grizzly bear management (P17) and that the burden of proof is on the people defending wildlife rather than on developers if recreational opportunities are impacted (P35).

This group strongly agrees that, instead of celebrating their achievements in grizzly bear management, they continue to talk about the challenges (P36). However, this narrative also clearly thinks that management is fragmented by jurisdiction (P18). In addition, this group firmly believes that grizzly bears have not been over-managed (P32) and that grizzly bear conservation is not taking up an excessive amount of resources (P30).

Projections

This narrative feels strongly that there will be more challenges for residents with bear activity intruding into communities in the future (P14), that the current population status of grizzly bears will not be maintained without improvements (P15), and that there is a high risk of the grizzly bear population being placed in jeopardy if they lose the connections and opportunities in that area (P16). Furthermore, this group firmly opposes the statements that they are bound to have more problems because of a trend toward having too many bears in the area (P25) and that the trend of closing each area with a female grizzly in it is leading them to close Banff (P32).

Alternatives

Narrative A12 firmly opposes Parks Canada taking a stronger stance towards prioritizing ecological integrity in BNP (S20). In addition, this group strongly supports developing a more concerted management effort among federal and provincial agencies, industry, and other stakeholders (S21) and increasing participation and communication with park residents (S08).

This narrative clearly rejects restricting human use in the park (S01 and S14) and emphasizing conservation as the function of national parks (S24). In addition, this group strongly supports a focus on human use in parks management (S07) and firmly opposes designing human use around ecological constraints (S25). Furthermore, this narrative moderately agrees that people do not need to change their value system (S22).

This group strongly supports changing the configuration of habitat to reduce the potential for conflict between humans and bears (S28) and creating bear habitat in the backcountry to keep bears and people separate (S10). In addition, this narrative strongly disagrees that they should use less invasive research on grizzly bears (S05) and that the integration of scientific management and research should be tightened (S02).

3.4.2.4 Narrative A22

Goals

Narrative A22 strongly believes that national parks should be managed for people to see and learn things (S07), firmly opposes prioritizing ecological integrity and conservation in national parks (S20 and S24), and moderately rejects the need to alter values (S22). In addition, this group clearly disagrees with directly coupling management actions to the outcomes of research (S02) but nonetheless supports research in national parks (S05).

This narrative firmly rejects the statement that there is a lack of an overall conservation strategy for grizzly bears (P02). In addition, this group strongly believes that it is not the role of a national park to produce bears but to have the right number of bears for the park itself (P28) and clearly opposes the view that the Bow Valley needs to be a source of bears to increase the regional population (P22).

Trends

This narrative feels strongly that the population status of grizzly bears is acceptable (P26), that they are not on a trend to having too many bears in the area (P25), and that grizzly bear populations are not shrinking elsewhere in Alberta (P22). This group also moderately agrees that the grizzly bear population is at an equilibrium (P09) and somewhat disagrees that the population status is not sustainable in the long term (P15).

Conditions

This narrative firmly believes that human activities in BNP have been unnecessarily sacrificed for grizzly bear protection (P24) and strongly disagrees that increasing human use has resulted in increased mortality rates of grizzly bears (P13). In addition, this group emphasizes that people management in BNP has been successful (P06), that human use issues do not receive priority in parks management (P31), and that the ecosystem is not overwhelmed by human pressure (P08). Furthermore, this narrative strongly disagrees that the precautionary principle does not hold water in grizzly bear management (P17). This group also moderately agrees that there is a false crisis mentality spurred by interest groups (P01) but somewhat disagrees that politics and special interest pleading have interfered with science and organizational mandates (P27).

This narrative strongly agrees that, instead of celebrating their achievements in grizzly bear management, they continue to talk about the challenges (P36) and that Parks Canada's successes in grizzly bear management are not recognized (P10). In addition, this group firmly believes that grizzly bears are managed as if they were an endangered species (P37).

Projections

This narrative strongly opposes the claim that they are bound to have more problems because of a trend toward having too many bears in the area (P25) and moderately disagrees that the current population status will not be maintained without improvements (P15).

Alternatives

Narrative A22 firmly opposes Parks Canada taking a stronger stance towards prioritizing ecological integrity in BNP (S20). In addition, this group strongly supports developing a more concerted management effort among federal and provincial agencies, industry, and other stakeholders (S21) and increasing participation and communication with park residents (S08).

This narrative clearly rejects restricting human use in the park (S01 and S14) and emphasizing conservation as the function of national parks (S24). In addition, this group strongly supports a focus on human use in parks management (S07) and firmly opposes designing human use around ecological constraints (S25). Furthermore, this narrative moderately agrees that people do not need to change their value system (S22).

This group strongly supports changing the configuration of habitat to reduce the potential for conflict between humans and bears (S28) and creating bear habitat in the backcountry to keep bears and people separate (S10). In addition, this narrative strongly disagrees that they should use less invasive research on grizzly bears (S05) and that the integration of scientific management and research should be tightened (S02).

3.4.2.5 Narrative A23

Goals

Narrative A23 strongly believes that national parks should be managed for people to see and learn things (S07) and firmly rejects the need to alter values (S22). In addition, this group emphasizes Banff's history for tourism and its context for ecological integrity (S16) and moderately opposes prioritizing ecological integrity in national parks (S20). Furthermore, this narrative feels strongly that management actions should be directly coupled to the outcomes of research (S02).

This group firmly rejects the statement that there is a lack of an overall conservation strategy for grizzly bears (P02). In addition, this narrative strongly believes that it is not the role of a national park to produce bears but to have the right number of bears for the park itself (P28) and clearly opposes the view that the Bow Valley needs to be a source of bears to increase the regional population (P22).

Trends

This narrative feels strongly that the population status of grizzly bears is acceptable (P26), that they are not on a trend to having too many bears in the area (P25), and that grizzly bear populations are not shrinking elsewhere in Alberta (P22). This group also moderately agrees that the grizzly bear population is at an equilibrium (P09) and somewhat disagrees that the population status is not sustainable in the long term (P15).

Conditions

This narrative firmly believes that human activities in BNP have been unnecessarily sacrificed for grizzly bear protection (P24) and strongly disagrees that increasing human use has resulted in increased mortality rates of grizzly bears (P13). In addition, this group emphasizes that people management in BNP has been successful (P06), that human use issues do not receive priority in parks management (P31), and that the ecosystem is not overwhelmed by human pressure (P08). Furthermore, this narrative strongly disagrees that the precautionary principle does not hold water in grizzly bear management (P17). This group also moderately agrees that there is a false crisis mentality spurred by interest groups (P01) but somewhat disagrees that politics and special interest pleading have interfered with science and organizational mandates (P27).

This narrative strongly agrees that, instead of celebrating their achievements in grizzly bear management, they continue to talk about the challenges (P36) and that Parks Canada's successes in grizzly bear management are not recognized (P10). In addition, this group firmly believes that grizzly bears are managed as if they were an endangered species (P37).

Projections

This narrative strongly opposes the claim that they are bound to have more problems because of a trend toward having too many bears in the area (P25) and moderately disagrees that the current population status will not be maintained without improvements (P15).

Alternatives

Narrative A23 strongly rejects making bears a higher priority in provincial management (S04) and moderately opposes Parks Canada taking a stronger stance towards prioritizing ecological integrity in BNP (S20). In addition, this group firmly believes in building an appreciation for grizzly bears among recreational users (S12).

This narrative strongly supports a focus on human use in parks management (S07) and firmly opposes restricting human use in the park (S01 and S14). In addition, this group clearly supports keeping in mind Banff's history for tourism (S16) and strongly rejects limiting growth on provincial lands adjacent to the park (S03). Furthermore, this narrative firmly disagrees with finding ways for humans and grizzly bears to cohabit in the same ecosystem (S23) and clearly thinks that people are not compromising their long-term well-being for short term material gains of wealth and power (S22).

This group strongly believes that the integration of scientific management and research should be tightened (S02) and that scientists and decision-makers should be clearer about what the science indicates (S17). In addition, this narrative firmly opposes opening areas for recreational opportunity when other areas are closed for grizzly bear management (S09).

3.4.2.6 Narrative A14

Goals

Narrative A14 firmly believes that people need to change their value system if they want bears on the landscape (S22) and also supports research as a justified function for national parks (S05). Furthermore, this group emphasizes that the function of national parks is conservation (S24) and firmly opposes developing specific objectives about demographics and habitat change for each habitat area (S11). In addition, this narrative strongly agrees that the responsible agencies are lacking system-wide objectives for grizzly bear management (P18).

Trends

This group strongly agrees that the grizzly bear population is vulnerable (P04) and not doing well (P38). In addition, this narrative firmly believes that the grizzly bear population is not sustainable in the long term (P15) and that they are not on a trend to having too many bears in the area (P25). Furthermore, this group feels strongly that the regional grizzly bear populations are not healthy (P21) and that the Bow Valley is an important linkage for them (P16).

Conditions

Narrative A14 strongly believes that increasing human use has resulted in increased mortality rates of grizzly bears (P13) and that human activities have not been unnecessarily sacrificed for bear protection (P24). In addition, this group strongly agrees that the policy discourse has not been hijacked by people with short-term views (P34).

This narrative firmly believes that management is fragmented by jurisdiction (P18), that grizzly bear conservation is not taking up an excessive amount of resources (P30), and that grizzly bears have not been over-managed (P32). In addition, this group feels strongly that the focus is still on talking about the challenges instead of celebrating the achievements in grizzly bear management (P36). Furthermore, this narrative moderately agrees that the precautionary principle does not hold water in grizzly bear management (P17) and that the burden of proof is on the people defending wildlife rather than on developers if recreational opportunities are impacted (P35).

Projections

This group feels strongly that there will be more challenges for residents with bear activity intruding into communities in the future (P14), that there is a high risk of the grizzly bear population being placed in jeopardy if they lose the connections and opportunities in that area (P16), and that the current population status will not be maintained without improvements (P15). In addition, this narrative firmly disagrees that they are bound to have more problems because of a trend to having too many bears in the area (P25) and that the trend of closing each area with a female grizzly in it is leading them to close Banff (P32).

Alternatives

Narrative A14 strongly supports finding ways for humans and grizzly bears to cohabit in the same ecosystem (S23), building an appreciation for grizzly bears among recreational users (S12), and increasing participation and communication with park residents (S08). In addition, this group firmly believes that people need to change their value system to appreciate other things besides profit and material gains (S22) and strongly favours conservation as the function of national parks (S24).

This narrative firmly rejects opening areas for recreational opportunity when other areas are closed for grizzly bear management (S09), is open to bears moving onto the plains (S26), and does not oppose invasive research on grizzly bears (S05). In addition, this group strongly opposes modifying habitat and changing its configuration (S10 and S28) as well as developing specific objectives for each habitat area (S11).

3.4.2.7 Narrative A34

Goals

Narrative A34 firmly believes that people need to change their value system if they want bears on the landscape (S22) and also supports research as a justified function of national parks (S05). Furthermore, this group emphasizes that the function of national parks is conservation (S24) and firmly opposes developing specific objectives about demographics and habitat change for each habitat area (S11). In addition, this narrative feels strongly that the absence of an overall conservation strategy and a visionary plan for grizzly bear management is a serious problem (P02 and P19) and moderately disagrees that it is not the role of a National Park to produce bears (P28).

Trends

This group strongly agrees that the grizzly bear population is vulnerable (P04) and not doing well (P38) and feels that the status and the mortality rate of the population are not acceptable (P26). In addition, this narrative firmly rejects the claim that the population is at an equilibrium (P09).

Conditions

Narrative A34 feels strongly that human activities have not been unnecessarily sacrificed for bear protection (P24). Furthermore, this group emphasizes that people management in BNP has not been successful (P06), that people are not having less of an impact on bears (P12), and that prioritizing human use issues in parks management has placed grizzly bears in jeopardy (P31). In addition, this narrative firmly believes that decision making is politicized (P33) and that politics and special interest pleading have interfered with science and the mandates of conservation organizations (P27).

This group feels strongly that grizzly bear conservation is not taking up an excessive amount of resources (P30) and that management is largely reactive (P29). Furthermore, this narrative somewhat disagrees with the views that achievements in grizzly bear management are not celebrated (P36) and that people tend to get caught up in the chicken little syndrome and think that the sky is falling (P10).

Projections

This narrative moderately agrees that there will be more challenges for residents with bear activity intruding into communities in the future (P14).

Alternatives

Narrative A34 strongly supports finding ways for humans and grizzly bears to cohabit in the same ecosystem (S23), building an appreciation for grizzly bears among recreational users (S12), and increasing participation and communication with park residents (S08). In addition, this group firmly believes that people need to change their value system to appreciate other things besides profit and material gains (S22) and strongly favours conservation as the function of national parks (S24).

This narrative firmly rejects opening areas for recreational opportunity when other areas are closed for grizzly bear management (S09), is open to bears moving onto the plains (S26), and does not oppose invasive research on grizzly bears (S05). Furthermore, this group strongly opposes modifying habitat and changing its configuration (S10 and S28) as well as developing specific objectives for each habitat area (S11).

3.4.2.8 Relationships among Narratives

Narratives A11 and A14 share a common understanding of the problem, but do not agree with each other about solutions. Narratives A31 and A34 also share a common understanding of the problem (which is different from that of A11 and A14), but do not agree with each other about solutions. In contrast, A11 and A31 agree with each other about solutions, but differ in their understandings of the problem. Finally, narratives A14 and A34 also agree with each other about solutions (which are different from those of A11 and A31), but differ in their understandings of the problem.

In spite of their differences, narratives A11, A31, A14, and A34 also have some views in common. These narratives all share some goals related to values, research, and management (P18, S05, and S22). In addition, they are all very concerned about the population status of grizzly bears and share the perception that human use is having a detrimental effect on grizzly bears (P04, P13, P24, P26, and P38). Furthermore, these narratives share some perspectives about institutions and management (P18 and P30) and agree with the projection that there will be more challenges for residents in the future (P14). In terms of their preferred alternatives, these narratives have largely compatible views about management and participation (S12 and S21) and also share some beliefs about values, human use, habitat, and research (S05, S09, S22, S25, and S26).

Similarly, narratives A12, A22 and A23 hold some similar views and diverge on other issues. Narratives A12 and A22 have contrasting views about the problems but agree on the solutions, whereas narratives A22 and A23 share an understanding of the problems but prefer different solutions.

Despite their diverging views, narratives A12, A22, and A23 also have some similarities. These narratives have compatible views about the goals related to human use and conservation (S07, S20, S22, and S24). In terms of trends, conditions, and projections, they agree that achievements are not celebrated (P36) and that they are not on a trend to having too many bears and more problems (P25). In addition, these narratives have many similar views about their preferred alternatives related to management, human use, and values (S01, S07, S14, S20, S22, and S24).

CHAPTER 4: CHANGES IN VIEWS

4.1 Introduction

This chapter explores changes in stakeholder views on grizzly bear management in the Banff-Bow Valley (BBV) between the summers of 2004 and 2008. The before Q study represents the views in the summer of 2004 and the after Q study represents the views in the summer of 2008. Between the before and after Q studies, three training workshops on Interdisciplinary Problem Solving (IPS) and two years of IPS group meetings took place. I explored changes in views by comparing the results of the before and after Q studies and by interviewing the participants about changes in their views and about factors that may have affected their views.

4.2 Comparisons between the Before and After Q Studies

4.2.1 Methods

To explore possible changes in views between the summers of 2004 and 2008, I compared the results of the before and after Q studies by conducting a Q method meta-analysis of the before and after factors and by examining changes in participant affiliations with the meta-factors.

4.2.1.1 Meta-Analysis

To explore the overall relationships among the before and after factors, I conducted a Q method meta-analysis of the before and after factors. To do this, I entered the model factor arrays from the before Q study and the after Q study into PQMethod as initial sorts. Otherwise, the meta-analysis involved the same methodological steps as the after Q study. The unrotated factor matrices and the Cattell's Scree Tests for the problems and solutions meta-analyses are shown in Appendix B.

In evaluating the different factor solutions for the meta-analyses, I placed the most weight on the number of unloaded factors, on the correlations between the meta-factors, and on theoretical considerations. As the analysis involved factor arrays instead of individual Q sorts, having multiple significant loadings and flags on each meta-factor was not an important requirement in the evaluation of the factor solutions. As the before and after Q studies had established that the views represented by the before and after factors existed in the BBV in the summers of 2004 and 2008, I only considered factor solutions in which all before and after factors were significantly loaded on a meta-factor.

For the problems meta-analysis, I selected the three-factor solution, which represented all the before and after factors and had low correlations between all the meta-factors. Meta-Factor 1 was bipolar and was split into two meta-factors, which represent the positive and negative dimensions of Meta-Factor 1. The positive dimension of Meta-Factor 1 remained as Meta-Factor 1, and the negative dimension of Meta-Factor 1 became Meta-Factor 2. The two subsequent meta-factors became Meta-Factors 3 and 4. In the remainder of this report, I refer to the four problems meta-factors as Meta-Factors PM1, PM2, PM3, and PM4.

For the solutions meta-analysis, I considered the factor solutions from the two-factor solution to the five-factor solution. I discarded the two-factor and three-factor solutions because they each included one unloaded factor. The four-factor and five-factor solutions both represented all the before and after factors and had acceptable correlations between the meta-factors. However, the four-factor solution had two after factors (Factors SA2 and SA3) significantly loaded on the same meta-factor, whereas the five-factor solution had those factors significantly loaded on different meta-factors. In the after Q study, Factors SA2 and SA3 had some similarities but represented distinctly different views on certain issues, and they had a low correlation (0.19). However, in the four-factor solution of the solutions meta-analysis, Factors SA2 and SA3 were both significantly loaded on Meta-Factor 2. In the five-factor solution of the solutions meta-analysis, Factor SA2 was significantly loaded on Meta-Factor 5, whereas Factor SA3 was significantly loaded on Meta-Factor 2. In the five-factor solution, Meta-Factors 2 and 5 had a moderate correlation (0.36). Similarly, Meta-Factors 1 and 4 had a moderate correlation (0.31) in both the four-factor and five-factor solutions. I decided that the distinct differences and

the merely moderate correlation between Meta-Factors 2 and 5 justified considering them as separate meta-factors. Therefore, I selected the five-factor solution for the solutions meta-analysis. In the remainder of this report, I refer to the five solutions meta-factors as Meta-Factors SM1, SM2, SM3, SM4, and SM5.

I used the Principal Components method to factor analyze the data and rotated the factors using the Varimax method. I followed the same criteria for flagging as in the after Q study. I then examined the factor arrays for the meta-factors and summarized the main views of each meta-factor. I have not included full descriptions of the meta-factors here due to the strong similarity between the before and after factors and the meta-factors (see Chamberlain 2006 for the full descriptions of the before factors, and see Chapter 3 of this report for the full descriptions of the after factors). The rotated factor matrices and the factor arrays for the problems and solutions meta-analyses are shown in Appendix B.

4.2.1.2 Changes in the Meta-Factor Affiliations of Participants

Of the 20 participants in the after Q study, 11 were involved in both the before Q study and the after Q study as well as the IPS group. To explore changes in the views of those 11 participants, I used PQMethod to compute the following correlations: 1) between their individual before Q sorts and their individual after Q sorts; 2) between their individual before Q sorts and the meta-factors; and 3) between their individual after Q sorts and the meta-factors. I then examined the affiliations of each participant's before and after Q sorts with the meta-factors based on their highest significant correlations with the problems meta-factors and their highest significant correlations with the solutions meta-factors. In addition to the highest significant correlations with the meta-factors, some participants' sorts were also significantly, but less strongly, correlated with other meta-factors. Due to the small number of participants involved in this component of the research, and the need to maintain the confidentiality of the identities of these participants, I cannot disclose the full correlation matrices or these secondary correlations of the participants' sorts with the meta-factors. Accordingly, I only report and discuss the highest significant correlations for each participant.

4.2.2 Results

4.2.2.1 Meta-Analysis

Overview of Before and After Factors

For ease of reference, the before and after problems factors are listed again in Table 4.1, and the before and after solutions factors are listed again in Table 4.2.

Table 4.1 Before and After Problems Factors
(see Chamberlain 2006 and Chapter 3 of this report)

Study	Factor ID	Factor Name
Before Q Study	PB1	Deficient Directives
	PB2	Exaggerated Problems
	PB3	Problematic Institutions
	PB4	Politicized Management
After Q Study	PA1	Problematic Status of Bears
	PA2	Exaggerated Problems
	PA3	Inadequate Management

Table 4.2 Before and After Solutions Factors
(see Chamberlain 2006 and Chapter 3 of this report)

Study	Factor ID	Factor Name
Before Q Study	SB1	Bear Conservation Advocates
	SB2	Process Reformers
	SB3	Habitat Modifiers
After Q Study	SA1	Bear Conservation Advocates
	SA2	Anthropocentric Habitat Managers
	SA3	Anthropocentric Scientific Managers
	SA4	Cohabitation Diplomats

Factor Loadings

The factor loadings for the problems meta-factors are shown in Table 4.3. Meta-Factor PM1 is defined by Factors PB2 and PA2 and is strongly dissimilar to Factors PB1 and PA3. Meta-Factor PM2 is defined by Factor PA3 and, to a lesser extent, Factor PB1 and is highly different from Factors PB2 and PA2. Meta-Factor PM3 is defined by Factors PB3 and PA1 and is also supported to a lesser extent by Factor PB1. Meta-Factor PM4 is strongly defined only by Factor PB4 but is also moderately supported by Factor PA3.

