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Rebuilding the Fortymile caribou herd: A model of cooperative management planning

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Abstract: We examined the public process used to develop the 1996–2001 Fortymile Caribou (*Rangifer tarandus*) Herd Management Plan adopted by state and federal management boards. The process differed from most government-supported planning processes because it was initiated by residents of Alaska and Yukon, and not by an agency. State, federal, and territorial agencies were asked to participate in and support development of a management plan that would include a broad range of interest groups. We describe the planning effort, issues addressed by the planning team that posed significant challenges during both the planning and implementation phases, and then identify unforeseen costs and benefits derived from the process. Critical decision points in plan development and implementation are discussed.

Key words: Alaska, consensus, fertility control, herd recovery, management plan, management team, nonlethal wolf control, predator management, sterilization, translocation.

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Introduction

Development of the Fortymile Caribou (*Rangifer tarandus*) Herd Management Plan (Plan), which incorporated predator management to help recovery of the Fortymile caribou herd, has been held up as a model for grassroots public participation in brainstorming solutions to challenging wildlife management issues. The Plan has been cited as "novel" in its unique holistic approach to wildlife management, making possible bold approaches to solving management issues (Boertje & Gardner, 1998; 2000).

Predator–prey management in Alaska has been and continues to be controversial and has created mistrust among groups interested in wildlife issues. The last predator control program that was completed as planned ended in 1982. From 1982 until 1997, no programs were designed that were publicly or politically acceptable and although a few programs were initiated, none were completed.

The first concerted effort to resolve this management and public dilemma was the creation of the Alaska Wolf (*Canis lupus*) Management Planning Team in 1990 (National Research Council, 1997). Team members represented a variety of interests from both rural and urban Alaska. All members shared the goal of maintaining viable wolf populations throughout the state and agreed to work together to find suitable solutions for wolf–prey management issues. The team produced by consensus a draft plan that was reviewed and revised by the Alaska Department of Fish and Game (ADF&G) and the Alaska Board of Game (Board). ADF&G and the Board used the revised plan to develop 3 implementation plans for areas where wolf control would occur, including one to benefit the Fortymile caribou herd. Many viewed the decision by the Board to initiate 3 wolf control programs simultaneously as excessive and not within the scope of the wolf management plan. The resulting social opposition prompted Governor Walter Hickel to rescind the programs and to initiate the Alaskan Wolf Summit to further explore steps necessary to resolve this controversy. The consensus point developed by groups attending the summit was that a public planning process that broadly represented the diverse interests in Alaska was neces-

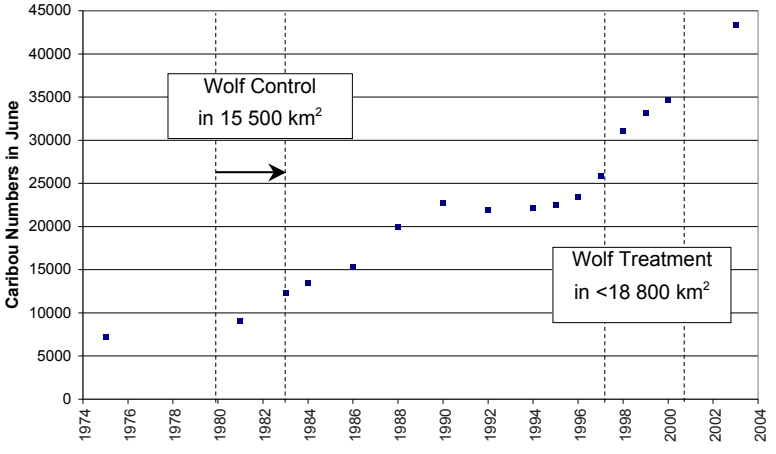

Fig. 1. Estimated abundance of caribou in the Fortymile Herd and periods of wolf control efforts, 1974–2004.

sary. This recommendation and the growing feeling that agencies had become ineffective in managing the Fortymile caribou herd prompted residents of Alaska and Yukon to initiate a public process that would develop management options that agencies could use to promote the recovery of the Fortymile caribou herd.

Background

In the early 1920s, the Fortymile caribou herd was estimated at 568 000 animals and considered to be the largest caribou herd in Alaska (Murie, 1935; Valkenburg *et al.*, 1994). Murie (1935) described the herd's range during the 1920s as being 220 000 km², extending from the White Mountains in eastcentral Alaska to Whitehorse, Yukon. The herd fluctuated in size from the 1930s through the 1950s, but continued to use most of its range in Alaska and Yukon. The Fortymile Herd was the most economically important wildlife resource in Interior Alaska and Canada throughout this period.