Table 4.3 Factor Loadings for the Problems Meta-Factors

Significant factor loadings (p<0.01) are identified in bold. Sorts that have significant loadings but are not flagged are identified with light grey shading. Flagged sorts are identified with dark grey shading.

Factor	PM1	PM2	PM3	PM4
PB1	**-0.70**	**0.70**	**0.58**	0.24
PB2	**0.91**	**-0.91**	-0.04	0.14
PB3	-0.05	0.05	**0.95**	-0.05
PB4	0.08	-0.08	0.00	**0.98**
PA1	-0.12	0.12	**0.95**	0.05
PA2	**0.88**	**-0.88**	-0.03	0.27
PA3	**-0.82**	**0.82**	0.19	0.42

The five-factor solution was selected to represent the solutions meta factors. The factor loadings for the solutions meta-factors are shown in Table 4.4. Meta-Factor SM1 is defined by Factors SB1 and SA1, and Meta-Factor SM2 is defined by Factors SB2 and SA3. Meta-Factor SM3 is defined only by Factor SB3, and Meta-Factor SM4 is defined only by Factor SA4. Meta-Factor SM5 is defined by Factor SA2 but is also moderately supported by SB2.

Table 4.4 Factor Loadings for the Solutions Meta-Factors

Significant factor loadings (p<0.01) are identified in bold.
Flagged sorts are identified with dark grey shading.

Factor	SM1	SM2	SM3	SM4	SM5
SB1	**0.94**	-0.04	-0.13	0.17	-0.10
SB2	0.13	**0.81**	0.03	-0.15	0.39
SB3	-0.08	-0.02	**0.99**	-0.07	0.08
SA1	**0.95**	-0.09	0.01	0.07	-0.09
SA2	-0.17	0.20	0.09	-0.01	**0.94**
SA3	-0.24	**0.92**	-0.04	-0.00	0.01
SA4	0.19	-0.09	-0.07	**0.97**	-0.01

Correlations

Among the problems meta-factors, Meta-Factors PM1 and PM2 have a strong negative correlation (-0.68) as they were originally the opposite dimensions of a bipolar factor (Table 4.5). All other correlations between the problems meta-factors are low.

Table 4.5 Correlations between the Problems Meta-Factors

High correlations (X≥0.5 or X≤-0.5) are identified in dark grey shading.

Factor	PM1	PM2	PM3	PM4
PM1	1.00	-0.68	-0.13	0.26
PM2	-0.68	1.00	0.27	0.29
PM3	-0.13	0.27	1.00	0.00
PM4	0.26	0.29	0.00	1.00

There are no strong correlations among the solutions meta-factors (Table 4.6). However, Meta-Factors SM1 and SM4 (0.31) as well as Meta-Factors SM2 and SM5 (0.36) have a moderate positive correlation. All other correlations between the solutions meta-factors are low.

Table 4.6 Correlations between the Solutions Meta-Factors

Moderate correlations (0.3≤X<0.5 or -0.3≥X>-0.5) are identified in light grey shading. High correlations (X≥0.5 or X≤-0.5) are identified in dark grey shading.

Factor	SM1	SM2	SM3	SM4	SM5
SM1	1.00	-0.22	-0.15	0.31	-0.26
SM2	-0.22	1.00	-0.01	-0.17	0.36
SM3	-0.15	-0.01	1.00	-0.16	0.18
SM4	0.31	-0.17	-0.16	1.00	-0.09
SM5	-0.26	0.36	0.18	-0.09	1.00

Problems Meta-Factors

I labeled the four problems meta-factors Exaggerated Problems (Meta-Factor PM1), Inadequate Management (Meta-Factor PM2), Problematic Status of Bears (Meta-Factor PM3), and Politicized Management (Meta-Factor PM4). I named the meta-factors according to the before or after factor they most strongly resembled. Each problems meta-factor and the areas of agreement among all the meta-factors are summarized in Table 4.7. The Q sample statements and factor scores for the problems meta-factors are shown in Appendix B.

Table 4.7 Summary of Factor Descriptions and Areas of Agreement for the Problems Meta-Factors

Meta-Factor	Summary
Meta-Factor PM1: Exaggerated Problems	Successes in bear management are not recognized, even though the status of the grizzly bear population is acceptable and people management in BNP has been successful. A National Park should not be a bear factory to provide bears for other areas. An overall conservation strategy for bears exists, human use issues do not receive greater priority than bears in Parks management, and an unrelenting tide of humanity has not descended on the region.
Meta-Factor PM2: Inadequate Management	There is no well organized management plan or conservation strategy for grizzly bears, management is largely reactive, and politics and special interest pleading have interfered with science and decision making. The bear population is vulnerable, human use issues receive greater priority than bears in Parks management, and people management has not been successful in BNP.
Meta-Factor PM3: Problematic Status of Bears	The grizzly bear population is vulnerable and not sustainable in the long term, bears have not been over-managed, and human activities have not been unnecessarily sacrificed in BNP for bear protection. The Bow Valley is an important linkage for the regional bear population, and increasing human use of grizzly bear habitat has resulted in increased mortality rates of grizzly bears.
Meta-Factor PM4: Politicized Management	Decision making is politicized, there is no visionary plan for grizzly bear management, and there will be more challenges with bears for residents. An unrelenting tide of humanity has descended on the region. A disproportionate amount of resources is not going into grizzly bear conservation, but there is enough funding to implement what needs to be done for grizzly bears. The Bow Valley should not be a regional source of bears.
All Meta-Factors: Areas of Agreement	The grizzly bear population is vulnerable and not doing well, there will be more challenges with bears for residents, and decision making is politicized. A disproportionate amount of resources is not going into grizzly bear conservation, the Bow Valley should not be a regional source of bears, and grizzly bears have not been over-managed. The policy discourse has not been hijacked, and compensation for livestock producers is adequate.

Solutions Meta-Factors

I labeled the five solutions meta-factors Bear Conservation Advocates (Meta-Factor SM1), Anthropocentric Scientific Managers (Meta-Factor SM2), Habitat Modifiers (Meta-Factor SM3), Cohabitation Diplomats (Meta-Factor SM4), and Anthropocentric Habitat Managers (Meta-Factor SM5). I named the meta-factors according to the before or after factor they most strongly resembled. Each solutions meta-factor and the areas of agreement among all the meta-factors are summarized in Table

4.8. The Q sample statements and factor scores for the solutions meta-factors are shown in Appendix B.

Table 4.8 Summary of Factor Descriptions and Areas of Agreement for the Solutions Meta-Factors

Meta-Factor	Summary
Meta-Factor SM1: Bear Conservation Advocates	Parks Canada must take a stronger stance towards prioritizing ecological integrity in BNP, bears need to be a higher priority in provincial management, and human use needs to be restricted. National Parks should not be managed for people over bears, and when one area of the park is closed for bear management, another one does not need to be opened for recreation.
Meta-Factor SM2: Anthropocentric Scientific Managers	The integration of scientific management and research needs to be tightened, scientists and decision makers should be clearer about the implications of science for bears, and we should build an appreciation for grizzly bears among recreational users. Our value system does not need to change, and growth on provincial lands adjacent to BNP and human use in BNP do not need to be restricted.
Meta-Factor SM3: Habitat Modifiers	When one area of the park is closed for bear management, another one needs to be opened for recreation. The quality and configuration of bear habitat needs to be modified to keep bears and people separate and to reduce human-bear conflict. The integration of scientific management and research does not need to be tightened, the conservation function of National Parks does not need to receive greater emphasis, and a more formal management process is not needed.
Meta-Factor SM4: Cohabitation Diplomats	We need to find ways to enable humans and grizzly bears to cohabit in the same ecosystem by minimizing bear habituation, by increasing participation and communication with Park residents, and by emphasizing the conservation function of National Parks. Bear habitat and its configuration does not need to be modified, and specific objectives need not be developed for habitat areas. There is no need to open areas for recreation when other areas are closed for grizzly bear management.
Meta-Factor SM5: Anthropocentric Habitat Managers	The quality and configuration of bear habitat needs to be modified to keep bears and people separate and to reduce human-bear conflict. National Parks should be managed for people to see and learn things, managers need not put greater emphasis on the conservation function of National Parks, and ecological integrity does not need to be a stronger priority in BNP. Human use and development need not be restricted further or designed around ecological constraints.
All Meta-Factors: Areas of Agreement	We should build an appreciation for grizzly bears among recreational users, increase participation and communication with park residents, and find a more effective way of including interests. We should focus on monitoring the trends of the grizzly bear population. Research in parks is appropriate, and we do not need to use less invasive research on grizzly bears. Human use in the park does not need to be restricted, and bears coming into conflict with agricultural operations are not a major problem.

4.2.2.2 Changes in Participant Affiliations with the Meta-Factors

In order to respect participant confidentiality, I am unable to disclose the before and after meta-factor correlations for individual participants in this part of the study. Therefore, the changes in the meta-factor affiliations can only be discussed on a general level, focusing on the highest significant meta-factor affiliations of the participants.

Of the 11 participants who were involved in both the before Q study and the after Q study as well as the IPS group, 8 were most strongly and significantly affiliated with the same problems meta-factor based on their before and after Q sorts, and 3 were most strongly and significantly affiliated with different problems meta-factors for their before and after sorts. The correlations between the before and after problems Q sorts of each of the participants ranged from moderate (0.36) to high (0.76), with an average of 0.59.

Of the three participants who were most strongly and significantly affiliated with different problems meta-factors for their before and after Q sorts, one moved from Meta-Factor PM1 (Exaggerated Problems) to Meta-Factor PM3 (Problematic Status of Bears), one from Meta-Factor PM2 (Inadequate Management) to Meta-Factor PM3 (Problematic Status of Bears), and one from Meta-Factor PM4 (Politicized Management) to Meta-Factor PM3 (Problematic Status of Bears).

Of the 11 participants who were involved in both the before Q study and the after Q study as well as the IPS group, 7 were most strongly and significantly affiliated with the same solutions meta-factor based on their before and after Q sorts, 2 were most strongly and significantly affiliated with different solutions meta-factors, and 2 were not significantly affiliated with any solutions meta-factor in either the before Q study or the after Q study, or both. The correlations between the before and after solutions Q sorts of each of the participants ranged from low (0.13) to high (0.92), with an average of 0.56.

Of the two participants who were most strongly and significantly affiliated with different solutions meta-factors in the before and after Q studies, one moved from Meta-Factor SM2 (Anthropocentric Scientific Managers) to Meta-Factor SM5 (Anthropocentric Habitat Managers), and the other moved from Meta-Factor SM3 (Habitat Modifiers) to Meta-Factor SM5 (Anthropocentric Habitat Managers).

The three participants whose problems meta-factor affiliations changed and the two participants whose solutions meta-factor affiliations changed did not overlap. As a result, 5 of the 11 participants were affiliated with different problems or solutions meta-factors in the before and after Q studies. Furthermore, some participants experienced other changes in their correlations that did not involve the highest significant meta-factor affiliations.

4.2.3 Discussion

The comparisons between the before and after Q studies revealed that there were strong similarities between some of the before and after factors. The problems meta-analysis revealed that Meta-Factor PM4 (Politicized Management), which is defined by Factor PB4 (Politicized Management), was the only problems meta-factor that was not significantly supported by any of the after factors. All the other problems meta-factors were significantly supported by both before and after factors. As a result, it appears that the view represented by problems Meta-Factor PM4 (Politicized Management) was significantly supported by participants only in the summer of 2004, but that the views represented by the other three problems meta-factors were significantly supported by participants both in the summer of 2004 and in the summer of 2008.

The solutions meta-analysis revealed that Meta-Factor SM3 (Habitat Modifiers), which is defined by Factor SB3 (Habitat Modifiers), was the only solutions meta-factor that was not significantly supported by any of the after factors. Furthermore, solutions Meta-Factors SM4 (Cohabitation Diplomats) and SM5 (Anthropocentric Habitat Managers), which are defined by Factors SA4 (Cohabitation Diplomats) and SA2 (Anthropocentric Habitat Managers), respectively, were not significantly supported by any of the before factors. Only solutions Meta-Factors SM1 (Bear Conservation Advocates) and SM2 (Anthropocentric Scientific Managers) were significantly supported by both before and after factors. As a result, it appears that the view represented by solutions Meta-Factor SM3 (Habitat Modifiers) was significantly supported by participants only in the summer of 2004 and that the views represented by solutions Meta-Factors SM4 (Cohabitation Diplomats) and SM5 (Anthropocentric Habitat Managers) were significantly supported by participants only in the summer of 2008.

However, solutions Meta-Factors SM1 (Bear Conservation Advocates) and SM2 (Anthropocentric Scientific Managers) were significantly supported by participants both in the summer of 2004 and in the summer of 2008.

Based on the meta-analyses, it seems that there have been some changes in stakeholder support for the views represented by the problems and solutions meta-factors between the summers of 2004 and 2008 (Table 4.9). Most of the views have stayed similar and retained support from stakeholders between the summers of 2004 and 2008 (problems Meta-Factors PM1 (Exaggerated Problems), PM2 (Inadequate Management), and PM3 (Problematic Status of Bears), and solutions Meta-Factors SM1 (Bear Conservation Advocates) and SM2 (Anthropocentric Scientific Managers)). However, two views appear to have lost support (problems Meta-Factor PM4 (Politicized Management) and solutions Meta-Factor SM3 (Habitat Modifiers)), and two new views seem to have emerged (solutions Meta-Factors SM4 (Cohabitation Diplomats) and SM5 (Anthropocentric Habitat Managers)) between the summers of 2004 and 2008.

Table 4.9 Changes in Stakeholder Support for the Meta-Factors

Meta-Factor			Stakeholder Support	
Q Sort	**ID**	**Name**	**2004**	**2008**
Problems Q Sort	PM1	Exaggerated Problems	X	X
	PM2	Inadequate Management	X	X
	PM3	Problematic Status of Bears	X	X
	PM4	Politicized Management	X	
Solutions Q Sort	SM1	Bear Conservation Advocates	X	X
	SM2	Anthropocentric Scientific Managers	X	X
	SM3	Habitat Modifiers	X	
	SM4	Cohabitation Diplomats		X
	SM5	Anthropocentric Habitat Managers		X

Possible causes for the changes in views between the summers of 2004 and 2008 could include changes in the views of the participants involved in both studies, or differences in the group of participants involved in the before and after Q studies, as only 55% of the participants in the after Q study were also involved in the before Q study.

However, an examination of the before and after views of the 11 participants who were involved in both the before Q study and the after Q study as well as the IPS group indicates that some substantial changes did occur in the actual views of these participants. Of these 11 participants, 5 experienced considerable changes in their views between the before and after Q studies, either with respect to the problems or the solutions. However, none of these participants changed their highest significant affiliation for both problems and solutions meta-factors (three participants changed views for problems but not solutions, and two participants changed views for solutions but not problems). Other changes in meta-factor affiliations also occurred that did not involve the highest significant meta-factor affiliations. Furthermore, the correlations between the before and after Q sorts of the participants varied greatly and averaged 0.59 for the problems Q sorts and 0.56 for the solutions Q sorts, suggesting that some substantial changes in the views of the participants did take place between the summers of 2004 and 2008.

Interestingly, the three participants whose problems meta-factor affiliations changed substantially moved from three different problems meta-factors (PM1 (Exaggerated Problems), PM2 (Inadequate Management), and PM4 (Politicized Management)) in the before Q study to Meta-factor PM3 (Problematic Status of Bears) in the after Q study. Similarly, the two participants whose solutions meta-factor affiliations changed substantially moved from two different solutions meta-factors (SM2 (Anthropocentric Scientific Managers) and SM3 (Habitat Modifiers)) in the before Q study to Meta-Factor SM5 (Anthropocentric Habitat Managers) in the after Q study. However, it is not possible to draw reliable conclusions about broader trends in the meta-factor affiliations due to the small number of participants that took part in both studies.

It is also noteworthy that one participant whose strongest problems meta-factor affiliation changed substantially moved from a problems meta-factor that was strongly supported only in the summer of 2004 (Meta-Factor PM4 (Politicized Management)) to a

problems factor that was strongly supported both in the summer of 2004 and in the summer of 2008 (Meta-Factor PM3 (Problematic Status of Bears). Furthermore, one participant whose strongest solutions meta-factor affiliation changed substantially moved from a solutions meta-factor that was strongly supported only in the summer of 2004 (Meta-Factor SM3 (Habitat Modifiers)) to a solutions factor that was strongly supported only in the summer of 2008 (Meta-Factor SM5 (Anthropocentric Habitat Managers)). In addition, one participant whose strongest solutions meta-factor affiliation changed substantially moved from a solutions meta-factor that was strongly supported both in the summer of 2004 and in the summer of 2008 (Meta-Factor SM2 (Anthropocentric Scientific Managers)) to a solutions factor that was strongly supported only in the summer of 2008 (Meta-Factor SM5 (Anthropocentric Habitat Managers)).

In addition to the changes in views about grizzly bear management, the participants could also have experienced changes in their views about other aspects of decision-making and other matters that were not revealed in this analysis due to the specific focus of the statements on grizzly bear management.

This study only included one participant who was involved in both the before Q study and the after Q study but not in the IPS process. Therefore, I was not able to compare the views of participants who were involved in both Q studies as well as the IPS process with the views of individuals who only participated in the two Q studies.

Several studies have used Q methodology to explore changes in views (Cuppen 2009; Raadgever 2009; Niemeyer 2004; Rodenbaugh 2001; Lipgar, Bair, and Fichtner 2000; Pelletier et al. 1999; Freie 1997; Brown 1977). Cuppen (2009) evaluated stakeholder perspectives before and after a collaborative dialogue in both a participant and a control group and found that the dialogue had a significant effect on the perspectives of the participants. Raadgever (2009) assessed stakeholder perspectives before and after collaborative research processes and found that the majority of participants experienced significant changes in their views during the collaborations.

Pelletier et al. (1999) explored participant views before and after a deliberative democracy process and found that the same factors were present both before and after the process but that significant changes in factor loadings took place. Niemeyer (2004) also examined the effect of a deliberative democracy process and found that support for competing symbolic perspectives declined and support for a pre-existing environmental consensus increased during the deliberation.

Lipgar, Bair, and Fichtner (2000) explored the effect of conference learning on the views of participants and staff and found that changes in views occurred during the conferences. Rodenbaugh (2001) studied the effect of experiential learning on the views of the participants and found that participants showed changes in views immediately after the workshop but that only a few participants maintained the changes after six weeks.

Brown (1977) measured the effect of reading a psychohistorical interpretation of Richard Nixon on student views of the president and found that reading the book had no significant effect on the perceptions of the students. Freie (1997) explored the effect of political campaign participation and found that the experimental group experienced significantly greater changes in views than the control group.

Overall, the studies exploring the effect of collaborative processes with Q methodology generally found that some changes in participant views did occur during the collaborations. The results of the present study are generally consistent with these previous findings.

4.3 Interviews about Changes in Views

4.3.1 Methods

In order to explore participants' beliefs about factors that may have affected their views on grizzly bear management between the summers of 2004 and 2008 when the before and after Q sorts were administered, I conducted structured, open-ended interviews with the participants after the post-Q-sort interviews. I asked the participants about changes in their views and about factors that may have affected their views. I asked the participants the following questions about their views on grizzly bear management:

1. Do you think your views about the problems or solutions related to grizzly bear management in the Banff-Bow Valley have changed at all since the summer of 2004? (If yes) How have your views changed?
2. Has anything affected or influenced your views about grizzly bear management in the Banff-Bow Valley since the summer of 2004? (If yes) What kinds of things or events have affected your views? How have your views changed?
3. Have the interdisciplinary problem solving workshops that you have been taking part in with Mike Gibeau and Felicity Edwards[8] affected your views about grizzly bear management in the Banff-Bow Valley? (If yes) How did the workshops affect your views? Have the workshops affected your views about 1) decision making; 2) the other participants; 3) science and policy? (IPS participants only)
4. Is there anything else you would like to say about your views or about grizzly bear management in the Banff-Bow Valley?

[8] Felicity Edwards was the facilitator for the IPS process.

I used an inductive strategy to analyze the interview data. I grouped comments about similar topics together to explore the range of perspectives that emerged from the responses. Similarly, I examined the factors that the participants felt had affected their views and categorized those emerging factors in order to identify the most common beliefs about influences on the views of the participants. To explore the effect of the IPS group, I identified whether participants believed that the IPS process had influenced their views about grizzly bear management, decision making, the other participants, and science and policy.