Between the mid-1960s and 1973, the herd declined precipitously, probably due to a combination of high harvests, severe winters, and high numbers of wolves (Davis *et al.*, 1978; Valkenburg & Davis, 1989). During 1973 through 1975, new photocensus techniques were developed and the population was estimated at an all time low of 5700 to 8600 caribou (Fig. 1; Valkenburg *et al.*, 1994).

Caribou herds typically reduce their range size as the population declines (Boertje & Gardner, 2000). Due to decreased herd size between 1966 and 1975, the Fortymile caribou herd reduced its range size and changed its seasonal migration patterns. The herd stopped crossing the Steese Highway in Alaska in 1967, and by 1973 few animals moved into Yukon each year. From the early 1970s to 1998, the herd's range size was about 50 000 km², less than 25% of the historic size (Valkenburg *et al.*, 1994).

The Fortymile caribou herd began increasing in 1976 in response to favorable weather conditions, reduced harvests, and a natural decline in wolf numbers (Fig. 1; Valkenburg *et al.*, 1994). In 1990 the herd was estimated at 22 800 caribou. The annual rate of increase during 1976–1990 was 5–10%. During 1990 through 1995, the herd remained relatively stable at between 21 900 and 22 600 caribou. During this period, except immediately after the severe winter of 1992–1993, indicators of herd nutritional status showed moderate to high condition, yet the Fortymile Herd was stable or possibly declining. In the early 1990s, Boertje & Gardner (2000) found that predation on calves by wolves and brown bears (*Ursus arctos*) was the major factor limiting growth of the herd. They also concluded that range condition was excellent and could support a much larger herd.

Following the Fortymile Herd decline in the early 1970s, few Alaska and Yukon residents saw Fortymile caribou because the herd's range size was markedly reduced. Many people within the herd's range supported management programs designed to increase herd size. Optimism and support for herd recovery increased following annual growth of 7–10% during the 1980s.

In 1990, ADF&G reviewed statewide caribou management policies as a step toward developing specific caribou management plans (Whitten, 1990). Biologists from the Yukon Department of Renewable Resources, the Canadian Wildlife Service and the ADF&G met later in 1990 to determine a future management direction for the Fortymile Herd. A common goal included restoring the herd to its historic range in Alaska and Canada, to be accomplished by limiting harvest to bulls only and establishing an annual quota based on herd size and growth. The herd size objective was 50 000 caribou by year 2000. Predator management would only be considered if the herd failed to respond to reduced harvest and predators were determined to be the primary limiting factor.

Also in 1990, the federal government assumed responsibility for regulating the subsistence harvest of wildlife on federal public lands in Alaska, in order to fulfill the mandates of Title VIII of the Alaska National Interest Lands Conservation Act of 1980. The resulting "dual management" system created conflicting objectives and complicated efforts to manage harvest of the herd. This conflict resulted in more complex harvest regulations and increased the potential for overharvest of Fortymile caribou.

During the early 1990s, the Fortymile Herd was no longer increasing and in an attempt to meet the population goal set by ADF&G, the Board adopted a wolf control program to be implemented in 1993. Bowing to public pressure, primarily from individuals and organizations outside of the herd's range, Governor Walter Hickel rescinded the program. It was apparent that greater input from the public and federal agencies was necessary before management that would benefit herd recovery could be implemented. During this time, no land or wildlife management agencies had a good plan for developing management direction to benefit the Fortymile Herd.

Public dissatisfaction with state and federal management of the Fortymile Herd increased after 1993. The Fortymile Herd continued to be essentially absent from Yukon and along the Steese Highway in Alaska and harvest allocations were very low in Alaska and Yukon. Much of the habitat available to the herd was not being utilized. What was once the most economically important herd in Yukon and Alaska had become essentially unavailable over much of its former range.