4.3.2 Results

4.3.2.1 Changes in Views on Grizzly Bear Management

The purpose of the interviews about changes in views was to explore if and how the participants believed that their views had changed between the before and after Q studies. Of the 20 participants, 12 (60%) indicated that their views about the problems related to grizzly bear management had changed between the summers of 2004 and 2008, and 8 (40%) expressed that their views about the solutions to the problems had changed (Table 4.10). Overall, 13 of the 20 participants (65%) indicated that their views on grizzly bear management had changed, either with respect to the problems or the solutions, or both.

Table 4.10 Participant Perceptions of Changes in Views about Grizzly Bear Management

N=20.

Changes in Views about Grizzly Bear Management					
Problems			Solutions		
Yes	Not Sure / No Major Change	No	Yes	Not Sure / No Major Change	No
12/20 (60%)	4/20 (20%)	4/20 (20%)	8/20 (40%)	5/20 (25%)	7/20 (35%)

During the interviews, participants were asked about how their views had changed between the summers of 2004 and 2008. The participants commented on various issues, such as changes in their views about learning, problem definition, the population status and mortality of grizzly bears, human use and development, transportation, management, science and research, education and communication, dialogue and collaboration, the IPS process, achievements, and solutions (Appendix C).

Based on the perceptions of the participants, the changes in views ranged from becoming less polarized to becoming more extreme to staying the same. Participant comments also involved learning more about the issues related to grizzly bear management in the BBV.

The participants also commented on how their definition of the problem had changed. Participant beliefs included that grizzly bears were not the main problem. However, perceptions of the major problem varied and included people, trust and relationships, the institutional structure of the government, the lack of collaboration and shared decision making, and transportation. In addition, participant comments included that their views of the problem had become clearer, that the problems had remained the same for years, and that the problem had shifted from inside BNP to outside the park.

In terms of the population status and mortality of grizzly bears, participant comments included that they had gained a better understanding of the grizzly bear population, of grizzly bear mortality, and of management options. In addition, the incidents involving grizzly bear mortalities and human fatalities were identified as having accentuated the issues around human use. Participant views also included that the situation of grizzly bears on the provincial lands in Alberta had become very serious and that maintaining the population had become a difficult challenge.

In addition, the participants commented on human use and development in the BBV. Participant perspectives included that the level of human use had become too high both in BNP and on provincial lands, especially around Canmore, that the capacity to manage for ecological integrity and to preserve grizzly bears could become compromised as a result of the human pressures, and that restrictions were needed for human use and recreational opportunities.

In terms of transportation, participant comments included that they had become more aware of the negative impacts of the railway and the grain spill on the grizzly bear population and that the transportation issues needed to be addressed. In addition, the commitment of Canadian Pacific Railway to fix grain cars was seen as a significant move.

The participants had varied views about management. Participant comments included that they had become more informed about management issues, that management had improved, and that management was problematic and lacked a larger vision, trust, and leadership. Comments about management also included the need to integrate new information into management strategies, the need to consider trail relocations in conflict areas, the concern about managing for one species at the peril of others, and the connection between fire management and grizzly bear habitat.

The participants also commented on how their views had changed regarding science and research. Participant comments included that that the problems had become less related to science, that science cannot and should not provide all the answers, and that science had improved and become more accepted. In addition, the comments included that research had influenced their views and that research had become less intrusive and more focused on monitoring. Furthermore, the views included the need to recognize the ecological facts and the need to apply science-based decision making.

The participants also commented on dialogue and collaboration. The comments involved the potential in working together, the willingness to work cooperatively, to look outside the box, and to learn, the increased communication, understanding, and maturity among the stakeholders, and the validity of the values of others. In addition, participant views included the need for continuing the dialogue, for reconciling different interests, and for balancing trade-offs in search of common ground.

The participants expressed both positive and negative comments about the IPS process. On the positive side, participant views included that the IPS process is the solution, that the IPS methodology has clear benefits, and that issues are being dealt with better in the IPS group. In addition, comments included that they had gained a better understanding of the views of others and learned a lot from the process. The critical

views involved the slowing of the group's progress, the difficulty in finding common-ground solutions, and the inadequate level of trust among stakeholders. In addition, comments were voiced about a need for more training on the IPS approach.

In terms of achievements, participant comments included the history of positive changes, the accomplishments of Parks Canada and the community, and the efforts to accommodate bears and minimize impacts on them. The views also included the need to recognize the support from the community and the taxpayer and to look at the initiatives in BNP as one big picture.

The participant views about education and communication included the importance of education and the difficulty in educating some visitors about bears. The participant comments about their preferred solutions involved restrictions on human access, education, aversive conditioning for bears, vigilance around bears, and leaving nature alone.

4.3.2.2 Factors Affecting Views on Grizzly Bear Management

In the interviews about changes in views, the most commonly mentioned factors that the participants felt had influenced their views included the IPS process (8/20 (40%)), research about grizzly bears (8/20 (40%)), and grizzly bear mortalities (7/20 (35%)) (Table 4.11).

Table 4.11 Factors with a Perceived Effect on Views about Grizzly Bear Management

The factors most commonly mentioned by participants are included. N=20.

Factor	Proportion of Participants
The IPS Process	8/20 (40%)
Research about Grizzly Bears	8/20 (40%)
Grizzly Bear Mortalities	7/20 (35%)
Dialogue among Organizations or Individuals	4/20 (20%)
Human Fatalities or Maulings	3/20 (15%)
Changes in Grizzly Bear Management	3/20 (15%)
Conflicts among Organizations or Individuals	2/20 (10%)
Human Use and Development	2/20 (10%)
Impacts of Climate Change	2/20 (10%)

4.3.2.3 IPS Process

The majority of participants (13/19 (68%)) who had been involved in the IPS group indicated that the IPS process had affected their views about grizzly bear management (Table 4.12). Based on the perceptions of the participants, the IPS process had also affected the views of many participants about decision making (15/19 (79%)), the other participants (16/19 (84%)), and science and policy (10/19 (53%)). In addition, some participants mentioned that the IPS process had improved their understanding of the views of others, provided them with new information about grizzly bears and research, and developed their problem-solving skills.

Table 4.12 Self-perceived Changes in Views due to the IPS Process

N=19.

Self-perceived Changes in Views due to the IPS Process			
Grizzly Bear Management	Decision Making	Other Participants	Science and Policy
13/19 (68%)	15/19 (79%)	16/19 (84%)	10/19 (53%)

Overall, of the 19 participants involved in the IPS process, 9 (47%) had a mainly positive view of the IPS process, 8 (42%) had mixed feelings about the group, and 2 (11%) had a mainly negative view of the process (Table 4.13). I considered the participants to have a mainly positive view of the IPS process if their comments mostly involved the positive aspects of the process, and I assessed the participants to have a mainly negative view of the process if their comments were mostly critical of the IPS process. If the participants clearly expressed both positive and negative comments about the IPS process, I considered them to have mixed feelings about the process.

Table 4.13 Participant Views of the IPS Process

N=19.

Participant View of the IPS Process		
Mainly Positive	**Mixed Feelings**	**Mainly Negative**
9/19 (47%)	8/19 (42%)	2/19 (11%)

4.3.3 Discussion

The interviews about the changes in views indicated that the majority of the participants felt that they had experienced at least some changes in their views between the before and after Q studies, and that the IPS process was one of the main factors that the participants perceived as having affected their views.

I compared the changes in the participant affiliations with the meta-factors and the answers of the participants to the question whether their views had changed between the summers of 2004 and 2008 and found some interesting discrepancies. For example, one participant denied any changes in views in the interview, but that participant was nonetheless affiliated with different meta-factors in the summers of 2004 and 2008, suggesting that some changes in the views of that participant had occurred after all. The participant may have been unaware of the changes in views or, for some reason, may not have wanted to admit the changes in views. On the other hand, several participants indicated in the interviews that their views had changed, even though they were affiliated with the same meta-factors in the summers of 2004 and 2008. It may be that their views

changed in some respects while still maintaining the same core views represented by the meta-factors. This examination suggests that people may not always be able to accurately assess whether their views have changed or not.

In the interviews, 8 of the 20 participants (40 %) indicated that the IPS process had affected their views between the summers of 2004 and 2008, suggesting that changes in management can have considerable effects on the self-perceived views of stakeholders. The feedback about the IPS process was largely positive, although many participants also expressed criticism of the process and its achievements. The participants identified a variety of benefits and criticisms of the IPS process (Table 4.14). Based on the interviews, some of the positive outcomes of the IPS process included creative problem solving, a better understanding of the views and values of the other participants, and increased respect and reduced hostility among stakeholders. According to the participants, the criticisms of the process included a lack of important breakthroughs, the avoidance of difficult issues, and the unwillingness to make sacrifices for grizzly bears. In addition, some participants suggested that the group might benefit from a review of the IPS approach and its components. Based on the interviews, one important benefit of the IPS process appeared to be increased social capital as a result of the improved relationships among the stakeholders. An increase in social capital and a reduction in hostility among the stakeholders may lead to more effective and creative problem solving in collaborative processes.

Table 4.14 Participant Views of the Benefits and Criticisms of the IPS Process

Benefits	Criticisms
• Agreements reached • Discovery of creative solutions • Better understanding of the views and values of others • Increased respect and reduced hostility among stakeholders • Improved relationships and communication among stakeholders • Involvement of diverse stakeholders • Better problem-solving skills • Increased knowledge of grizzly bears • Increased awareness of the issues and complexities related to grizzly bear management • Better understanding of decision making and policy • Increased knowledge of research and science • A forum for discussion and information-sharing	• No significant achievements • Avoidance of controversial issues • Unwillingness to make sacrifices for the benefit of grizzly bears • Lack of direction and common goals • Progress has been slowing down • Parks Canada has compromised its core values • Parks Canada needs to take a stronger leadership role and take responsibility for decision making • Parks Canada has used the process to validate its own agenda • IPS group is very localized and leaves out the larger Canadian and international public • Frustrating and time-consuming • Need for more IPS training

In the interviews, 8 of the 20 participants (40%) mentioned that research about grizzly bears had affected their views between the summers of 2004 and 2008, indicating that they believe that research can have an impact on their views. The background research revealed that a large amount of research relevant to grizzly bear management in the BBV was published between the before and after Q studies. Therefore, the perceived effect of research on the views of the participants is not surprising. Specific studies that were mentioned by the participants included the provincial DNA-based studies to estimate size of the grizzly bear population in Alberta (Alberta Grizzly Bear Inventory Team 2007; Boulanger, Stenhouse, MacHutchon, et al. 2005; Boulanger, Stenhouse, Proctor, et al. 2005) and the report on grizzly bear mortalities and encounters between humans and grizzly bears in the Mountain National Parks (Bertch and Gibeau 2008).

In the interviews, 7 of the 20 participants (35%) indicated that grizzly bear mortalities had influenced their views between the summers of 2004 and 2008, suggesting that participants believe that grizzly bear mortalities affect their views. Specific grizzly bear mortalities that were mentioned by participants included bear No. 66 and her cubs and the cub of bear No. 72. Bear No. 66 was a female with three cubs that was killed on the highway in BNP. Two of her cubs were subsequently killed on the highway, and the third cub was captured and put in a zoo. The cub of bear No. 72 was killed on the railway. These types of incidents have become focal points for the much larger debate surrounding grizzly bear management in the BBV (Michael Gibeau, pers. comm.).

In the interviews, 3 of the 20 participants (15%) indicated that human fatalities or maulings had affected their views between the summers of 2004 and 2008. Based on participant comments, the human fatality that occurred in the BBV in 2005 had a substantial impact on the communities in the area.

CHAPTER 5: DISCUSSION

5.1 Synthesis

This study used Q methodology to explore stakeholder views in the Banff-Bow Valley (BBV) of Alberta in the summer of 2008 and found three problems factors and four solutions factors related to grizzly bear management. The problems factors are entitled Problematic Status of Bears (Factor PA1), Exaggerated Problems (Factor PA2), and Inadequate Management (Factor PA3). The solutions factors are entitled Bear Conservation Advocates (Factor SA1), Anthropocentric Habitat Managers (Factor SA2), Anthropocentric Scientific Managers (Factor SA3), and Cohabitation Diplomats (Factor SA4). There were clear relationships between the problems and solutions factors that formed seven different narratives, describing the problem orientations of the participants.

This research also involved a comparison of the before Q study, which was conducted in the summer of 2004 (Chamberlain 2006), and the after Q study, which was conducted in the summer of 2008. A meta-analysis of the before and after factors revealed that some views had remained similar, some views had lost support, and some new views had emerged between the summers of 2004 and 2008. The meta-analysis uncovered four problems meta-factors and five solutions meta-factors. The problems meta-factors are entitled Exaggerated Problems (Meta-Factor PM1), Inadequate Management (Meta-Factor PM2), Problematic Status of Bears (Meta-Factor PM3), and Politicized Management (Meta-Factor PM4). The solutions meta-factors are entitled Bear Conservation Advocates (Meta-Factor SM1), Anthropocentric Scientific Managers (Meta-Factor SM2), Habitat Modifiers (Meta-Factor SM3), Cohabitation Diplomats (Meta-Factor SM4), and Anthropocentric Habitat Managers (Meta-Factor SM5).

The majority of participants who were involved in both the before Q study and the after Q study as well as the IPS group were most strongly affiliated with the same meta-factors based on their before and after Q sorts, indicating that the major aspects of their views had remained similar. However, almost half of the participants were most strongly affiliated with either different problems meta-factors or different solutions meta-factors in

the summers of 2004 and 2008, suggesting that some views had changed considerably between the before and after Q studies.

Interviews with the participants provided further support for the finding that some changes in views had occurred between the before and after Q studies. In the interviews about changes in views, 65% of the participants indicated that their views on grizzly bear management had changed between the summers of 2004 and 2008, either with respect to the problems or the solutions, or both.

This study also examined factors that may have affected the views of the participants between the before and after Q studies. Background research on the context of grizzly bear management in the BBV revealed that many possible factors could have affected the views of the participants, including 1) human fatalities, maulings, and encounters with grizzly bears, 2) grizzly bear mortalities, 3) research related to grizzly bears, and 4) changes in grizzly bear management. Interviews with the participants indicated that the Interdisciplinary Problem Solving (IPS) process, research about grizzly bears, and grizzly bear mortalities were the most common factors that the participants felt had affected their views between the summers of 2004 and 2008.

This study also explored the effect of the IPS process on the views of the participants. Of the 20 participants in the after Q study (19 of which were involved in the IPS process), 8 (40 %) indicated that the IPS process had affected their views about grizzly bear management between the summers of 2004 and 2008. The majority of the 19 participants who were involved in the IPS group indicated that the IPS process had affected their views about grizzly bear management (13/19 (68%)) as well as about decision making (15/19 (79%)), the other participants (16/19 (84%)), and science and policy (10/19 (53%)). The majority of participants had either a mainly positive view (9/19 (47%)) or mixed feelings (8/19 (42 %)) about the IPS group, although some participants also expressed mainly criticism of the process (2/19 (11%)).

Overall, this study found that some changes did occur in stakeholder views on grizzly bear management in the BBV between the summers of 2004 and 2008, based on both the before and after Q studies and the interviews about changes in views. This research also suggests that participants believed that the IPS process was one of the main factors that affected their views between the before and after Q studies.

5.2 IPS Process

The IPS process began with the three IPS training workshops that took place between May 2005 and March 2006. After the training workshops, the ongoing IPS group was established, and the group met, on average, every two to three months from June 2006 until March 2009. However, the new superintendent of Banff National Park (BNP) who took office in January 2008 has subsequently chosen not to continue with the IPS process. The IPS group has not been formally disbanded, but the group has not had a meeting for more than a year and there are no plans for future meetings. The superintendent of BNP replaced the IPS group with a new consultation process entitled the *Bow Valley Parkway Area Planning Process*. The new group was created in the summer of 2009 and met for the first time in February 2010. The new group was created specifically to explore management options for the Bow Valley Parkway and to make recommendations to the superintendent (Michael Gibeau, pers. comm.).

The apparent shift from stakeholder participation in decision making to stakeholder consultation implemented by Parks Canada in BNP has substantially altered the approach to decision making and grizzly bear management in the BBV. The IPS process was an innovative collaboration between Parks Canada and other stakeholder groups in the BBV, and the process resulted in some joint agreements and positive changes in grizzly bear management in the BBV, based on participant comments. In spite of the criticisms and shortcomings of the IPS process, most participants had either a positive view or mixed feelings of the group and felt that it was beneficial and worthwhile. The implications of this change for grizzly bear management and stakeholder relationships in the BBV remain to be seen.

5.3 Limitations

The major limitations of this study concern the qualitative aspects of the research methods and design. Q methodology examines the range of viewpoints within a group of participants but the results cannot be generalized to a larger population (Brown 1980). The goal of this research was to represent a wide variety of views on grizzly bear management held by the stakeholders in the BBV. However, due to the nature of the research methodology, this study could only involve a small number of participants. In addition, the group of potential participants was constrained to those individuals who had participated either in the before Q study or in the IPS process, or in both. Although this study involved participants with diverse affiliations and interests, and included many of the active key stakeholders involved with grizzly bear management in the BBV, certain viewpoints may not have been represented in this study. Furthermore, the distribution of views among the participants of this study cannot be used to infer the proportions of those views within a larger population. Therefore, the views revealed by this study are specific to the group of participants and may not accurately represent the range of views on grizzly bear management among the general population in the BBV or elsewhere in Alberta.

The group of participants in this study consisted of key stakeholders who had already been involved in grizzly bear management in the BBV. Stakeholders who are not involved or interested in grizzly bear management may have considerably different views than those presented in this study. Furthermore, First Nations were not represented in this study, and there may be stakeholders that were not represented because they were not involved in the IPS process from which the participants in this after Q study were drawn.

The Q sample statements used in this study were developed for the before Q study in 2004 by Chamberlain (2006). In order to statistically compare the results of the before and after Q studies, I used the same set of statements in the after Q study as Chamberlain (2006). However, some of the statements may not have been as relevant in 2008 as they were in 2004. In addition, any new issues that emerged since 2004 were not represented by the statements. Therefore, using the same statements in the after Q study may have constrained the ability of the participants to express their views about issues that were

missing from the Q samples. In the post-Q-sort interviews, the participants commented on additional statements that they would have included in the Q samples (Appendix A).

This study explored factors that may have affected the views of the participants between the before and after Q studies. However, the range of factors explored and the level of the examination were not comprehensive. Furthermore, this research cannot confirm any causal relationships between factors and changes in views, especially in the absence of a control group. However, based on the interviews about changes in views, this study was able to reveal the perceptions of the participants about factors that had affected their views.

5.4 Implications

This study provided information about stakeholder views on grizzly bear management in the BBV in the summer of 2008, revealed changes in views between the summers of 2004 and 2008, and explored factors that may have affected the views of the participants. This research found that the stakeholders held very different views about the problems and solutions related to grizzly bear management in the BBV, in spite of an extensive amount of biological and ecological information about the grizzly bear population in the region.

This research has both theoretical and practical implications. This study contributes to the field of research using Q methodology by investigating stakeholder views about wildlife management. Furthermore, this research provides an application of Q methodology with a before–after approach.

This research also has practical implications for the field of environmental management by providing useful information for managers and decision-makers about the views of stakeholders and about factors affecting perspectives. The results of this study could help managers identify management strategies that may be widely supported by stakeholders. The areas of agreement identified in this study represent views that are generally supported by the participants and provide information about management options that may be broadly acceptable to the stakeholders in the community. In addition, the differences in views may help managers to identify possible causes for conflict and to address those issues collaboratively with the stakeholders without escalation into acrimonious disputes. This study could also assist managers in evaluating which management strategies are perceived as successful or ineffective by stakeholders. In addition, this study provides insight into factors that may have affected the views of the participants between the before and after studies. This information could help managers to recognize the kinds of factors that shape the views of stakeholders and to use that knowledge for reaching out to their stakeholders and for educating the public about grizzly bear management.

This study could also contribute to increased dialogue and reduced conflict over grizzly bear management in the BBV by increasing the awareness and understanding of the stakeholders about their own views and about the views of others. The areas of agreement could help stakeholders find common ground, and the differences in views could provide a starting point for discussing controversial topics and clarifying views. Collaborative discussions among stakeholders could facilitate the discovery of creative solutions to contentious problems.

This study also contributes to the research on public participation in decision-making processes by exploring the effect of the IPS process on the views of the stakeholders. The results of this research could help in assessing the potential of increased public participation in environmental management.

In my opinion, the greatest contributions of this research include the discoveries that some changes had occurred in the views of the participants between the before and after Q studies and that many participants believe that the IPS process was an important factor that affected their views.

5.5 Areas of Further Research

This research employed Q methodology to uncover views on grizzly bear management among a small group of stakeholders in the BBV. However, this study did not reveal the distribution of those views in the underlying population. Future research could use surveys or questionnaires to explore the distribution of different views on grizzly bear management among the larger population in the BBV.

This study explored changes in views on grizzly bear management in the BBV between the summers of 2004 and 2008 and found that some changes had occurred. Future research could use Q methodology to conduct a study in the future to examine further changes in views, either in the presence or absence of the IPS process. If the IPS process continues, future research could include both a group of participants involved in the IPS process and a control group of stakeholders who have not been involved in the IPS process. The inclusion of a control group could help in evaluating the effects of the IPS process more rigorously than in this study.

Future research could also use Q methodology to explore views on grizzly bear management among a broader population of stakeholders from different regions of Alberta. Participants could include individuals who are involved and interested in grizzly bear management as well as stakeholders who are not. In addition to the diversity of participants in this study, a future study could include stakeholder groups that were missing from this study. Subsequently, surveys or questionnaires could be used to reveal the distribution of views among the larger population in Alberta. The research could also involve a comparison of stakeholder views in the BBV and in the rest of Alberta.

Although this study attempted to evaluate the effect of the IPS process on the views of the participants, the statements in the Q studies were specific to grizzly bear management, not decision-making processes in general. To explore the effect of collaborative decision making on participant views, future research could use Q methodology to examine participant views on all aspects of the decision-making process before and after participation in a collaborative process.

In my opinion, a priority for future research would be to explore the distribution of views among a representative group of stakeholders in the BBV and across Alberta or Canada. Such research could provide decision-makers with valuable information about the views of their constituents and about the management approaches preferred by the larger population. Due to the national and international importance of the BBV region, I believe that managers should take into account the views of a broadly representative population in making decisions about grizzly bear management in the BBV.

5.6 Conclusion

This study has emphasized the importance of understanding stakeholder views for the successful management of grizzly bears and the potential of collaborative processes to reduce conflict and promote dialogue among stakeholders. Q methodology provides a useful approach for exploring the subjective views of stakeholders on complex and controversial environmental issues, including the conservation of large carnivores. The persistence of vulnerable species, such as the grizzly bear, in developed landscapes depends on the values and decisions of human societies. Therefore, the views of the public and societal considerations are essential factors affecting the future of grizzly bears. The extensive amount of biological and ecological information about grizzly bears and about the effects of human development on their populations clearly indicates that the grizzly bear population in the BBV is very vulnerable and that conservation measures and constraints on human development are necessary to ensure the sustainability of the population.

APPENDICES

Appendix A: After Q Study

A1 Unrotated Factor Matrices

Table A1 Unrotated Factor Matrix for the Problems Q Sort

Factors that are significant according to the eigenvalue criterion are identified in bold.

ID	Unrotated Problems Factors							
	1	2	3	4	5	6	7	8
01	0.4018	0.4771	0.2033	0.3590	-0.4305	0.1030	-0.2343	-0.1863
02	0.8044	-0.2121	0.0787	-0.2096	0.1484	0.0434	-0.0326	0.0707
03	0.7536	0.3505	-0.0936	-0.2520	-0.0258	-0.0559	-0.2978	-0.1060
04	-0.2176	0.4727	0.6677	0.0565	-0.1211	-0.1933	-0.0421	-0.0937
05	0.8585	-0.0768	0.0344	-0.1604	-0.2325	0.0428	0.0932	0.2315
06	0.3521	-0.3278	0.3863	0.5350	0.2422	0.2212	0.3702	0.1304
07	0.6188	0.2895	0.0239	-0.4714	-0.0925	-0.0420	0.3145	-0.0406
08	-0.4543	0.7003	0.2919	0.0320	0.0024	0.0552	0.0479	-0.0711
09	0.5925	0.2880	-0.3159	0.0398	-0.0682	0.4963	-0.0181	0.0830
10	0.7866	0.1044	0.0897	0.1010	-0.1203	-0.2615	-0.1069	0.1821
11	0.3654	0.4052	-0.5080	0.4707	0.2588	-0.2182	0.0027	-0.0152
12	0.8211	-0.1976	0.1689	-0.0662	-0.0954	0.0540	0.2087	-0.1015
13	0.6309	0.2846	0.1352	0.1360	0.4178	0.2082	-0.0773	-0.2562
14	0.4393	0.3481	0.1703	-0.2019	0.6631	-0.2380	-0.0921	0.0819
15	0.8622	-0.0794	0.1841	-0.1377	-0.0443	0.0111	-0.1399	0.0717
16	-0.3236	0.7560	-0.3202	0.0339	-0.0736	-0.1318	0.0683	0.2459
17	0.6717	0.2121	-0.3176	0.0071	-0.0582	0.0748	0.2756	-0.3593
18	0.7212	0.2338	0.0290	0.2813	-0.1834	-0.3531	0.2367	0.1556
19	0.6127	-0.4028	-0.0155	0.2607	-0.0211	0.0978	-0.4037	0.1165
20	-0.2650	0.6955	0.1278	-0.1006	0.0681	0.4802	0.0064	0.2895
Eigenvalue	**7.5078**	**3.1293**	**1.4347**	**1.2491**	**1.1029**	0.9617	0.7823	0.5762
Variance (%)	38	16	7	6	6	5	4	3

Table A2 Unrotated Factor Matrix for the Solutions Q Sort

Factors that are significant according to the eigenvalue criterion are identified in bold.

ID	Unrotated Solutions Factors							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
01	0.4437	0.4540	0.1624	-0.1181	0.1486	-0.5185	0.4490	0.1318
02	0.8007	-0.1154	-0.1524	0.0306	0.2022	0.3218	-0.0584	0.1490
03	0.1998	0.4071	-0.0447	0.7574	-0.3336	0.0237	-0.0894	0.0678
04	-0.3359	0.2634	0.7612	-0.1574	0.0662	0.2200	-0.3111	0.0016
05	0.8020	-0.1447	-0.0680	-0.0310	0.2727	-0.0452	-0.0482	0.3562
06	0.6164	0.2240	-0.2488	-0.1806	-0.4289	0.0168	-0.2781	0.3108
07	0.7372	0.2260	0.3317	-0.1556	0.2824	-0.1549	-0.2293	0.1916
08	-0.3223	0.2250	0.7653	0.0940	-0.0643	0.2751	0.2083	0.2222
09	0.7690	0.1271	0.2319	0.2484	-0.0625	-0.3321	0.0101	-0.0771
10	0.8281	-0.1323	0.1098	-0.2834	-0.0186	0.0314	0.0643	-0.1270
11	-0.2215	0.7830	-0.1840	-0.1484	0.1016	0.0518	-0.1041	0.0988
12	0.8575	-0.2073	0.1558	0.2023	-0.0611	-0.0329	-0.0553	0.0223
13	0.1395	0.6658	0.1322	0.1489	0.2158	-0.0488	-0.1317	-0.4245
14	0.7157	-0.2841	0.0228	-0.2086	0.2172	0.2923	0.1839	-0.2714
15	0.7707	0.1900	-0.1170	-0.2815	-0.0765	0.2256	-0.1367	-0.1291
16	-0.2674	0.4128	-0.3520	0.2939	0.6730	0.0705	-0.0998	0.0728
17	0.7442	0.2946	-0.0238	0.0265	-0.0996	0.2987	0.3284	0.0087
18	0.5486	0.6318	-0.0776	-0.0882	-0.2370	-0.0855	-0.0868	-0.2613
19	0.5326	-0.2704	0.0810	0.6960	0.0869	0.1803	0.0535	-0.0498
20	-0.2837	0.7142	-0.2094	-0.0852	-0.0966	0.3152	0.3150	0.1222
Eigenvalue	**7.1390**	**3.1167**	**1.7299**	**1.6163**	**1.1747**	**1.0104**	0.8008	0.7476
Variance (%)	36	16	9	8	6	5	4	4

A2 Cattell's Scree Tests

Figure A1 Cattell's Scree Test for the Unrotated Problems Factors

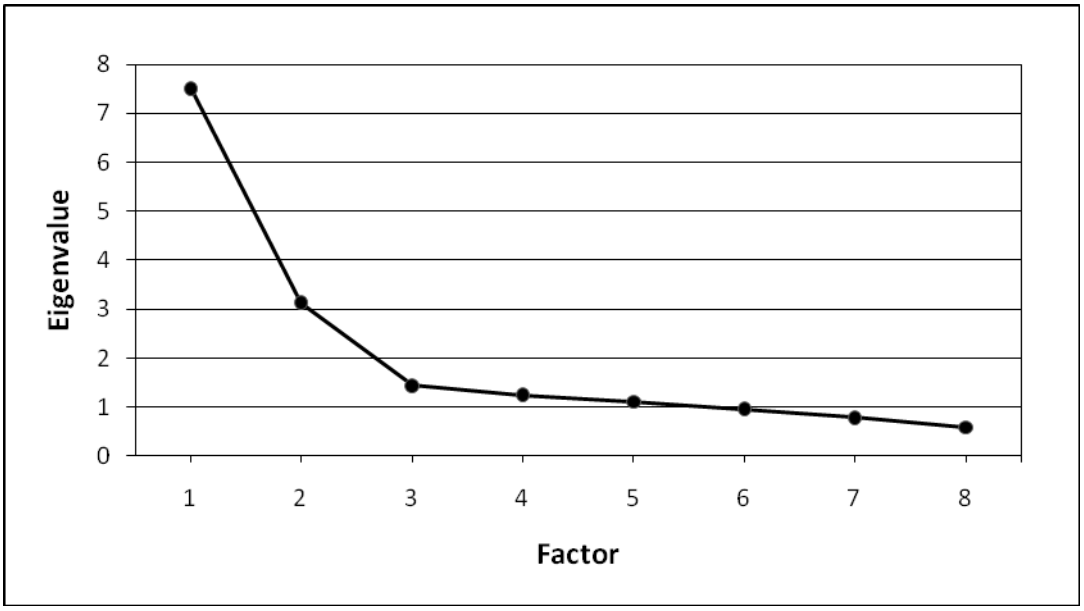
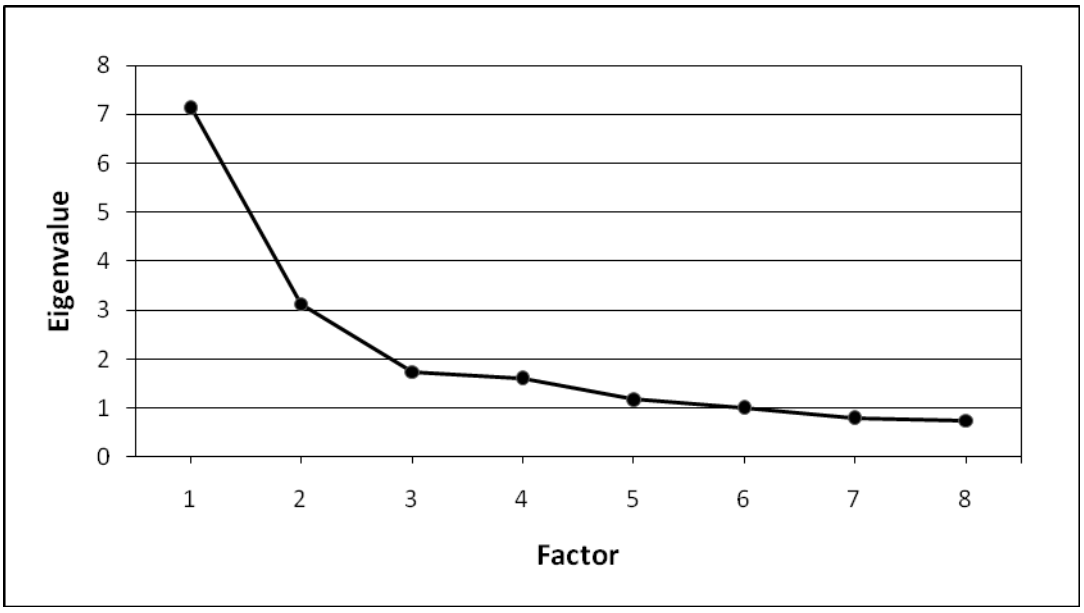


Figure A2 Cattell's Scree Test for the Unrotated Solutions Factors



A3 Rotated Factor Matrices

Table A3 Rotated Factor Matrix for the Problems Q Sort

The shown factor matrix is for the selected two-factor solution with the initial Factor 2 split into Factors PA2 and PA3. Significant factor loadings (p<0.01) are identified in bold. Sorts that have significant loadings but are not flagged are identified with light grey shading. Flagged sorts are identified with dark grey shading.

ID	Rotated Problems Factors		
	PA1	PA2	PA3
01	**0.5885**	0.2067	-0.2067
02	**0.5850**	-0.5914	**0.5914**
03	**0.8271**	-0.0811	0.0811
04	0.0528	**0.5178**	-0.5178
05	**0.7003**	-0.5024	**0.5024**
06	0.1366	-0.4613	**0.4613**
07	**0.6801**	-0.0651	0.0651
08	-0.0354	**0.8340**	-0.8340
09	**0.6567**	-0.0531	0.0531
10	**0.7305**	-0.3098	0.3098
11	**0.5206**	0.1632	-0.1632
12	**0.6067**	-0.5875	**0.5875**
13	**0.6880**	-0.0755	0.0755
14	**0.5552**	0.0765	-0.0765
15	**0.7023**	-0.5065	**0.5065**
16	0.1055	**0.8156**	-0.8156
17	**0.6863**	-0.1587	0.1587
18	**0.7400**	-0.1651	0.1651
19	0.3230	-0.6583	**0.6583**
20	0.1252	**0.7337**	-0.7337
Variance (%)	32	21	21

Table A4 Rotated Factor Matrix for the Solutions Q Sort

The shown factor matrix is for the selected four-factor solution. Significant factor loadings (p<0.01) are identified in bold. Sorts that have significant loadings but are not flagged are identified with light grey shading. Flagged sorts are identified with dark grey shading.

ID	Rotated Solutions Factors			
	SA1	SA2	SA3	SA4
01	**0.5718**	0.2814	0.1842	0.0567
02	**0.6792**	-0.2274	-0.3398	0.2237
03	0.0586	0.3478	-0.0030	**0.8105**
04	-0.1053	0.0846	**0.8607**	-0.1651
05	**0.7014**	-0.2803	-0.2660	0.1684
06	**0.6419**	0.1565	-0.2969	-0.0052
07	**0.8173**	-0.0428	0.2250	0.0917
08	-0.1742	0.0438	**0.8432**	0.0760
09	**0.6935**	-0.1127	0.0848	**0.4712**
10	**0.8230**	-0.3271	-0.0920	-0.0527
11	0.0077	**0.8305**	0.0817	-0.1464
12	**0.6973**	-0.4188	-0.0909	0.4167
13	0.2635	**0.5496**	0.2646	0.2468
14	**0.6506**	-0.4189	-0.1930	-0.0304
15	**0.8205**	0.0533	-0.2099	-0.0542
16	-0.2728	**0.5450**	-0.1790	0.2207
17	**0.7443**	0.1266	-0.0998	-0.0998
18	**0.6734**	**0.4976**	-0.0182	0.1123
19	0.2322	-0.3893	-0.1278	**0.7912**
20	-0.0875	**0.7869**	0.0505	-0.1104
Variance (%)	32	16	10	10

A4 Factor Arrays

Figure A3 Factor Arrays for the Problems Factors

The numbers in the templates refer to the statement numbers in the problems Q sample.

Factor PA1: Problematic Status of Bears

-4	-3	-2	-1	0	+1	+2	+3	+4
P25	P34	P05	P09	P08	P10	P35	P15	P04
P24	P21	P29	P11	P02	P12	P03	P13	P16
P38	P30	P01	P37	P22	P28	P07	P36	P14
	P32	P26	P31	P19	P33	P17	P18	
			P20	P23	P06			
				P27				

Factor PA2: Exaggerated Problems

-4	-3	-2	-1	0	+1	+2	+3	+4
P31	P25	P03	P30	P16	P21	P12	P10	P36
P02	P13	P15	P19	P38	P18	P09	P37	P36
P22	P08	P35	P14	P11	P32	P01	P06	P26
	P17	P27	P23	P04	P07	P05	P24	
			P29	P33	P20			
				P34				

Factor PA3: Inadequate Management

-4	-3	-2	-1	0	+1	+2	+3	+4
P38	P30	P10	P22	P11	P15	P13	P27	P19
P06	P26	P36	P05	P32	P07	P18	P29	P04
P09	P12	P37	P17	P25	P16	P08	P31	P02
	P24	P28	P01	P21	P34	P14	P33	
			P35	P03	P23			
				P20				

Figure A4 Factor Arrays for the Solutions Factors

The numbers in the templates refer to the statement numbers in the solutions Q sample.

Factor SA1: Bear Conservation Advocates

-4	-3	-2	-1	0	+1	+2	+3	+4
S07	S23	S19	S10	S14	S28	S27	S15	S20
S01	S13	S05	S08	S29	S30	S12	S25	S04
S09	S16	S26	S17	S02	S06	S03	S21	S22
			S24	S18	S11			

Factor SA2: Anthropocentric Habitat Managers

-4	-3	-2	-1	0	+1	+2	+3	+4
S14	S02	S22	S29	S27	S12	S19	S21	S10
S20	S25	S17	S09	S23	S13	S15	S28	S07
S24	S05	S06	S11	S30	S16	S03	S08	S01
			S26	S04	S18			

Factor SA3: Anthropocentric Scientific Managers

-4	-3	-2	-1	0	+1	+2	+3	+4
S14	S09	S24	S25	S19	S30	S29	S07	S02
S22	S04	S20	S13	S15	S05	S18	S17	S01
S03	S23	S26	S10	S27	S08	S06	S16	S12
			S11	S28	S21			

Factor SA4: Cohabitation Diplomats

-4	-3	-2	-1	0	+1	+2	+3	+4
S11	S26	S06	S01	S04	S29	S21	S12	S23
S28	S05	S15	S27	S19	S20	S03	S22	S08
S09	S10	S02	S17	S13	S14	S25		S24
			S07		S18	S30		
			S16					

A5 Q Samples and Factor Scores

Table A5 Q Sample Statements and Factor Scores for the Problems Q Sort

Statistically distinguishing factor scores at the p<0.01 level are identified with dark grey shading. Statistically distinguishing factor scores at the p<0.05 level are identified with light grey shading.

No.	Statement	Factor		
		PA1	PA2	PA3
P01	There is a false crisis mentality spurred by interest groups who have more in line than the health and welfare of grizzly bears.	-2	2	-1
P02	There is a lack of an overall conservation strategy for grizzly bears, lack of clear goals, targets and a bigger vision.	0	-4	4
P03	There is not enough funding to implement what we know needs to be done for grizzly bear management.	2	-2	0
P04	The grizzly bear population is vulnerable.	4	0	4
P05	The grizzly bear population of the Banff-Bow Valley is the Healthiest it has been in 25 years.	-2	2	-1
P06	People management in Banff Park has been successful and has led to us cultivating bears not wiping them out.	1	3	-4
P07	The current management of grizzly bears is somewhat disjointed between several different responsible agencies. Techniques to manage bears are not consistent and communication is not as good as it could be between these agencies.	2	1	1
P08	An unrelenting tide of humanity has descended on a place that has a finite capacity to accommodate human pressure.	0	-3	2
P09	The grizzly bear population is at an equilibrium, it's neither dropping nor increasing. Management is doing a good job with what they're working with.	-1	2	-4
P10	We tend to get caught up in the chicken little syndrome – thinking that the sky is falling and we need to fix everything – without recognizing Parks Canada's successes in grizzly bear management.	1	3	-2
P11	The squeaky wheel wins in grizzly bear management. Organizations that speak loudly and are connected to the media have their views incorporated into policy.	-1	0	0
P12	Although human use in Banff Park has increased, that use is more concentrated and people are better educated, so people are having less of an impact on grizzly bears.	1	2	-3
P13	Increasing human use of grizzly bear habitat, through recreational use, residential use, and tourism development, both inside and outside of the Park has resulted in increased mortality rates of grizzly bears.	3	-3	2
P14	There will be more challenges for residents with bear activity intruding in communities in the future.	4	-1	2
P15	The population status of grizzly bears is not sustainable in the long term. If we sit back today and call it acceptable, we won't make the improvements that need to be made to maintain the position we're in now.	3	-2	1
P16	The Bow Valley is an important linkage for the regional grizzly bear population. If we lose the connections and opportunities in this area, then there is a high risk of the population being placed in jeopardy.	4	0	1
P17	The precautionary principle doesn't hold water in grizzly bear management. The onus of proof is still on those defending wildlife instead of on developers.	2	-3	-1
P18	Management is fragmented by jurisdiction. There are no system wide specific objectives that Parks Canada and the provincial agencies are trying to manage for.	3	1	2
P19	There is no well organized or visionary plan in place that outlines when success is achieved in management and when we've achieved a healthy population.	0	-1	4

No.	Statement	Factor		
		PA1	PA2	PA3
P20	Banff Park doesn't have room for more bears because the ecosystem in the Park is at carrying capacity.	-1	1	0
P21	We're taking our local situation with bears and extrapolating. In the regional context, grizzly bear populations are healthy.	-3	1	0
P22	Elsewhere in Alberta, grizzly bear populations are shrinking. The Bow Valley needs to be a source of bears to increase the regional population of bears.	0	-4	-1
P23	Decisions are made with urban perceptions and by wildlife groups, with less consideration given to agriculture. Livestock producers have generally borne the costs of grizzly bear protection and do not get adequate compensation for losses incurred by bears.	0	-1	1
P24	We have unnecessarily sacrificed human activities in Banff National Park for grizzly bear protection.	-4	3	-3
P25	We are on a trend to having way too many bears in the area which means we'll be bound to have more problems between bears and people, and a huge proportion of habituated bears.	-4	-3	0
P26	The population status of grizzly bears is acceptable as it is. We'll never achieve zero mortality of bears given the circumstances we're in and that's fine.	-2	4	-3
P27	Politics and special interest pleading have interfered with the essential scientific understanding of the fundamental established mandates of conservation organizations. We're no longer talking about science, we're talking about who can speak the loudest and who can get the most media coverage.	0	-2	3
P28	It is not the role of a National Park to be a bear factory and produce bears, but instead to have the right amount of bears for the Park itself.	1	4	-2
P29	Management is largely reactive, it's based on the political bureaucratic mood of the day and is not entirely science based.	-2	-1	3
P30	A disproportionate amount of resources are going into saving bears when they're shot just outside Park borders.	-3	-1	-3
P31	Human use issues receive greater priority in Parks Management to the point where grizzly bears have been jeopardized.	-1	-4	3
P32	Grizzly bears have been over managed. The trend of closing each area with a female grizzly in it is leading us to close Banff.	-3	1	0
P33	Political pressure lets people get what they want. Decision making is politicized.	1	0	3
P34	Most of the discourse associated with policy making has been high-jacked by people whose views are short term and do not take into account the larger interests, sensibilities or history of this country.	-3	0	1
P35	If something will impact recreational opportunities, the burden of proof is always on the bear, their habitat, and the people who defend their habitat, to show that harm is being done. This is wrong.	2	-2	-1
P36	Instead of celebrating our achievements in grizzly bear management, we continue to talk about our challenges.	3	4	-2
P37	Grizzlies are managed from the perspective that they're an endangered species when they're not. The Banff-Bow Valley is not the last stand of the grizzly bear.	-1	3	-2
P38	The grizzly bear population is doing very well, describing the population as just "stable" is the crisis version of what is happening.	-4	0	-4

Table A6 Q Sample Statements and Factor Scores for the Solutions Q Sort

Statistically distinguishing factor scores at the p<0.01 level are identified with dark grey shading. Statistically distinguishing factor scores at the p<0.05 level are identified with light grey shading.