In 1993, the chief of the Dawson First Nation in Yukon contacted the chair of the Upper Tanana–Fortymile Fish and Game Advisory Committee in Tok, Alaska, suggesting a grassroots coalition be formed to work toward rebuilding the herd. By February 1994, these visionaries assembled representatives from Yukon and Alaska federal, state, and territorial agencies, First Nations, Alaska Native organizations, and other interest groups and individuals "to discuss present and future management of the Fortymile caribou herd" (Entsminger, 1994). At that meeting, agencies were asked and agreed to help develop a grassroots management plan involving all interests. Direction from the meeting was clear. A full management plan, not just a harvest plan, involving all interests would be developed. During this meeting, groups were identified that needed to be on a planning team, including a representative from each of the state advisory committees within the herd's range, and representatives from various environmental groups, hunting groups, and state, federal, and territorial agencies.

Among the challenges that had to be addressed to benefit herd recovery were the complex harvest regulatory structure in Alaska and developing acceptable methods for managing predation and habitat. In Alaska, subsistence hunting was managed by both the state and federal governments under different mandates. In the early 1990s, state regulations applied primarily to hunting on state and private lands and were designed to provide harvest opportunity while promoting growth of the Fortymile Herd. Federal regulations, on the other hand, governed subsistence hunting by local rural residents on federal public lands and had the potential to allow an increase in harvest levels unfavorable to herd growth. To meet the goal of promoting the return of caribou to the herd's traditional range in Yukon and Alaska, steps had to be taken to increase herd size. These steps had to be both biologically and socially acceptable. Habitat protection measures would have to meet mandates and objectives of private, state, and federal landowners. A public awareness campaign to keep Alaska and Yukon residents involved in the herd's recovery was recognized as an essential component early in the process.

This 1994 meeting initiated the Fortymile caribou herd planning process. This paper examines the 6-year history and evolution of this planning effort and evaluates the strengths and weaknesses of the process.

Planning process

Forming the planning team

In 1994, ADF&G conducted public scoping meetings in the local communities of Eagle, Tok, Fairbanks, and Delta Junction, Alaska and Dawson, Yukon. These meetings helped to identify issues and further identified interests that needed to be represented on a planning team. In late 1994, representatives of state fish and game advisory committees within the herd's range, Native organizations, First Nations, subsistence advisory councils, environmental groups, and state, federal, and territorial agencies met to form the Fortymile Caribou Herd Planning Team (FCHPT or Team). During the first 2 meetings participants identified other groups, including environmental, tourism, and animal welfare interests, which they believed should be involved to assure success of the planning effort. The Team recognized that as group size increased, achieving consensus would become more difficult, but knowing that the Plan would involve contentious issues, they needed a balance that ensured broad representation on the Team. Many organizations were invited to participate and 20 accepted. Those that declined largely supported the

management planning effort, provided input, and asked to be kept informed via the Team mailing list and publications.

All meetings were open to the public. The Team further agreed to invite representatives of groups that did not have formal members on the Team to attend meetings and be part of the discussion when input from their interest was needed for development of plan alternatives. In most cases this worked, but became a point of contention within some groups that did not have formal membership (see chapter Challenges in the process).

The primary benefit of such a public process is drawing from a wide range of experiences, wisdom, and interest in the problem to be solved. Many minds of varied viewpoints, but shared vision, developed the unique solutions in this planning effort and were able to support the recommendations.

The Team consisted of 20 members representing the local state fish and game advisory committees (advisory committees) from Eagle, Upper Tanana–Fortymile (Tok), Delta, and Fairbanks; the federal subsistence Eastern Interior Regional Advisory Council (advisory council); Tanana Chiefs Conference; Tanacross Village Council; Tr'ondëk Hwëch'in First Nation, Yukon (formerly Dawson First Nation); the Northern Alaska Environmental Center; Alaska Outdoor Council; Tanana Valley Sportsmen's Association; Alaska Wildlife Conservation Association; Alaska Wilderness Recreation and Tourism Association; Alaska Wildlife Alliance; a public member at large; Yukon Department of Renewable Resources (now called Yukon Department of the Environment); ADF&G; Bureau of Land Management (BLM); National Park Service; and U.S. Fish and Wildlife Service (FWS) (FCHPT, 1995). Previous state agency management efforts had not included federal land managers, and it was recognized that their participation was critical to assure that they would be able to support recommendations for managing the herd. The Team set as its initial goal the development of a plan that would benefit the Fortymile caribou herd without being subject to subsequent changes in state political administrations (Gardner *et al*., 1994). In order to ensure participation by nonagency members, ADF&G, BLM and FWS provided travel and per diem support as needed.