No.	Statement	Factor			
		SA1	SA2	SA3	SA4
S01	Restricting human use doesn't have to be the answer. Human use has already been restricted in the areas most important for grizzly bears and we don't need more restrictions.	-4	4	4	-1
S02	Tighten the integration of scientific management and research. Management actions should be directly coupled to the outcomes of research.	0	-3	4	-2
S03	Limit growth on provincial lands adjacent to the Park.	2	2	-4	2
S04	Make bears a higher priority in provincial management. In Alberta, create bold, legally accountable legislation that makes government manage for the needs of grizzly bears.	4	0	-3	0
S05	Use less invasive research on grizzly bears and strictly monitor the population. Research is not a mandate for National Parks, and parks are not a lab.	-2	-3	1	-3
S06	Use science more to guide policy decisions.	1	-2	2	-2
S07	National Parks are not game preserves, they should be managed for people to come here to see and learn things.	-4	4	3	-1
S08	Increase participation and communication with park residents.	-1	3	1	4
S09	When management closes one area of the Park for grizzly bear management, they have to open another area for recreational opportunity.	-4	-1	-3	-4
S10	Create bear habitat in wilderness areas in the backcountry, outside of communities and development areas, to keep bears and people separate.	-1	4	-1	-3
S11	Develop specific objectives for each habitat area. Figure out how many bear deaths can be tolerated in each area (demographic target), and how much habitat change is acceptable.	1	-1	-1	-4
S12	Build an appreciation for grizzly bears among recreational users. The issue of management comes down to managing people.	2	1	4	3
S13	Keep collaring and drugging bears to a minimum because these techniques completely change a bear's behaviour and then you're no longer studying wild bears. This is the bear's National Park too.	-3	1	-1	0
S14	Restrict human use in the Park, create areas where bears can live on the landscape and meet their year round needs.	0	-4	-4	1
S15	Develop a more formal process between Parks Canada and the provincial agencies for managing bears by developing a multiagency group to deal with grizzly bear management that has some power to influence decisions.	3	2	0	-2
S16	We need to keep in mind the historical context for ecological integrity. People think that Banff National Park is Eden, but in fact Banff history was for tourism.	-3	1	3	-1
S17	Scientists and decision makers should be clearer about what the science indicates is in the interest of bears.	-1	-2	3	-1
S18	Focus on monitoring trends of the grizzly bear population in scientific research, and finding less intrusive ways to do so.	0	1	2	1
S19	Engage landowners in decisions. Get more input from people out on the land who are actually seeing the wildlife on a more regular basis.	-2	2	0	0

No.	Statement	Factor			
		SA1	SA2	SA3	SA4
S20	Parks Canada must take a stronger stance towards prioritizing ecological integrity in Banff National Park.	4	-4	-2	1
S21	We need a more concerted management effort between the province, Parks Canada, industry, and people who do things on the land.	3	3	1	2
S22	We need to change our value system and value other things besides profit if we want bears on the landscape. We are compromising our long term well-being for short term material gains of wealth and power.	4	-2	-4	3
S23	Find ways so that humans and grizzly bears can co-habitate in the same ecosystem by minimizing bear habituation. Our biggest mistake in management has been to designate separate spaces for bears and humans.	-3	0	-3	4
S24	Managers should say outright that the function of a National Park is a conservation function. Someone needs to say no to the next round of development expansion.	-1	-4	-2	4
S25	Design human use around ecological constraints.	3	-3	-1	2
S26	Increase habitat in the Park for bears so that less bears move onto the plains and come into conflict with agricultural operations.	-2	-1	-2	-3
S27	Improve the communication structure between various parties that have a role to play in grizzly bear protection. Develop a standardized protocol for information sharing between organizations.	2	0	0	-1
S28	Change the configuration of habitat to reduce the potential for conflict between humans and bears, such as getting rid of high quality bear habitat near human development.	1	3	0	-4
S29	Adjust values and attitudes so that people value a live bear so highly that they wouldn't cause the circumstances of that bear's death.	0	-1	2	1
S30	Find a more effective way of including interests, not just those who are loud, but where prudence and understanding drive the logic and argument, not just passion.	1	0	1	2

A6 Unclear Statements

Table A7 Unclear Problems Statements

No.	Statement
P05	The grizzly bear population of the Banff-Bow Valley is the Healthiest it has been in 25 years.
P07	The current management of grizzly bears is somewhat disjointed between several different responsible agencies. Techniques to manage bears are not consistent and communication is not as good as it could be between these agencies.
P10	We tend to get caught up in the chicken little syndrome – thinking that the sky is falling and we need to fix everything – without recognizing Parks Canada's successes in grizzly bear management.
P16	The Bow Valley is an important linkage for the regional grizzly bear population. If we lose the connections and opportunities in this area, then there is a high risk of the population being placed in jeopardy.
P17	The precautionary principle doesn't hold water in grizzly bear management. The onus of proof is still on those defending wildlife instead of on developers.
P20	Banff Park doesn't have room for more bears because the ecosystem in the Park is at carrying capacity.
P22	Elsewhere in Alberta, grizzly bear populations are shrinking. The Bow Valley needs to be a source of bears to increase the regional population of bears.
P23	Decisions are made with urban perceptions and by wildlife groups, with less consideration given to agriculture. Livestock producers have generally borne the costs of grizzly bear protection and do not get adequate compensation for losses incurred by bears.
P26	The population status of grizzly bears is acceptable as it is. We'll never achieve zero mortality of bears given the circumstances we're in and that's fine.
P27	Politics and special interest pleading have interfered with the essential scientific understanding of the fundamental established mandates of conservation organizations. We're no longer talking about science, we're talking about who can speak the loudest and who can get the most media coverage.
P35	If something will impact recreational opportunities, the burden of proof is always on the bear, their habitat, and the people who defend their habitat, to show that harm is being done. This is wrong.
P37	Grizzlies are managed from the perspective that they're an endangered species when they're not. The Banff-Bow Valley is not the last stand of the grizzly bear.

Table A8 Unclear Solutions Statements

No.	Statement
S02	Tighten the integration of scientific management and research. Management actions should be directly coupled to the outcomes of research.
S05	Use less invasive research on grizzly bears and strictly monitor the population. Research is not a mandate for National Parks, and parks are not a lab.
S06	Use science more to guide policy decisions.
S08	Increase participation and communication with park residents.
S16	We need to keep in mind the historical context for ecological integrity. People think that Banff National Park is Eden, but in fact Banff history was for tourism.
S17	Scientists and decision makers should be clearer about what the science indicates is in the interest of bears.
S19	Engage landowners in decisions. Get more input from people out on the land who are actually seeing the wildlife on a more regular basis.
S24	Managers should say outright that the function of a National Park is a conservation function. Someone needs to say no to the next round of development expansion.
S26	Increase habitat in the Park for bears so that less bears move onto the plains and come into conflict with agricultural operations.
S30	Find a more effective way of including interests, not just those who are loud, but where prudence and understanding drive the logic and argument, not just passion.

A7 Additional Statements

Table A9 Additional Problems Statements

Theme	Statement Topic
Problem Definition	• The problem is people, not bears
Education, Values, and Behaviours	• Effectiveness and impact of education • Educating people about using landscapes intelligently to avoid running into bears • Educating people about the connection between species conservation and ecosystem services • Making people conscious of their choices and of how the landscape works • The community's acceptance of and investment in grizzly bears • Willingness of people to provide time and space for other species • Willingness of people to sacrifice some personal freedom for the well-being of bears • Influencing the views of people • The behaviour and impact of people • Difficulties in changing the values and behaviours of people • Ability to increase compatibility between human activity and the presence of bears • Improving methods to reduce conflicts between bears and people in the Bow Valley
Human Use and Development	• Urgency to address the needs of grizzly bears in response to the rapidly increasing human population and development • Priority of economic development over environmental issues • The distinction between human use and development
IPS and Stakeholder Involvement	• Effect of IPS process • Importance of stakeholder involvement in decision making
Parks Canada	• Parks Canada's achievements in grizzly bear management • Influence of political pressure on Parks Canada
Grizzly Bears	• The status of the grizzly bear population is stable to increasing • Response to problem bears • The symbolic importance of the grizzly bear
Transportation	• Railway and grain spillage • Railway as the leading cause of mortality • Efforts of Canadian Pacific Railway to reduce grizzly bear mortality • Transportation impacts associated with tourism and visitors
Research	• Research as an industry
Hunting	• First Nations hunting

Table A10 Additional Solutions Statements

Theme	Statement Topic
Education and Communication	• Taking advantage of opportunities for communication and education about National Parks and wildlife protection • Educating people about behaviour in bear country, including visitors from Calgary and elsewhere • Involvement of businesses in Bear Aware education • Requiring a certain level of proficiency and preparedness from people who use certain areas of the backcountry • Need for an objective communication strategy incorporating the diversity of views
Conservation and Human Use	• Balancing conservation and human use in National Parks • Balance of humans and wildlife in National Parks • Considering the historical interaction between wildlife and humans
IPS and Stakeholder Involvement	• Potential for success through IPS • Continuing to build on the work done through the IPS process • Including more people in the IPS group and providing it with more information • Need for an increase in engagement of all the stakeholders • Including the interests and perspectives of national and international stakeholders regarding National Parks • Need for common goals and an overall strategy for the IPS group • Importance of dialogue and collaboration • Finding a way out of adversarial entrenchment and creating dialogue to solve problems • Finding creative solutions to the problems
Decision Making	• Incorporating values into decision making • Values underlying decision making in National Parks • Need for people-oriented solutions
Parks Canada	• Parks Canada is doing a good job as the steward of Banff National Park • Increasing the level of trust between various stakeholders and Parks Canada • Need for leadership from Parks Canada to maintain and restore ecological integrity
Transportation	• Focusing efforts and funding on addressing the mortality and the issues associated with transportation, both on the railway and the highways • Addressing transportation as the leading cause of grizzly bear mortality by emphasizing transportation management • Addressing the problem of grain on railroad tracks and grizzly bear mortalities on the railway • Finding more effective ways to work with Canadian Pacific Railway • Using secondary roads instead of the 1A highway in Banff National Park • Lowering and/or enforcing speed limits more
Habitat Management	• Establishing priority areas for bears and people with buffer zones in the interface • Reclamation of habitat for grizzly bears
Science	• Science is necessary, but not sufficient, for conservation
Funding	• Need for increased funding for grizzly bear management
Hunting	• Making the moratorium on grizzly bear hunting permanent
Achievements	• Celebrating the successes in parks management • Considering the overall effect of individual initiatives within Banff National Park

Appendix B: Comparisons between the Before and After Q Studies

B1 Unrotated Factor Matrices

Table B1 Unrotated Factor Matrix for the Problems Meta-Analysis

Factors that are significant according to the eigenvalue criterion are identified in bold.

Factor	Unrotated Problems Meta-Factors						
	1	2	3	4	5	6	7
PB1	0.9274	0.1194	0.1346	0.1159	-0.0369	0.2693	0.1425
PB2	-0.7485	0.5289	0.0518	0.3522	0.1523	-0.0520	0.0862
PB3	0.5782	0.6875	-0.3203	-0.0400	-0.2093	-0.1943	0.0852
PB4	0.0160	0.3396	0.9198	0.0501	-0.1610	-0.0203	-0.0971
PA1	0.6444	0.6802	-0.2200	-0.0109	0.1878	0.0685	-0.1833
PA2	-0.7133	0.5591	0.1708	-0.3540	0.0766	0.0961	0.0948
PA3	0.8197	-0.1919	0.4246	-0.0818	0.2506	-0.1848	0.0859
Eigenvalue	**3.3507**	**1.6940**	**1.2274**	0.2738	0.1983	0.1615	0.0944
Variance (%)	48	24	18	4	3	2	1

Table B2 Unrotated Factor Matrix for the Solutions Meta-Analysis

Factors that are significant according to the eigenvalue criterion are identified in bold.

Factor	Unrotated Solutions Meta-Factors						
	1	2	3	4	5	6	7
SB1	0.7962	0.5232	0.1371	-0.1120	-0.0430	-0.0285	0.2415
SB2	-0.5000	0.7593	0.0531	-0.1059	0.0338	-0.3916	-0.0704
SB3	-0.2741	-0.1833	0.8725	0.0894	0.3477	-0.0039	0.0319
SA1	0.7654	0.4629	0.2899	-0.1707	-0.0456	0.2069	-0.2045
SA2	-0.5879	0.3498	0.2488	0.4288	-0.5046	0.1750	0.0312
SA3	-0.6119	0.5210	-0.2754	-0.0918	0.4076	0.3191	0.0433
SA4	0.4930	0.1684	-0.1776	0.7854	0.2720	-0.0697	-0.0351
Eigenvalue	**2.5081**	**1.5203**	**1.0363**	0.8701	0.6207	0.3344	0.1102
Variance (%)	36	22	15	12	9	5	2

B2 Cattell's Scree Tests

Figure B1 Cattell's Scree Test for the Unrotated Problems Meta-Factors

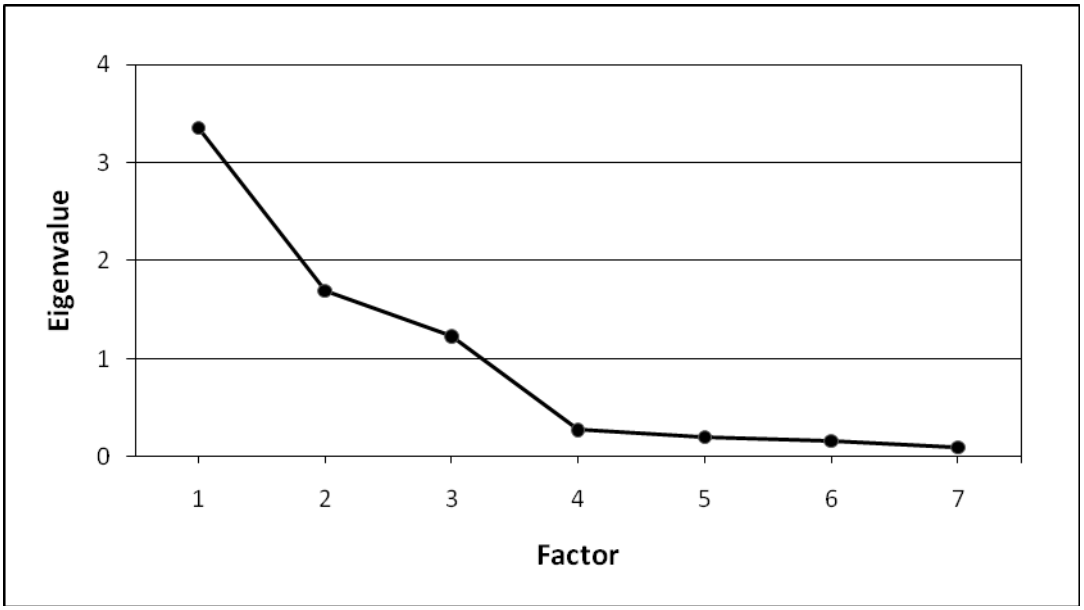
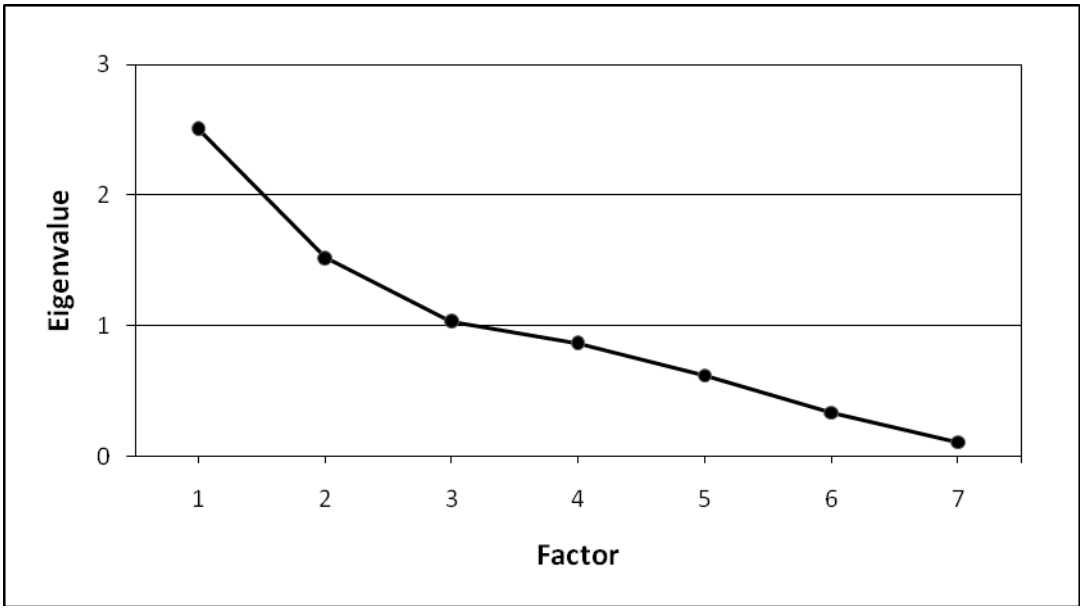


Figure B2 Cattell's Scree Test for the Unrotated Solutions Meta-Factors



B3 Rotated Factor Matrices

Table B3 Rotated Factor Matrix for the Problems Meta-Analysis

The shown factor matrix is for the selected three-factor solution with the initial Meta-Factor 1 split into Meta-Factors PM1 and PM2. Significant factor loadings (p<0.01) are identified in bold. Sorts that have significant loadings but are not flagged are identified with light grey shading. Flagged sorts are identified with dark grey shading.

Factor	Rotated Problems Meta-Factors			
	PM1	PM2	PM3	PM4
PB1	**-0.7049**	**0.7049**	**0.5803**	0.2424
PB2	**0.9058**	**-0.9058**	-0.0352	0.1444
PB3	-0.0499	0.0499	**0.9511**	-0.0491
PB4	0.0819	-0.0819	0.0002	**0.9772**
PA1	-0.1188	0.1188	**0.9538**	0.0496
PA2	**0.8816**	**-0.8816**	-0.0269	0.2695
PA3	**-0.8237**	**0.8237**	0.1948	0.4154
Variance (%)	40	40	31	18

Table B4 Rotated Factor Matrix for the Solutions Meta-Analysis

The shown factor matrix is for the selected five-factor solution. Significant factor loadings (p<0.01) are identified in bold. Sorts that have significant loadings but are not flagged are identified with light grey shading. Flagged sorts are identified with dark grey shading.

Factor	Rotated Solutions Meta-Factors				
	SM1	SM2	SM3	SM4	SM5
SB1	**0.9399**	-0.0438	-0.1285	0.1709	-0.0990
SB2	0.1275	**0.8073**	0.0276	-0.1501	0.3878
SB3	-0.0774	-0.0165	**0.9905**	-0.0708	0.0817
SA1	**0.9451**	-0.0918	0.0116	0.0741	-0.0899
SA2	-0.1729	0.2023	0.0904	-0.0053	**0.9431**
SA3	-0.2377	**0.9155**	-0.0389	-0.0026	0.0060
SA4	0.1869	-0.0897	-0.0738	**0.9722**	-0.0142
Variance (%)	27	22	14	14	15

B4 Factor Arrays

Figure B3 Factor Arrays for the Problems Meta-Factors

The numbers in the templates refer to the statement numbers in the problems Q sample.

Meta-Factor PM1: Exaggerated Problems

-4	-3	-2	-1	0	+1	+2	+3	+4
P31	P13	P18	P07	P25	P14	P24	P26	P10
P08	P22	P19	P34	P20	P38	P01	P37	P36
P02	P27	P29	P30	P16	P33	P09	P06	P28
	P17	P15	P23	P04	P32	P05		
		P35		P11	P21	P12		
		P03						

Meta-Factor PM2: Inadequate Management

-4	-3	-2	-1	0	+1	+2	+3	+4
P38	P30	P37	P35	P32	P34	P18	P33	P19
P06	P24	P36	P22	P25	P07	P14	P31	P04
P09	P12	P10	P05	P21	P23	P13	P29	P02
	P26	P28	P01	P20	P16	P08	P27	
			P17	P03	P15			
				P11				

Meta-Factor PM3: Problematic Status of Bears

-4	-3	-2	-1	0	+1	+2	+3	+4
P25	P38	P20	P37	P27	P22	P35	P18	P13
P24	P30	P01	P19	P23	P28	P17	P14	P16
P32	P21	P11	P05	P02	P06	P07	P36	P04
	P34	P26	P31	P09	P10	P03	P15	
		P29		P08	P33			
				P12				

Meta-Factor PM4: Politicized Management

-4	-3	-2	-1	0	+1	+2	+3	+4
P22	P17	P16	P20	P38	P11	P36	P28	P33
P03	P31	P24	P32	P37	P10	P29	P19	P08
P30	P35	P13	P06	P34	P21	P27	P14	
	P23	P12	P09	P02	P05	P26	P01	
			P18	P25	P15	P04		
				P07				

Figure B4 Factor Arrays for the Solutions Meta-Factors

The numbers in the templates refer to the statement numbers in the solutions Q sample.

Meta-Factor SM1: Bear Conservation Advocates

-4	-3	-2	-1	0	+1	+2	+3	+4
S09	S13	S23	S08	S28	S30	S27	S22	S20
S01	S16	S26	S10	S24	S11	S03	S25	S04
S07	S05	S19	S17	S02	S14	S12	S21	
			S29		S06		S15	
			S18					

Meta-Factor SM2: Anthropocentric Scientific Managers

-4	-3	-2	-1	0	+1	+2	+3	+4
S22	S04	S20	S11	S19	S05	S16	S07	S12
S14	S24	S23	S13	S27	S08	S21	S06	S02
S03	S09	S26	S28	S10	S15	S18	S17	S01
			S25	S29	S30			

Meta-Factor SM3: Habitat Modifiers

-4	-3	-2	-1	0	+1	+2	+3	+4
S02	S01	S21	S29	S27	S05	S30	S28	S09
S24	S26	S14	S06	S23	S19	S18	S25	
S15	S22	S07	S17	S20	S08	S13	S12	
			S04	S03	S16		S11	
							S10	

Meta-Factor SM4: Cohabitation Diplomats

-4	-3	-2	-1	0	+1	+2	+3	+4
S09	S05	S06	S16	S13	S29	S30	S22	S24
S11	S26	S15	S27	S04	S20	S25	S12	S23
S28	S10	S02	S01	S19	S18	S03		S08
			S07		S14	S21		
			S17					

Meta-Factor SM5: Anthropocentric Habitat Managers

-4	-3	-2	-1	0	+1	+2	+3	+4
S24	S05	S17	S29	S30	S18	S19	S28	S10
S20	S02	S06	S26	S27	S16	S15	S21	S07
S14	S25	S22	S09	S23	S13	S03	S08	S01
			S11	S04	S12			

B5 Q Samples and Factor Scores

Table B5 Q Sample Statements and Factor Scores for the Problems Meta-Analysis

Statistically distinguishing factor scores at the p<0.01 level are identified with dark grey shading. Statistically distinguishing factor scores at the p<0.05 level are identified with light grey shading.

No.	Statement	Meta-Factor			
		PM1	PM2	PM3	PM4
P01	There is a false crisis mentality spurred by interest groups who have more in line than the health and welfare of grizzly bears.	2	-1	-2	3
P02	There is a lack of an overall conservation strategy for grizzly bears, lack of clear goals, targets and a bigger vision.	-4	4	0	0
P03	There is not enough funding to implement what we know needs to be done for grizzly bear management.	-2	0	2	-4
P04	The grizzly bear population is vulnerable.	0	4	4	2
P05	The grizzly bear population of the Banff-Bow Valley is the Healthiest it has been in 25 years.	2	-1	-1	1
P06	People management in Banff Park has been successful and has led to us cultivating bears not wiping them out.	3	-4	1	-1
P07	The current management of grizzly bears is somewhat disjointed between several different responsible agencies. Techniques to manage bears are not consistent and communication is not as good as it could be between these agencies.	-1	1	2	0
P08	An unrelenting tide of humanity has descended on a place that has a finite capacity to accommodate human pressure.	-4	2	0	4
P09	The grizzly bear population is at an equilibrium, it's neither dropping nor increasing. Management is doing a good job with what they're working with.	2	-4	0	-1
P10	We tend to get caught up in the chicken little syndrome – thinking that the sky is falling and we need to fix everything – without recognizing Parks Canada's successes in grizzly bear management.	4	-2	1	1
P11	The squeaky wheel wins in grizzly bear management. Organizations that speak loudly and are connected to the media have their views incorporated into policy.	0	0	-2	1
P12	Although human use in Banff Park has increased, that use is more concentrated and people are better educated, so people are having less of an impact on grizzly bears.	2	-3	0	-2
P13	Increasing human use of grizzly bear habitat, through recreational use, residential use, and tourism development, both inside and outside of the Park has resulted in increased mortality rates of grizzly bears.	-3	2	4	-2
P14	There will be more challenges for residents with bear activity intruding in communities in the future.	1	2	3	3
P15	The population status of grizzly bears is not sustainable in the long term. If we sit back today and call it acceptable, we won't make the improvements that need to be made to maintain the position we're in now.	-2	1	3	1
P16	The Bow Valley is an important linkage for the regional grizzly bear population. If we lose the connections and opportunities in this area, then there is a high risk of the population being placed in jeopardy.	0	1	4	-2
P17	The precautionary principle doesn't hold water in grizzly bear management. The onus of proof is still on those defending wildlife instead of on developers.	-3	-1	2	-3
P18	Management is fragmented by jurisdiction. There are no system wide specific objectives that Parks Canada and the provincial agencies are trying to manage for.	-2	2	3	-1

No.	Statement	Meta-Factor			
		PM1	PM2	PM3	PM4
P19	There is no well organized or visionary plan in place that outlines when success is achieved in management and when we've achieved a healthy population.	-2	4	-1	3
P20	Banff Park doesn't have room for more bears because the ecosystem in the Park is at carrying capacity.	0	0	-2	-1
P21	We're taking our local situation with bears and extrapolating. In the regional context, grizzly bear populations are healthy.	1	0	-3	1
P22	Elsewhere in Alberta, grizzly bear populations are shrinking. The Bow Valley needs to be a source of bears to increase the regional population of bears.	-3	-1	1	-4
P23	Decisions are made with urban perceptions and by wildlife groups, with less consideration given to agriculture. Livestock producers have generally borne the costs of grizzly bear protection and do not get adequate compensation for losses incurred by bears.	-1	1	0	-3
P24	We have unnecessarily sacrificed human activities in Banff National Park for grizzly bear protection.	2	-3	-4	-2
P25	We are on a trend to having way too many bears in the area which means we'll be bound to have more problems between bears and people, and a huge proportion of habituated bears.	0	0	-4	0
P26	The population status of grizzly bears is acceptable as it is. We'll never achieve zero mortality of bears given the circumstances we're in and that's fine.	3	-3	-2	2
P27	Politics and special interest pleading have interfered with the essential scientific understanding of the fundamental established mandates of conservation organizations. We're no longer talking about science, we're talking about who can speak the loudest and who can get the most media coverage.	-3	3	0	2
P28	It is not the role of a National Park to be a bear factory and produce bears, but instead to have the right amount of bears for the Park itself.	4	-2	1	3
P29	Management is largely reactive, it's based on the political bureaucratic mood of the day and is not entirely science based.	-2	3	-2	2
P30	A disproportionate amount of resources are going into saving bears when they're shot just outside Park borders.	-1	-3	-3	-4
P31	Human use issues receive greater priority in Parks Management to the point where grizzly bears have been jeopardized.	-4	3	-1	-3
P32	Grizzly bears have been over managed. The trend of closing each area with a female grizzly in it is leading us to close Banff.	1	0	-4	-1
P33	Political pressure lets people get what they want. Decision making is politicized.	1	3	1	4
P34	Most of the discourse associated with policy making has been high-jacked by people whose views are short term and do not take into account the larger interests, sensibilities or history of this country.	-1	1	-3	0
P35	If something will impact recreational opportunities, the burden of proof is always on the bear, their habitat, and the people who defend their habitat, to show that harm is being done. This is wrong.	-2	-1	2	-3
P36	Instead of celebrating our achievements in grizzly bear management, we continue to talk about our challenges.	4	-2	3	2
P37	Grizzlies are managed from the perspective that they're an endangered species when they're not. The Banff-Bow Valley is not the last stand of the grizzly bear.	3	-2	-1	0
P38	The grizzly bear population is doing very well, describing the population as just "stable" is the crisis version of what is happening.	1	-4	-3	0

Table B6 Q Sample Statements and Factor Scores for the Solutions Meta-Analysis

Statistically distinguishing factor scores at the p<0.01 level are identified with dark grey shading. Statistically distinguishing factor scores at the p<0.05 level are identified with light grey shading.

No.	Statement	Factor				
		SM1	SM2	SM3	SM4	SM5
S01	Restricting human use doesn't have to be the answer. Human use has already been restricted in the areas most important for grizzly bears and we don't need more restrictions.	-4	4	-3	-1	4
S02	Tighten the integration of scientific management and research. Management actions should be directly coupled to the outcomes of research.	0	4	-4	-2	-3
S03	Limit growth on provincial lands adjacent to the Park.	2	-4	0	2	2
S04	Make bears a higher priority in provincial management. In Alberta, create bold, legally accountable legislation that makes government manage for the needs of grizzly bears.	4	-3	-1	0	0
S05	Use less invasive research on grizzly bears and strictly monitor the population. Research is not a mandate for National Parks, and parks are not a lab.	-3	1	1	-3	-3
S06	Use science more to guide policy decisions.	1	3	-1	-2	-2
S07	National Parks are not game preserves, they should be managed for people to come here to see and learn things.	-4	3	-2	-1	4
S08	Increase participation and communication with park residents.	-1	1	1	4	3
S09	When management closes one area of the Park for grizzly bear management, they have to open another area for recreational opportunity.	-4	-3	4	-4	-1
S10	Create bear habitat in wilderness areas in the backcountry, outside of communities and development areas, to keep bears and people separate.	-1	0	3	-3	4
S11	Develop specific objectives for each habitat area. Figure out how many bear deaths can be tolerated in each area (demographic target), and how much habitat change is acceptable.	1	-1	3	-4	-1
S12	Build an appreciation for grizzly bears among recreational users. The issue of management comes down to managing people.	2	4	3	3	1
S13	Keep collaring and drugging bears to a minimum because these techniques completely change a bear's behaviour and then you're no longer studying wild bears. This is the bear's National Park too.	-3	-1	2	0	1
S14	Restrict human use in the Park, create areas where bears can live on the landscape and meet their year round needs.	1	-4	-2	1	-4
S15	Develop a more formal process between Parks Canada and the provincial agencies for managing bears by developing a multiagency group to deal with grizzly bear management that has some power to influence decisions.	3	1	-4	-2	2
S16	We need to keep in mind the historical context for ecological integrity. People think that Banff National Park is Eden, but in fact Banff history was for tourism.	-3	2	1	-1	1
S17	Scientists and decision makers should be clearer about what the science indicates is in the interest of bears.	-1	3	-1	-1	-2
S18	Focus on monitoring trends of the grizzly bear population in scientific research, and finding less intrusive ways to do so.	-1	2	2	1	1

No.	Statement	Factor				
		SM1	SM2	SM3	SM4	SM5
S19	Engage landowners in decisions. Get more input from people out on the land who are actually seeing the wildlife on a more regular basis.	-2	0	1	0	2
S20	Parks Canada must take a stronger stance towards prioritizing ecological integrity in Banff National Park.	4	-2	0	1	-4
S21	We need a more concerted management effort between the province, Parks Canada, industry, and people who do things on the land.	3	2	-2	2	3
S22	We need to change our value system and value other things besides profit if we want bears on the landscape. We are compromising our long term well-being for short term material gains of wealth and power.	3	-4	-3	3	-2
S23	Find ways so that humans and grizzly bears can co-habitate in the same ecosystem by minimizing bear habituation. Our biggest mistake in management has been to designate separate spaces for bears and humans.	-2	-2	0	4	0
S24	Managers should say outright that the function of a National Park is a conservation function. Someone needs to say no to the next round of development expansion.	0	-3	-4	4	-4
S25	Design human use around ecological constraints.	3	-1	3	2	-3
S26	Increase habitat in the Park for bears so that less bears move onto the plains and come into conflict with agricultural operations.	-2	-2	-3	-3	-1
S27	Improve the communication structure between various parties that have a role to play in grizzly bear protection. Develop a standardized protocol for information sharing between organizations.	2	0	0	-1	0
S28	Change the configuration of habitat to reduce the potential for conflict between humans and bears, such as getting rid of high quality bear habitat near human development.	0	-1	3	-4	3
S29	Adjust values and attitudes so that people value a live bear so highly that they wouldn't cause the circumstances of that bear's death.	-1	0	-1	1	-1
S30	Find a more effective way of including interests, not just those who are loud, but where prudence and understanding drive the logic and argument, not just passion.	1	1	2	2	0

Appendix C: Interviews about Changes in Views

C1 Participant Comments about Changes in Views

Table C1 Participant Comments about Changes in Views

Some comments have been summarized or rephrased.

Theme	Comments
Changes in Views and Learning	• My views are less polarized than before. • My views may have become accentuated or a little more extreme. • My views have not changed, but I have learned more. • I am more informed about problems. • I have a better understanding of the issues around keeping bear populations sustainable and healthy. • I am more knowledgeable about what is happening in the Bow Valley and the Canmore area.
Problem Definition	• I have a clearer view of what the problems might be. • The nature, complexity, and details of the problem have become clearer. • We have come to the realization that the problem is not the bears. • It is not a grizzly bear problem, it is a people problem. • I have a better understanding of the nature of the problem, being more to do with trust and relationships, as opposed to grizzly bears. • The underlying problem is the institutional structure of the government and the lack of collaboration and shared decision making. • The problem is predominantly a transportation problem. • The problem has shifted largely from inside the park to outside the park. • The same problems still exist that were here years ago, and those show no sign of going away.
Population Status and Mortality	• We have a clearer picture of the populations and their health. • We have a better sense of population status and management options. • We have a clearer picture of the nature and effects of grizzly bear mortality within and outside Banff National Park. • Several mortalities and incidents, including a human fatality, have accentuated the issues around human use. • The plight of bears on provincial land has become much more obvious. • The province of Alberta is facing an enormous challenge to maintain grizzly bears. • I still think we probably will not have grizzly bears here in 50 to 150 years.

Theme	Comments
Human Use and Development	• There is too much human use in Banff National Park. • I am more aware of the impact and extent of development in Canmore. • Human use issues have become much more acute, especially around Canmore. • The amount of human use and development is unprecedented, particularly in the lower Bow Valley. • Diverse types of use pressures are encroaching both on our landscape and our capacity to manage for ecological integrity. • I am concerned that any progress is overcome by development pressures that are going to have unpredictable consequences on our ability to preserve grizzly bears. • It is difficult to resolve the conflict between habitat security and human use. • We need some solutions that actually will include some compromises for people's activities. • We need to celebrate restrictions that enable grizzly bears to exist in this landscape. • I have become increasingly disgusted with the concept of no-net-loss of recreational opportunities.
Transportation	• I have a greater awareness of the impacts of the railway on the grizzly bear population. • I have a better understanding of the negative role of the railway in grizzly bear mortality. • I am more aware of the significance of the grain spill on the railroads. • It was a significant move that Canadian Pacific Railway agreed to fix grain cars. • We need to address transportation issues. • The solutions are largely related to our effectiveness in dealing with transportation problems. • We need to address the problems with transportation corridors by working more closely with the provinces. • We need to address the grizzly bear mortality on the Trans-Canada Highway and the railway by managing traffic and the situations on the railway.

Theme	Comments
Management	• I am more aware of the role of management and the complexities of decision making. • I am more informed about better management. • There is a way to manage human use and bears. • We are better at managing bears and the interaction interface between bears and people. • We are better at experimentation. • We need to integrate new information about the nature and effect of grizzly bear mortality into management strategies. • We need to consider trail relocations in conflict areas. • We need to be careful not to over-manage for one species at the peril of others. • I have become aware of the conflict between protecting communities from fire and managing bear habitat near communities, where reducing the risk of catastrophic fire leads to creating bear habitat near communities. • There is a need for a larger vision that includes protected areas. • There is a lack of trust in the ability of Parks Canada to develop a sound strategy and to hold on to it over a period of time. • The biggest problem seems to be in the management itself by Parks Canada. • There is a continued chronic lack of leadership.
Science and Research	• The problems are less related to science. • Science cannot and should not provide all the answers. • Science is accepted now as basic facts. • I think we have better science. • The means of counting bears have improved in British Columbia. • My views are informed by more scientific data coming from recent research about the picture of the grizzly bear population in the province. • The Bow Valley Study had a tremendous influence on everyone. • I have softened my stance on research because it has become less intrusive and more focused on monitoring. • We need to recognize the ecological facts. • We should continue to apply science-based decision making while taking into account the needs of people.
Education and Communication	• We need to put more effort into educating school children. • I recognize the absolute importance of education that incorporates the values expressed in the *National Parks Act* and the National Park policy. • It is difficult to educate some visitors about bears. • I have learned a lot from the Wild Smart program in Canmore.

Theme	Comments
Dialogue and Collaboration	• There is potential in working together to come up with better solutions. • Bringing people together to discuss the issue is the only way to go. • There is a willingness to try to work cooperatively and to look outside the box. • There is increased communication and understanding and a willingness to learn. • There is more maturity among interest groups. • People have a deeply felt sentiment for grizzly bears throughout the province. • I have learned to accept the validity of other people's values. • There is a need for continued dialogue. • We need to try to reconcile people's different interests. • We need to balance trade-offs in search of common ground.
IPS	• The IPS process is the solution. • The IPS methodology has clear benefits. • Issues are being dealt with better in the IPS group. • I have a better understanding of the views of other stakeholders in the IPS group. • I have learned a lot from the IPS process. • The progress of the IPS group seems to be slowing down. • The IPS group should not be afraid to tackle tough issues. • In some cases, we have not been able to move beyond our own individual perspectives and actually come up with common-ground solutions. • There is not enough trust among stakeholders to achieve real solutions. • There is a need for another IPS training session. • There is a need for revisiting the fundamentals of the IPS process through re-training.
Achievements	• I have an appreciation for the history of positive things that have been done. • Parks Canada and the community have done a terrific job. • We need to recognize the support from the community and the taxpayer. • We need to look at all the initiatives in the Park as one big picture. • I have a greater awareness of the efforts to accommodate bears and minimize impacts on them.
Solutions	• I still think the solution needs to be an array of restricted access, periodic closures, education, and hazing of bears away from where you don't want them, and more vigilance around bears. • My solution is just to leave nature alone.

REFERENCE LIST

Addams, H. 2000. Q methodology. In *Social discourse and environmental policy: An application of Q methodology*, ed. H. Addams and J. Proops, 14-40. Cheltenham, U.K.: Edward Elgar.