Team building and goals

During the first meetings, the Team made 4 important decisions that contributed to the ultimate success of the plan: 1) It identified a rounded and inclusive list of participants, 2) established a common vision which was and continues to be the recovery of the Fortymile caribou herd in its historic range, 3) hired an independent facilitator, and 4) agreed on a consensus process and developed ground rules for that process. Establishing a common vision and doing so early in the process was paramount to success of the planning effort and implementation of the plan. The common vision the Team developed for the Fortymile caribou herd and its ecosystem was:

> "To restore the abundance and diversity of wildlife in this ecosystem, of which the Fortymile Herd is the most important indicator species, and
>
> To promote healthy wildlife populations for their intrinsic value, as well as consumptive and nonconsumptive uses" (FCHPT, 1995).

A major factor contributing to the success of the planning process and support for the resulting recommendations was the hiring of an independent facilitator. An ADF&G planner served as facilitator for the first few meetings. It soon became clear, however, that a facilitator affiliated with a resource management agency might be perceived as lacking objectivity. ADF&G, FWS, and BLM pooled funds to hire an independent facilitator, who guided the Team through the formative stages of the management plan. This facilitator proposed ground rules governing the conduct of Team members at planning meetings and recommended that decisions be made by consensus. She began working with the Team to develop issues and options for solutions. The assemblage of those options eventually became the 3 plan alternatives. The facilitator placed high demands on the Team and spent many hours reviewing and compiling information that served as the building blocks for the plan.

Under the ground rules, decisions were made by consensus, and a process was developed to use when consensus was not reached. "Consensus" as used by the Team was a package of compromises that all can live with and meets members' most important concerns. All Team members agreed to abide by these procedures, under which they could present viewpoints and experience but also convey the interests they represented.

Impartial facilitation and the development of ground rules helped create a foundation for an effective process and outcome. Both helped to develop a strong feeling of trust among Team members and contributed to their ability to work by consensus. A member who could not work under a consensus process was asked to resign from the Team. Minority opinions were included in the draft Plan. Even with minority opinions from members who were unable to work within this framework, the Team was able to address tough issues and go forward with implementation of the Plan with little criticism. The diversity of the Team, the public process, and the common

vision to restore the herd to the landscape helped to maintain public and government support for and endorsement of the Plan.

Plan development

Prior to scheduling any formal Team meetings, ADF&G was directed by the process founders to hold a series of public meetings to identify issues for the Team to address. Meetings were conducted from July and November 1994. A comprehensive search of public and agency issues enabled the Team to establish the necessary Team membership and carefully craft management actions and justifications for those actions that could withstand public and political scrutiny.

The Team held preliminary planning meetings in November 1994. Active planning began in May 1995, when the independent facilitator was hired, and by August 1995 the Team had produced a Draft Fortymile Caribou Herd Management Plan. The draft plan, which included potential impacts of alternatives, was published in newspaper format for public review and comment (FCHPT, 1995). The draft plan described the Team's vision and presented 3 alternatives: 1) no change from existing management, 2) moderate population growth (5–10%), and 3) more aggressive population growth. Each alternative recommended different approaches to achieving plan goals over the 5-year period of July 1996–June 2001. These goals were to:

> Benefit the Fortymile caribou herd and the people who value the herd and its ecosystem;
> Provide an opportunity for the caribou population to increase and expand into its historic range;
> Promote similar goals between the agencies involved in management of the Fortymile caribou herd;
> Resolve conflicts among interest groups; and
> Encourage sound wildlife management decisions that consider diverse values.

Within each alternative, recommendations were developed on each issue. The Team's preferred alternative to restore the herd recommended the following actions: maintain habitat quality, reduce harvest of Fortymile caribou, decrease predation on calves by wolves using nonlethal control, possibly decrease predation on calves by grizzly bears, and increase public involvement and awareness through outreach. The preferred alternative, which became the draft plan, was supported by all Team members except the Alaska Wildlife Alliance and the member at large, neither of whom could come to consensus on the use of nonlethal wolf control to reduce predation on calves.

Plan recommendations

Maintain habitat quality

Research from the early 1990s had shown that Fortymile caribou winter range condition was excellent and nutrition was not considered to be a strong limiting factor to herd growth (Boertje & Gardner, 1998). The recommendation therefore emphasized maintaining habitat quality. A habitat management needs assessment was published, primarily for land managers, mining interests, the air service industry, the military, and other land users and developers, and provided a strong means for public awareness and involvement during implementation (FCHPT, 2000). The assessment identified critical use areas and also established outreach to increase awareness of the importance of these habitats. ADF&G developed a website for use by exploration companies, miners and the military to help prevent their activities from disturbing caribou on any given day, especially during critical times, such as calving and postcalving.