Addams, H., and J. Proops, eds. 2000. *Social discourse and environmental policy: An application of Q methodology*. Cheltenham, U.K.:Edward Elgar.

Alberta Forestry, Lands and Wildlife. 1990. *Management plan for grizzly bears in Alberta*. Wildlife management planning series, no. 2. Publication no. T/232. Alberta Forestry, Lands and Wildlife, Fish and Wildlife Division, Edmonton, Alberta. http://www.assembly.ab.ca/lao/library/egovdocs/alflw/1990/70036.pdf.

Alberta Grizzly Bear Inventory Team. 2007. Grizzly bear population and density estimates for the 2006 Alberta unit 5 management area inventory. Report prepared for Alberta Sustainable Resource Development, Fish and Wildlife Division. http://srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/BearManagement/documents/GrizzlyBear-DNAPopulationEstimate2006-May2007.pdf.

Alberta Grizzly Bear Inventory Team. 2009. Grizzly bear population and density estimates for the 2008 DNA inventory of the Grande Cache bear management area (BMA 2). Report prepared for Alberta Sustainable Resource Development, Fish and Wildlife Division. http://srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/BearManagement/documents/GrizzlyBear-DNAPopulationEstimate2008-Jul7-2009.pdf.

Alberta Grizzly Bear Recovery Team. 2008. *Alberta grizzly bear recovery plan 2008-2013*. Alberta species at risk recovery plan no. 15. Publication no. I/297. Alberta Sustainable Resource Development, Fish and Wildlife Division, Edmonton, Alberta. http://srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/BearManagement/documents/GrizzlyBear-RecoveryPlan2008-13-revJuly23-2008.pdf.

ASRD (Alberta Sustainable Resource Development). 2001. *The general status of Alberta wild species 2000*. Publication no. I/023. Alberta Environment/Alberta Sustainable Resource Development, Edmonton, Alberta. http://srd.alberta.ca/BioDiversityStewardship/SpeciesAtRisk/GeneralStatus/documents/GeneralStatusOfAlbertaWildSpecies-2000.pdf.

———. 2007. *The general status of Alberta wild species 2005*. Alberta Sustainable Resource Development, Edmonton, Alberta. http://srd.alberta.ca/BioDiversityStewardship/SpeciesAtRisk/GeneralStatus/StatusOfAlbertaWildSpecies2005/Default.aspx.

———. 2008. Questions and answers – grizzly bear recovery plan. Alberta Sustainable Resource Development, Edmonton, Alberta. http://srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/BearManagement/documents/GrizzlyBear-RecoveryPlan-QandA-Mar31-2008.pdf.

———. 2009. Alberta grizzly bear mortality rates. http://srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/BearManagement/GrizzlyBears/AlbertaGrizzlyBearMortalityRates.aspx.

———. 2010. Grizzly bears. http://srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/BearManagement/GrizzlyBears/GrizzlyBears.aspx.

ASRD (Alberta Sustainable Resource Development) and ACA (Alberta Conservation Association). 2010. *Status of the grizzly bear (*Ursus arctos*) in Alberta: Update 2010*. Wildlife status report no. 37 (Update 2010). Publication no. T/223. Alberta Sustainable Resource Development, Edmonton, Alberta. http://srd.alberta.ca/BioDiversityStewardship/SpeciesAtRisk/DetailedStatus/documents/Status-GrizzlyBear-inAlberta-Feb2010.pdf.

Andersone, Z., and J. Ozolins. 2004. Public perception of large carnivores in Latvia. *Ursus* 15 (2): 181-87.

Apps, C. D., B. N. McLellan, and J. G. Woods. 2006. Landscape partitioning and spatial inferences of competition between black and grizzly bears. *Ecography* 29: 561-572.

Ascher, W. 1986. The evolution of the policy sciences: Understanding the rise and avoiding the fall. *Journal of Policy Analysis and Management* 5 (2): 365-73.

Austin, M. A. 2004. Grizzly bear recovery planning in the British Columbia portion of the North Cascades: Lessons learned and re-learned. *Ursus* 15 (1): 123-28.

Babbie, E., and L. Benaquisto. 2002. *Fundamentals of social research*. Scarborough, Ontario: Nelson Education Ltd.

Benn, B., and S. Herrero. 2002. Grizzly bear mortality and human access in Banff and Yoho National Parks, 1971-98. *Ursus* 13:213-21.

Berger, J. 2007. Carnivore repatriation and holarctic prey: Narrowing the deficit in ecological effectiveness. *Conservation Biology* 21 (4): 1105-16.

Bertch, B., and M. Gibeau. 2008. Grizzly bear monitoring in the Mountain National Parks: Mortalities and bear/human encounters 1990-2007. First annual report. Parks Canada.

———. 2009. Grizzly bear monitoring in and around the Mountain National Parks: Mortalities and bear/human encounters 1990-2008. Second annual report. Parks Canada.

Blood, D. A. 2002. *Grizzly Bears in British Columbia: Ecology, conservation and management*. British Columbia Ministry of Water, Land and Air Protection. http://www.env.gov.bc.ca/wld/documents/grzzlybear.pdf.

Boulanger, J., G. Stenhouse, G. MacHutchon, M. Proctor, S. Himmer, D. Paetkau, and J. Cranston. 2005. Grizzly bear population and density estimates for the 2005 Alberta (proposed) unit 4 management area inventory. Report prepared for Alberta Sustainable Resource Development, Fish and Wildlife Division. http://srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/BearManagement/documents/GrizzlyBear-DNAPopulationEstimate2005-Dec2005.pdf.

Boulanger, J., G. Stenhouse, M. Proctor, S. Himmer, D. Paetkau, and J. Cranston. 2005. 2004 Population Inventory and Density Estimates for the Alberta 3B and 4B grizzly bear management area. Report prepared for Alberta Sustainable Resource Development, Fish and Wildlife Division. http://srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/BearManagement/documents/GrizzlyBear-DNAPopulationEstimate2004-Jul29-2005.pdf.

Boyd, D. R. 2003. *Unnatural law: Rethinking Canadian environmental law and policy*. Vancouver, British Columbia: UBC Press.

Brewer, G. D. 1974. The policy sciences emerge: To nurture and structure a discipline. *Policy Sciences* 5:239-44.

Brewer, G. D., and P. deLeon. 1983. *The foundations of policy analysis*. Homewood, Illinois: The Dorsey Press.

British Columbia Ministry of Environment, Lands and Parks. 1995a. *A future for the grizzly: The British Columbia grizzly bear conservation strategy*. British Columbia Ministry of Environment, Environmental Stewardship Division. http://www.env.gov.bc.ca/wld/grzz/grst.html.

———. 1995b. *Conservation of grizzly bears in British Columbia: A background report*. Victoria, British Columbia: British Columbia Ministry of Environment, Lands and Parks.

Brodie, J. F, and M. L. Gibeau. 2007. Brown bear population trends from demographic and monitoring-based estimators. *Ursus* 18 (2): 137-144.

Brown, S. R. 1977. Political literature and the response of the reader: Experimental studies of interpretation, imagery, and criticism. *The American Political Science Review* 71 (2): 567-84.

———. 1980. *Political subjectivity: Applications of Q methodology in political science*. New Haven, Connecticut: Yale University Press.

———. 2003a. Re: pre-flagging in PQMethod. Message posted to the Q Methodology Network, June 17. http://listserv.kent.edu/archives/q-method.html.

———. 2003b. Re: pre-flagging in PQMethod. Message posted to the Q Methodology Network, June 18. http://listserv.kent.edu/archives/q-method.html.

———. 2005. Re: Significance of flagging. Message posted to the Q Methodology Network, November 20. http://listserv.kent.edu/archives/q-method.html.

Brunner, R. D. 1982. The policy sciences as a science. *Policy Sciences* 15:115-35.

———. 1984. Integrating knowledge and action. *Policy Sciences* 17:3-11.

———. 1991. The policy movement as a policy problem. *Policy Sciences* 24:65-98.

Burns, M., and A. S. Cheng. 2007. Framing the need for active management for wildfire mitigation and forest restoration. *Society and Natural Resources* 20:245-259.

Byrd, K. L. 2002. Mirrors and metaphors: Contemporary narratives of the wolf in Minnesota. *Ethics, Place and Environment* 5:50-65.

CBC News. 2007. Missing Calgary hunter mauled by bear. November 29. http://www.cbc.ca/canada/calgary/story/2007/11/29/hunter-mauled.html.

Carroll, C., R. F. Noss, P. C. Paquet, and N. H. Schumaker. 2004. Extinction debt of protected areas in developing landscapes. *Conservation Biology* 18 (4): 1110-20.

Cattell, R. B. 1966. The scree test for the number of factors. *Multivariate Behavioural Research* 1 (2): 245-76.

Chamberlain, E. C. 2006. Perspectives on grizzly bear management in Banff National Park and the Bow River Watershed, Alberta: A Q methodology study. Master's project, Simon Fraser University.

Ciarniello, L. M., M. S. Boyce, D. C. Heard, and D. R. Seip. 2005. Denning behavior and den site selection of grizzly bears along the Parsnip River, British Columbia, Canada. *Ursus* 16 (1): 47-58.

———. 2007. Components of grizzly bear habitat selection: Density, habitats, roads, and mortality risk. *Journal of Wildlife Management* 71 (5): 1446-57.

Ciarniello, L. M., M. S. Boyce, D. R. Seip, and D. C. Heard. 2007. Grizzly bear habitat selection is scale dependent. *Ecological Applications* 17 (5): 1424-40.

City of Calgary. 2009. Facts about Calgary. http://www.calgary.ca/portal/server.pt/gateway/PTARGS_0_0_766_280_0_43/ http;/content.calgary.ca/CCA/City+Visitors/About+Calgary/Facts+about+Calgary .htm.

Clark, T. W. 1992. Practicing natural resource management with a policy orientation. *Environmental Management* 16 (4): 423-33.

———. 2002. *The policy process: A practical guide for natural resource professionals*. New Haven, Connecticut: Yale University Press.

Clark, T. W., A. P. Curlee, and R. P. Reading. 1996. Crafting effective solutions to the large carnivore conservation problem. *Conservation Biology* 10 (4): 940-48.

Clark, T. W., M. B. Rutherford, and D. Casey, eds. 2005. *Coexisting with large carnivores: Lessons from Greater Yellowstone*. Washington, District of Columbia: Island Press.

Clevenger, A. P., A. T. Ford, and M. A. Sawaya. 2009. Banff wildlife crossings project: Integrating science and education in restoring population connectivity across transportation corridors. Final report prepared for the Parks Canada Agency, Radium Hot Springs, British Columbia.

Clevenger, A. P., and N. Waltho. 2000. Factors influencing the effectiveness of wildlife underpasses in Banff National Park, Alberta, Canada. *Conservation Biology* 14 (1): 47-56.

———. 2005. Performance indices to identify attributes of highway crossing structures facilitating movement of large mammals. *Biological Conservation* 121:453-64.

Colorado Institute of Public Policy. 2006. *Water in 2025: Beliefs and values as a means for cooperation*. Living in the Rocky Mountain West, a Series from the Colorado Institute of Public Policy. Fort Collins, Colorado: Colorado State University.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2002. *COSEWIC assessment and update status report on the grizzly bear* Ursus arctos *in Canada*. Ottawa, Ontario: Committee on the Status of Endangered Wildlife in Canada. http://dsp-psd.pwgsc.gc.ca/Collection/CW69-14-166-2002E.pdf.

———. 2009a. About COSEWIC. http://www.cosewic.gc.ca/eng/sct6/index_e.cfm.

———. 2009b. COSEWIC and the *Species at Risk Act*. http://www.cosewic.gc.ca/eng/sct6/sct6_6_e.cfm.

———. 2009c. Wildlife species search: *Ursus arctos*. http://www.cosewic.gc.ca/eng/sct1/SearchResult_e.cfm?commonName=&scienceName=Ursus+arctos&Submit=Submit.

———. 2010. Definitions and abbreviations. http://www.cosewic.gc.ca/eng/sct2/sct2_6_e.cfm.

CTV News. 2005. Bear attack victim on closed trail: Officials. June 7. http://www.ctv.ca/servlet/ArticleNews/story/CTVNews/1118064525891_6/?hub=CTVNewsAt11.

Cuppen, E. 2009. Putting perspectives into participation: Constructive Conflict Methodology for problem structuring in stakeholder dialogues. PhD diss., VU University Amsterdam.

D'Aliesio, R. 2006. Alberta suspends grizzly bear hunt. *Calgary Herald*, March 4.

deLeon. P. 1981. Policy Sciences: The discipline and profession. *Policy Sciences* 13:1-7.

———. 1988. *Advice and consent: The development of the policy sciences*. New York, New York: Russell Sage Foundation.

———. 1994. Reinventing the policy sciences: Three steps back to the future. *Policy Sciences* 27:77-95.

———. 1999. The stages approach to the policy process: What has it done? Where is it going? In *Theories of the policy process*, ed. P. A. Sabatier, 19-32. Boulder, Colorado: Westview Press.

Dery, D. 1984. P*roblem definition in policy analysis*. Lawrence, Kansas: University Press of Kansas.

Eden, S., A. Donaldson, and G. Walker. 2005. Structuring subjectivities: Using Q methodology in human geography. *Area* 37 (4): 413-22.

Ellis, G., J. Barry, and C. Robinson. 2007. Many ways to say 'no,' different ways to say 'yes': Applying Q methodology to understanding public acceptance of wind farm proposals. *Journal of Environmental Planning and Management* 50 (4): 517-51.

Fernandez-Gil, A., J. Naves, and M. Delibes. Courtship of brown bears *Ursus arctos* in northern Spain: Phenology, weather, habitat and durable mating areas. *Wildlife Biology* 12 (4): 367-73.

Fish and Wildlife Division. 2004. *Report of Alberta's Endangered Species Conservation Committee: June 2002*. Alberta Sustainable Resource Development, Fish and Wildlife Division, Edmonton, Alberta. http://srd.alberta.ca/BioDiversityStewardship/SpeciesAtRisk/LegalDesignation/documents/2002_ESCC_Report.pdf.

———. 2008a. *Alberta's strategy for the management of species at risk (2009-2014)*. Alberta Sustainable Resource Development, Fish and Wildlife Division, Edmonton, Alberta. http://srd.alberta.ca/BioDiversityStewardship/SpeciesAtRisk/AlbertasSpeciesAtRiskStrategy/documents/Alberta'sStrategyForManagementOfSpeciesAtRisk2009-14.pdf.

———. 2008b. *Report on Alberta's endangered species conservation committee: June 2006*. Alberta Sustainable Resource Development, Fish and Wildlife Division, Edmonton, Alberta. http://srd.alberta.ca/BioDiversityStewardship/SpeciesAtRisk/LegalDesignation/documents/2006_ESCC_Report.pdf.

———. 2010. ENFOR Database.

Fishbein, M., and I. Ajzen. 1975. *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, Massachusetts: Addison-Wesley Publishing Company, Inc.

Focht, W. 2002. Assessment and management of policy conflict in the Illinois River Watershed in Oklahoma: An application of Q methodology. *International Journal of Public Administration* 25 (11): 1311-49.

Francis, W. 2000. Endangered species protection in Alberta: "Where's the beef?" In *Proceedings of a conference on the biology and management of species and habitats at risk, Kamloops, British Columbia, 15-19 February, 1999*, ed. W. Francis, 1:37-40. British Columbia Ministry of Environment, Lands and Parks, Victoria, British Columbia, and University College of the Cariboo, Kamloops, British Columbia. http://www.env.gov.bc.ca/wld/documents/ss06francis.pdf.

Freie, J. F. 1997. The effects of campaign participation on political attitudes. *Political Behavior* 19 (2): 133-56.

Garcia, P., J. Lastra, J. Marquinez, and C. Nores. 2007. Detailed model of shelter areas for the Cantabrian brown bear. *Ecological Informatics* 2 (4): 297-307.

Garshelis, D. L. 2006. On the allure of noninvasive genetic sampling – putting a face to the name. *Ursus* 17 (2): 109-23.

Garshelis, D. L., M. L. Gibeau, and S. Herrero. 2005a. Grizzly bear demographics in and around Banff National Park and Kananaskis Country, Alberta. *Journal of Wildlife Management* 69 (1): 277-97.

———. 2005b. Grizzly bear demographics in and around Banff National Park and Kananaskis Country – postscript for 2003-2004. In *Biology, demography, ecology, and management of grizzly bears in and around Banff National Park and Kananaskis Country: The final report of the Eastern Slopes Grizzly Bear Project*, ed. S. Herrero, 50-51. Faculty of Environmental Design, University of Calgary, Calgary, Alberta. http://www.canadianrockies.net/wp-content/uploads/2009/03/Complete_ESGBP_FinalReport2005.pdf.

Gau, R. J., R. Mulders, L. M. Ciarniello, D. C. Heard, C. B. Chetkiewicz, M. Boyce, R. Munro, et al. 2004. Uncontrolled field performance of Televilt GPS-Simplex™ collars on grizzly bears in western and northern Canada. *Wildlife Society Bulletin* 32 (3): 693-701.

Gibeau, M. L. 2000. A conservation biology approach to management of grizzly bears in Banff National Park, Alberta. PhD diss., University of Calgary.

———. 2005. Mortality of grizzly bears in the Bow River Watershed. In *Biology, demography, ecology, and management of grizzly bears in and around Banff National Park and Kananaskis Country: The final report of the Eastern Slopes Grizzly Bear Project*, ed. S. Herrero, 61-62. Faculty of Environmental Design, University of Calgary, Calgary, Alberta. http://www.canadianrockies.net/wp-content/uploads/2009/03/Complete_ESGBP_FinalReport2005.pdf.

Gibeau, M. L., A. P. Clevenger, S. Herrero, and J. Wierzchowski. 2002. Grizzly bear response to human development and activities in the Bow River Watershed, Alberta, Canada. *Biological Conservation* 103:227-36.

Gibeau, M. L., S. Herrero, J. Kansas, and B. Benn. 1996. Grizzly bear population and habitat status in Banff National Park. In *Ecological outlooks project. A cumulative effects assessment and futures outlook of the Banff-Bow Valley Study*, ed. J. Green, C. Pacas, L. Cornwell, and S. Bayler. Prepared for the Banff-Bow Valley Study. Ottawa, Ontario: Department of Canadian Heritage.

Gibeau, M. L., and S. Stevens. 2005. Study areas. In *Biology, demography, ecology, and management of grizzly bears in and around Banff National Park and Kananaskis Country: The final report of the Eastern Slopes Grizzly Bear Project*, ed. S. Herrero, 11-16. Faculty of Environmental Design, University of Calgary, Calgary, Alberta. http://www.canadianrockies.net/wp-content/uploads/2009/03/Complete_ESGBP_FinalReport2005.pdf.

Gillies, C. S., M. Hebblewhite, S. E. Nielsen, M. A. Krawchuk, C. L. Aldridge, J. L. Frair, D. J. Saher, C. E. Stevens, and C. L. Jerde. 2006. Application of random effects to the study of resource selection by animals. *Journal of Animal Ecology* 75: 887-98.

Graves, T. A., S. Farley, M. I. Goldstein, and C. Servheen. 2007. Identification of functional corridors with movement characteristics of brown bears on the Kenai Peninsula, Alaska. Landscape Ecology 22:765-72.

Graves, T. A., S. Farley, and C. Servheen. 2006. Frequency and distribution of highway crossings by Kenai Peninsula brown bears. *Wildlife Society Bulletin* 34 (3): 800-808.

Graves, T. A., and J. S. Waller. 2006. Understanding the causes of missed Global Positioning System telemetry fixes. *Journal of Wildlife Management* 70 (3): 844-51.

Grizzly Bear Inventory Team. 2008. Grizzly bear population and density estimates for Alberta bear management unit 6 and British Columbia management units 4-1, 4-2, and 4-23 (2007). Report prepared for Alberta Sustainable Resource Management, Fish and Wildlife Division, British Columbia Ministry of Forests and Range, British Columbia Ministry of Environment, and Parks Canada. http://srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/BearManagement/documents/GrizzlyBear-DNAPopulationEstimate2007-Mar31-2008.pdf.

Gunther. K. A., M. A. Haroldson, K. Frey, S. L. Cain, J. Copeland, and C. C. Schwartz. 2004. Grizzly bear-human conflicts in the Greater Yellowstone ecosystem, 1992-2000. *Ursus* 15 (1): 10-22.

Heard, D. C., L. M. Ciarniello, and D. R. Seip. 2006. Grizzly bear behavior and Global Positioning System Collar Fix Rates. *Journal of Wildlife Management* 72 (3): 596-602.

Heinz, D., and C. Youmans. 1985. Conservation in the political arena. *Forest Planning* May:12-15.

Hennessy, M. J. 2009. Understanding the blockages: Stakeholder perceptions of greywater reuse in Metro Vancouver. Master's project, Simon Fraser University.

Henton, D. 2010. Group wants grizzlies on threatened list, now. *Edmonton Journal*, March 23. http://www.edmontonjournal.com.