Reduce harvest of caribou

Reducing the harvest of Fortymile caribou in Alaska became a cornerstone for further consensus within the planning process. The annual harvest quota was reduced from 450 to 150 bulls for the 5-year life of the plan, motorized access to some popular hunting areas was prohibited, and hunting permits were issued only in hunt area communities. Hunters recommended the harvest reduction because they were willing to forego harvest opportunity in the short-term for future returns.

Harvest was not considered to be a limiting factor in herd growth but the Team agreed that a reduction in harvest was necessary for Team and public support of any proposed actions to reduce predation. Reducing harvest would also help isolate the effects of other management actions being proposed. This recommendation became pivotal in the acceptance of the Plan by Team members representing Yukon, animal welfare, and tourism interests.

The impacts of a substantial reduction in the harvest quota from regulatory years 1995–1996 through 1999–2000 were fortuitously offset in part by the increased availability of Nelchina caribou in the Upper Tanana region during the winter months. The presence of Nelchina caribou allowed both state and federal subsistence laws to be met and helped ensure that subsistence users had alternatives to Fortymile caribou for meeting their subsistence needs, making possible the reduction in the Fortymile harvest. Although the Team believed local subsistence uses would be accommodated with the reduced quota, members acknowledged that other

hunters and local businesses that supported nonlocal hunters were impacted in the short term by this recommendation.

Decrease wolf predation on calves

Predation on calves and the resulting low calf survival were found to be the primary constraints on herd growth in the 1990s (Boertje & Gardner, 1995). Of the estimated 8260 Fortymile caribou calves born in 1994, about 5000 were killed by predators within their first year. Wolves were the primary predator, killing 27% of the annual calf production. Reducing predation by wolves therefore emerged as a necessary and predictably controversial element of the plan.

Lethal predator control was and remains a divisive issue in Alaska. The Team agreed that recommending its use would be socially or politically unacceptable and therefore was not an option toward achieving herd growth. Additionally, difficult access to the calving and summer ranges limited the effectiveness of efforts by local trappers, although increased trapping activity was successful in reducing wolves within other portions of the Fortymile range, primarily the herd's winter range. Trappers independently organized the Fortymile Caribou Calf Protection Association program during 1996, which offered financial incentives ($400 per wolf) to trappers to take wolves within the herd's range. This program substantially reduced wolf numbers in the herd's wintering range, but had limited success in the calving and summer ranges and calf mortality from wolf predation was not significantly reduced (Boertje & Gardner, 1999).

The Team realized that if the goal of herd recovery was to be met, a new direction in predator management had to be found, one that was more socially acceptable even if it might be less successful than lethal control. During the 1993 Alaskan Wolf Summit and from comments received during the public scoping meetings for this process, there appeared to be support for nonlethal wolf control. Since most of the calf mortality occurred on the herd's calving and summer ranges, the Team proposed experimental fertility control on alpha pairs within the calving and summer range, in combination with translocation of subordinate pack members and public trapping. This option, combined with reduced caribou harvest, was supported by most Team members.

Experts on fertility control in wild canids, wolf biology, and predator–prey relationships assisted the Team in developing this option and the rigorous study design to implement and monitor its effects. The recommendation to translocate wolves also expanded the planning effort to include people throughout northern and western Alaska to find suitable release sites. Decisions on where wolves would be moved were made using public processes and required permission from the local advisory committees or council(s) representing the area.

The Team limited the number of possible packs to receive treatment to 15 that resided within the herd's calving and summer ranges but outside of Yukon–Charley Rivers National Preserve. National Park Service policies prohibit predator control unless it is part of an endangered species management plan. All the subordinate wolves (>9 months of age) in these packs were captured and moved at least 150 miles from the territory to areas that supported ungulate densities as high as or higher than the Fortymile area. The adult breeding pairs were also captured but were sterilized and released back into their territory. The desired outcome was that the 2 sterilized pairs would continue to defend their territory and maintain a pack size of 2. Using wolf relocation and fertility control to significantly reduce wolf numbers (≥70% reduction) and maintain reduced wolf numbers over a large area (15 pack territories) for at least 4 years was a new and largely untested technique (Mech *et al.*, 1996; Spence, 1996), but the team agreed on the need to find predator management tools that were both socially acceptable and biologically sound. Ten independent North American and Australian scientists experienced in fertility control in canids either helped to develop or reviewed the study design.