Herrero, S. 1992. *The significance of the Wind Valley for mammalian carnivores.* Calgary, Alberta: Canadian Parks and Wilderness Society.

———, ed. 2005a. *Biology, demography, ecology, and management of grizzly bears in and around Banff National Park and Kananaskis Country: The final report of the Eastern Slopes Grizzly Bear Project*. Faculty of Environmental Design, University of Calgary, Calgary, Alberta. http://www.canadianrockies.net/wp-content/uploads/2009/03/Complete_ESGBP_FinalReport2005.pdf.

———. 2005b. The Eastern Slopes Grizzly Bear Project and science-based grizzly bear conservation. In *Biology, demography, ecology, and management of grizzly bears in and around Banff National Park and Kananaskis Country: The final report of the Eastern Slopes Grizzly Bear Project*, ed. S. Herrero, 1-10. Faculty of Environmental Design, University of Calgary, Calgary, Alberta. http://www.canadianrockies.net/wp-content/uploads/2009/03/Complete_ESGBP_FinalReport2005.pdf.

Herrero, S., J. Roulet, and M. L. Gibeau. 2001. Banff National Park: Science and policy in grizzly bear management. *Ursus* 12:161-72.

Holling, C. S. 1973. Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics* 4:1-23.

Johnson, C. J., M. S. Boyce, R. L. Case, H. D. Cluff, R. J. Gau, A. Gunn, and R. Mulders. 2005. Cumulative effects of human developments on arctic wildlife. *Wildlife Monographs* 160:1-36.

Johnson, C. J., M. S. Boyce, R. Mulders, A. Gunn, R. J. Gau, H. D. Cluff, and R. L. Case. 2004. Quantifying patch distribution at multiple spatial scales: Applications to wildlife-habitat models. *Landscape Ecology* 19 (8): 869-882.

Johnson, C. J., M. S. Boyce, C. C. Schwartz, and M. A. Haroldson. 2004. Modeling survival: Application of the Andersen-Gill model to Yellowstone grizzly bears. *Journal of Wildlife Management* 68 (4): 966-78.

Kaczensky, P., M. Blazic, and H. Gossow. 2004. Public attitudes toward brown bears (*Ursus arctos*) in Slovenia. *Biological Conservation* 118: 661-74.

Kaiser, H. F. 1960. The application of electronic computers to factor analysis. *Educational and Psychological Measurement* 20:141-51.

Kangas, A., N. Saarinen, H. Saarikoski, L. A. Leskinen, T. Hujala, and J. Tikkanen. 2010. Stakeholder perspectives about proper participation for regional forest programmes in Finland. *Forest Policy and Economics* 12 (3): 213-22.

Kansas, J. L. 2002. *Status of the grizzly bear (*Ursus arctos*) in Alberta*. Alberta wildlife status report no. 37. Publication no. T/006. Alberta Sustainable Resource Development, Fish and Wildlife Division, and Alberta Conservation Association, Edmonton, Alberta. http://www.assembly.ab.ca/lao/library/egovdocs/alsrd/2002/135652.pdf.

Katajisto, J., and A. Moilanen. 2006. Kernel-based home range method for data with irregular sampling intervals. *Ecological Modelling* 194:405-13.

Keeney, R. L., D. von Winterfeldt, and T. Eppel. 1990. Eliciting public values for complex policy decisions. *Management Sciences* 36 (9): 1011-30.

Kellert, S. R. 1980. Contemporary values of wildlife in American society. In *Wildlife values*, ed. W. W. Shaw and E. H. Zube, 31-60. Institutional series report no. 1. Tucson, Arizona: University of Arizona, Center for Assessment of Noncommodity Natural Resource Values.

———. 1994. Public attitudes toward bears and their conservation. *International Conference of Bear Research and Management* 9:43-50.

Kellert, S. R., M. Black, C. R. Rush, and A. J. Bath. 1996. Human culture and large carnivore conservation in North America. *Conservation Biology* 10 (4): 977-90.

Lasswell, H. D. 1970. The emerging conception of the policy sciences. *Policy Sciences* 1 (1): 3-14.

———. 1971. *A pre-view of the policy sciences*. New York: American Elsevier Publishing Company, Inc.

Lasswell, H. D., and M. S. McDougal. 1992. *Jurisprudence for a free society: Studies in law, science and policy*. New Haven, Connecticut: New Haven Press.

Lillebuen, S. 2008. Alberta extends ban on grizzly bear hunt. *Edmonton Journal*, April 27.
http://www.edmontonjournal.com.

Linke, J., S. E. Franklin, F. Huettmann, and G. B. Stenhouse. 2005. Seismic cutlines, changing landscape metrics and grizzly bear landscape use in Alberta. *Landscape Ecology* 20:811-26.

Lipgar, R. M., J. P. Bair, C. G. Fichtner. 2000. Integrating research with conference learning: 10 years of Q methodology studies exploring experiential learning in the Tavistock tradition. *Operant Subjectivity* 24 (1): 1-24.

Mace, R. D. 2004. Integrating science and road access management: Lessons from the Northern Continental Divide Ecosystem. *Ursus* 15 (1): 129-36.

Martin, I. M., and T. A. Steelman. 2004. Using multiple methods to understand agency values and objectives: Lessons for public lands management. *Policy Sciences* 37 (1): 37-69.

Mattson, D. J., K. L. Byrd, M. B. Rutherford, S. R. Brown, and T. W. Clark. 2006. Finding common ground in large carnivore conservation: Mapping contending perspectives. *Environmental Science and Policy* 9 (4): 392-405.

Mattson, D. J., S. Herrero, R. G. Wright, and C. M. Pease. 1996. Science and management of Rocky Mountain grizzly bears. *Conservation Biology* 10 (4): 1013-25.

Mattson, D. J., and T. Merrill. 2002. Extirpations of grizzly bears in the contiguous United States, 1850-2000. *Conservation Biology* 16 (4): 1123-36.

Mattson, D. J., and T. Merrill. 2004. A model-based appraisal of habitat conditions for grizzly bears in the Cabinet-Yaak region of Montana and Idaho. *Ursus* 15 (1): 76-89.

McCool, S. F., and A. M. Braithwaite. 1989. Beliefs and behaviors of backcountry campers in Montana toward grizzly bears. *Wildlife Society Bulletin* 17:514-19.

McKeown, B., and D. Thomas. 1988. *Q methodology*. Series: Quantitative applications in the social sciences. Newbury Park, California: Sage Publications, Inc.

McLellan, B. N. 1998. Maintaining viability of brown bears along the southern fringe of their distribution. *Ursus* 10:607-11.

McLellan, B. N. 2005. Sexually selected infanticide in grizzly bears: The effects of hunting on cub survival. *Ursus* 16 (2): 141-56.

Miller, S. D. and T. France. 2004. Small populations of grizzly bears in the U.S.–Canada transborder region: Introduction to the workshop proceedings. *Ursus* 15 (1): 61-64.

Moe, T. F., J. Kindberg, I. Jansson, and J. E. Swenson. 2007. Importance of diel behaviour when studying habitat selection: Examples from female Scandinavian brown bears (*Ursus arctos*). *Canadian Journal of Zoology* 85 (4): 518-25.

Morgan, C. P., J. Davis, T. Ford, and N. Laney. 2004. Promoting understanding: The approach of the North Cascades Grizzly Bear Outreach Project. *Ursus* 15 (1): 137-41.

Mowat, G., and D. C. Heard. 2006. Major components of grizzly bear diet across North America. *Canadian Journal of Zoology* 84 (3): 473-89.

Mowat, G., D. C. Heard, D. R. Seip, K. G. Poole, G. Stenhouse, and D. W. Paetkau. 2005. Grizzly *Ursus arctos* and black bear *U. americanus* densities in the interior mountains of North America. *Wildlife Biology* 11 (1): 31-48.

Mowat, G., J. Russell, and C. Strobeck. 1998. Estimating population size of grizzly bears using hair capture and DNA fingerprinting in southwest Alberta. Report prepared for Alberta Environmental Protection, Natural Resources Service, Claresholm, Alberta, and Waterton Lakes National Park, Waterton Lakes, Alberta.

Mueller, C., S. Herrero, and M. L. Gibeau. 2004. Distribution of subadult grizzly bears in relation to human development in the Bow River Watershed, Alberta. *Ursus* 15 (1): 35-47.

Munro, R. H. M., S. E. Nielsen, M. H. Price, G. B. Stenhouse, and M. S. Boyce. 2006. Seasonal and diel patterns of grizzly bear diet and activity in west-central Alberta. *Journal of Mammalogy* 87 (6): 1112-21.

Nams, V. O., G. Mowat, and M. A. Panian. 2006. Determining the spatial scale for conservation purposes – an example with grizzly bears. *Biological Conservation* 128:109-19.

Nellemann, C., O. Stoen, J. Kindberg, J. E. Swenson, I. Vistnes, G. Ericsson, J. Katajisto, B. P. Kaltenborn, J. Martin, and A. Ordiz. 2007. Terrain use by an expanding brown bear population in relation to age, recreational resorts and human settlements. *Biological Conservation* 138:157-65.

Nevin, O. T., and B. K. Gilbert. 2005. Measuring the cost of risk avoidance in brown bears: Further evidence of positive impacts of ecotourism. *Biological Conservation* 123 (4): 453-60.

Newell, R. G. 2009. Evaluating bear management education on a community scale: Insight on mechanisms of environmental education. Master's thesis, Royal Roads University.

Nielsen, S. E., M. S. Boyce, and G. B. Stenhouse. 2004. Grizzly bears and forestry: I. Selection of clearcuts by grizzly bears in west-central Alberta, Canada. *Forest Ecology and Management* 199 (1): 51-65.

Nielsen, S. E., S. Herrero, M. S. Boyce, R. D. Mace, B. Benn, M. L. Gibeau, and S. Jevons. 2004. Modelling the spatial distribution of human-caused grizzly bear mortalities in the Central Rockies ecosystem of Canada. *Biological Conservation* 120 (1): 101-113.

Nielsen, S. E., R. H. M. Munro, E. L. Bainbridge, G. B. Stenhouse, and M. S. Boyce. 2004. Grizzly bears and forestry: II. Distribution of grizzly bear foods in clearcuts of west-central Alberta, Canada. *Forest Ecology and Management* 199 (1): 67-82.

Nielsen, S. E., G. B. Stenhouse, and M. S. Boyce. 2006. A habitat-based framework for grizzly bear conservation in Alberta. *Biological Conservation* 130 (2): 217-229.

Niemeyer, S. 2004. Deliberation in the wilderness: Displacing symbolic politics. *Environmental Politics* 13 (2): 347-72.

Ordiz, A., C. Rodriguez, J. Naves, A. Fernandez, D. Huber, P. Kaczensky, A. Mertens, et al. 2007. Distance-based criteria to identify minimum number of brown bear females with cubs in Europe. *Ursus* 18 (2): 158-67.

Parks Canada. 2003. *Banff National Park state of the park report*. Parks Canada.

———. 2007. *Banff National Park of Canada management plan*. Parks Canada. http://www.pc.gc.ca/pn-np/ab/banff/docs/plan1/chap1/ plan1_E.asp.

———. 2008. *Banff National Park of Canada state of the park report*. Parks Canada. http://www.pc.gc.ca/~/media/pn-np/ab/banff/plan/pdfs/REP_SPR_e.ashx.

———. 2009. Trans-Canada Highway twinning project, Phase IIIB – June 2005. http://www.pc.gc.ca/eng/pn-np/ab/banff/docs/routes/phase111b3.aspx.

———. 2010. Trans-Canada Highway twinning project: Update: November 2009. http://www.pc.gc.ca/eng/pn-np/ab/banff/docs/routes/index.aspx.

Pelletier, D., V. Kraak, C. McCullum, U. Uusitalo, and R. Rich. 1999. The shaping of collective values through deliberative democracy: An empirical study from New York's North Country. *Policy Sciences* 32 (2): 103-31.

Pengelly, I., and D. Hamer. 2006. Grizzly bear use of pink hedysarum roots following shrubland fire in Banff National Park, Alberta. *Ursus* 17 (2): 124-31.

Primm, S., and S. M. Wilson. 2004. Re-connecting grizzly bear populations: Prospects for participatory projects. *Ursus* 15 (1): 104-14.

Proctor, M. F. 2003. Genetic analysis of movement, dispersal and population fragmentation of grizzly bears in southwestern Canada. PhD diss., University of Calgary.

Proctor, M. F., B. N. McLellan, and C. Strobeck. 2002. Population fragmentation of grizzly bears in southeastern British Columbia, Canada. *Ursus* 13:153-60.

Proctor, M. F., B. N. McLellan, C. Strobeck, and R. M. R. Barclay. 2005. Genetic analysis reveals demographic fragmentation of grizzly bears yielding vulnerably small populations. *Proceedings of the Royal Society B* 272:2409-16.

Proctor, M. F., and D. Paetkau. 2004. *A genetic-based spatial analysis of grizzly bears in Alberta*. Report prepared for Alberta Sustainable Resource Development, Fish and Wildlife Division.

Proctor, M. F., C. Servheen, S. D. Miller, W. F. Kasworm, and W. L. Wakkinen. 2004. A comparative analysis of management options for grizzly bear conservation in the U.S.–Canada trans-border area. *Ursus* 15 (2): 145-60.

Raadgever, G. T. 2009. Does collaboration enhance learning? The challenge of learning from collaborative water management research. PhD diss., Delft University of Technology.

Remington, R. 2005. Grizzly attack kills woman jogger: Bear was relocated days earlier. *Calgary Herald*, June 6.

Robbins, C. T., C. C. Schwartz, and L. A. Felicetti. 2004. Nutritional ecology of ursids: A review of newer methods and management implications. *Ursus* 15 (2): 161-71.

Robbins, P. 2000. The practical politics of knowing: State environmental knowledge and local political economy. *Economic Geography* 76 (2): 126-44.

———. 2005. Q methodology. In *Encyclopedia of Social Measurement*, ed. K. Kempf-Leonard, 3:209-15. Boston: Elsevier, Inc.

Rode, K. D., S. D. Farley, and C. T. Robbins. 2006. Sexual dimorphism, reproductive strategy, and human activities determine resource use by brown bears. *Ecology* 87 (10): 2636-46.

Rodenbaugh, M. H. 2001. The effectiveness of experiential education in executive development. PhD diss., Walden University.

Ross, P. I. 2002. Update COSEWIC status report on the grizzly bear *Ursus arctos* in Canada. In *COSEWIC assessment and update status report on the grizzly bear* Ursus arctos *in Canada*. Ottawa, Ontario: Committee on the Status of Endangered Wildlife in Canada. http://dsp-psd.pwgsc.gc.ca/Collection/CW69-14-166-2002E.pdf.

Rutherford, M. B., and T. W. Clark. 2005. Coexisting with large carnivores: Lessons from Greater Yellowstone. In *Coexisting with large carnivores: Lessons from Greater Yellowstone*, ed. T. W. Clark, M. B. Rutherford, and D. Casey, 254-70. Washington, District of Columbia: Island Press.

Rutherford, M. B., M. L. Gibeau, S. G. Clark, and E. C. Chamberlain. 2009. Interdisciplinary problem solving workshops for grizzly bear conservation in Banff National Park, Canada. *Policy Sciences* 42:163-87.

Schmolck, P. 2002. PQMethod Manual. http://www.lrz-muenchen.de/~schmolck/qmethod/pqmanual.htm.

Schmolck, P., and J. Atkinson. 2002. PQMethod 2.11 for Windows. http://www.lrz-muenchen.de/~schmolck/qmethod/downpqx.htm.

Servheen, C. 1999. Status and management of the grizzly bear in the lower 48 United States. In *Bears: Status survey and conservation action plan*, comp. C. Servheen, S. Herrero, and B. Peyton, 50-54. IUCN/SSC Bear and Polar Bear Specialist Groups. IUCN, Gland, Switzerland and Cambridge, UK.

Singleton, P. H., W. L. Gaines, and J. F. Lehmkuhl. 2004. Landscape permeability for grizzly bear movements in Washington and southwestern British Columbia. *Ursus* 15 (1): 90-103.

Species at Risk Public Registry. 2008. Species search: Grizzly bear. http://www.sararegistry.gc.ca/search/advSearchResults_e.cfm?stype=species&lng=e&advkeywords=grizzly%20bear&op=3&locid=0&taxid=0&desid=0&schid=0&.

———. 2009. *National Accord for the Protection of Species at Risk*. http://www.sararegistry.gc.ca/approach/strategy/accord_text_e.cfm.

———. n.d. *Species at Risk Act*: *The Accord for the Protection of Species at Risk*. http://www.sararegistry.gc.ca/approach/strategy/Accord_Backgrounder_e.pdf.

Steelman, T. A., and L. A. Maguire. 1999. Understanding participant perspectives: Q-methodology in national forest management. *Journal of Policy Analysis and Management* 18 (3): 361-88.

Stenhouse, G., J. Boulanger, J. Lee, K. Graham, J. Duval, and J. Cranston. 2005. Grizzly bear associations along the eastern slopes of Alberta. *Ursus* 16 (1): 31-40.

Stephenson, W. 1935a. Correlating persons instead of tests. *Character and Personality* 4:17-24.

———. 1935b. Techniques of factor analysis. *Nature* 136:297.

———. 1953. *The study of behavior*. Chicago: University of Chicago Press.

Strumpf-Allen, R. C. G., B. L. McFarlane, and D. O. Watson. 2004. *Managing for grizzly bears in the Foothills Model Forest: A survey of local and Edmonton residents*. Edmonton, Alberta: Canadian Forestry Service.

Summerfield, B., W. Johnson, and D. Roberts. 2004. Trends in road development and access management in the Cabinet-Yaak and Selkirk grizzly bear recovery zones. *Ursus* 15 (1): 115-22.

Suring, L. H., S. D. Farley, G. V. Hilderbrand, M. I. Goldstein, S. Howlin, W. P. Erickson. 2007. Patterns of landscape use by female brown bears on the Kenai Peninsula, Alaska. *Journal of Wildlife Management* 70 (6): 1580-87.

Thomson, G. H. 1935. On complete families of correlation coefficients, and their tendency to zero tetrad-differences: Including a statement of the sampling theory of abilities. *British Journal of Psychology* (General Section) 26:63-92.

Torgenson, D. 1986. Between knowledge and politics: Three faces of policy analysis. *Policy Sciences* 19:33-59.

Town of Canmore. n.d. About Canmore. http://www.canmore.ca/About-Canmore/.

UNESCO (United Nations Educational, Scientific and Cultural Organization). 2010. World heritage list: Canadian Rocky Mountain Parks. http://whc.unesco.org/en/list/304.

van Eeten, M. J. G. 2001. Recasting intractable policy issues: The wider implications of the Netherlands civil aviation controversy. *Journal of Policy Analysis and Management* 20 (3): 391-414.

Wakkinen, W. L., and W. F. Kasworm. 2004. Demographics and population trends of grizzly bears in the Cabinet-Yaak and Selkirk ecosystems of British Columbia, Idaho, Montana, and Washington. *Ursus* 15 (1): 65-75.

Waller, J. S., and C. Servheen. 2005. Effects of transportation infrastructure on grizzly bears in northwestern Montana. *Journal of Wildlife Management* 69 (3): 985-1000.

Weaver, J. L., P. C. Paquet, and L. F. Ruggiero. 1996. Resilience and conservation of large carnivores in the Rocky Mountains. *Conservation Biology* 10 (4): 964-76.

Webler, T., and S. Tuler. 2001. Public participation in watershed management planning: Views on process from people in the field. *Human Ecology Review* 8 (2): 29-39.

Webler, T., S. Tuler, and R. Krueger. 2001. What is a good public participation process? Five perspectives from the public. *Environmental Management* 27:435-50.

Webler, T., S. Tuler, I. Shockey, P. Stern, and P. Beattie. 2003. Participation by local government officials in watershed management planning. *Society & Natural Resources* 16 (2): 105-21.

Weekes, V. L. 2008. Attitudes and perspectives toward water and water management in the town of Gibsons, British Columbia. Master's project, Simon Fraser University.

Wilson, S. M., M. J. Madel, D. J. Mattson, J. M. Graham, J. A. Burchfield, J. M. Belsky. 2005. Natural landscape features, human-related attractants, and conflict hotspots: A spatial analysis of human–grizzly bear conflicts. *Ursus* 16 (1): 117-29.

Wilson, S. M., M. J. Madel, D. J. Mattson, J. M. Graham, and T. Merrill. 2006. Landscape conditions predisposing grizzly bears to conflicts on private agricultural lands in western USA. *Biological Conservation* 130 (1): 47-59.

Woolley, J. T., and M. V. McGinnis. 2000. The conflicting discourses of restoration. *Society & Natural Resources* 13:339-57.

Zager, P., and J. Beecham. 2006. The role of American black bears and brown bears as predators on ungulates in North America. *Ursus* 17 (2): 95-108.