The Team included in the Plan the importance of monitoring the impacts of additional trapping and nonlethal wolf control on wolves, caribou, moose (*Alces alces*), and Dall sheep (*Ovis dalli*). In response, the state and federal agencies funded and conducted a research experiment evaluating effects and results (Boertje & Gardner, 2000).

Decrease predation on calves by grizzly bears

Caribou calves are most vulnerable to grizzly bear predation during the first 2 weeks of life, after which they are able to evade these predators in most situations. The Team recommended that the Plan include provisions for relocating bears from calving areas during the fourth year of implementation, if bear predation limited calf recruitment after wolf predation had been reduced. Based on past experience, biologists believed that bears moved from the calving area to locations north of the Yukon River or at least 150 miles away, would not return to home areas until at least 2 weeks after the peak calving period (Miller & Ballard, 1982). Relocation of 30–45 bears was proposed for the final year of the Plan if needed, with the assumption that most of the bears would return to the calving area later in the summer. Yukon and Native representatives were reluctant to

move bears, but agreed to this provision as part of the package. The compromise was that this step would only be taken if bear predation was found to be compensatory and became the primary limiting factor to herd growth. Consideration of bear translocation, and a decision that it was not necessary, would be considered implementation of this step. Grizzly bear predation did not increase after wolf predation had been reduced and no bears were moved during the last year of Plan implementation.

Public involvement and awareness

The Team realized that the Plan and the recovery effort would not gain or maintain public support without an active outreach program. The primary tool used was *"The Comeback Trail,"* a newsletter published and circulated once or twice a year to over 4500 people, primarily Alaska and Yukon residents. Publication began in June 1994, and 13 issues have been published to date. Periodic news releases also were issued throughout the planning and implementation phases. These 2 outreach programs continue to be used. Additionally, roadside information exhibits are being constructed along the Taylor, Top of the World, and Steese highways. Art and other contests increased public understanding of the issues and created opportunities for people to experience the herd firsthand during the development and implementation of the plan.

Implementing the recommendations

All 5 management actions in the Plan were important to the success of Fortymile Herd recovery. Developing each recommendation required substantial compromises by all Team members, and the Team agreed that no one section was more important than another. Timing of implementation differed for each of the recommended actions. To ensure that actions were not implemented independently, the Team developed and presented the Plan as a package, so that if any one section was not implemented by either the state or federal regulatory boards or management agencies, the Plan would be terminated.

Plan approval

Habitat protection, reduced caribou harvest, and nonlethal wolf control were the primary recommendations contained in the plan. The draft gained consensus by all but 2 Team members. These members could not accept the recommendation for nonlethal wolf control. During September 1995, the facilitator and Team took the Plan to the public through a published draft and 6 public meetings held in Dawson, Yukon, and Delta Junction, Fairbanks, Anchorage, Eagle and Tok, Alaska. Written comments were also accepted. All comments received were considered and used to produce the final Fortymile Caribou Herd Management Plan (FCHPT, 1995).

Team approval

As noted above, consensus was reached on the draft by all but 2 team members. One member (public at large) could not accept nonlethal wolf control and voluntarily left the Team after the draft plan was completed. She supported the process but decided she could not support the final Plan. Instead of eroding the process or delaying implementation, she decided to resign her membership. The other member that did not reach consensus, representing the Alaska Wildlife Alliance, did not support the process or the agreement that each recommendation was dependent on the others. This person and the group he represented operated outside of the established ground rules and the Team asked him to resign.

The final Plan was approved by the Eagle, Upper Tanana–Fortymile, Delta, Fairbanks, and Central advisory committees, the Eastern Interior Regional Advisory Council, the Tr'ondëk Hwëch'in First Nation, and was endorsed by Alaska's 3 largest newspapers (Anchorage Daily News, Fairbanks Daily News-Miner, and Juneau Empire).

The Plan was presented to the Board of Game and the Federal Subsistence Board as a package. Both regulatory bodies endorsed the plan, concluding that the appropriate interest groups had been involved in the process and that the Team had built a consensus-based plan with broad public participation and support. The boards recognized the importance of accepting the Plan as a package and made strong statements on record that, even though the management actions recommended in the Plan had different implementation times, all steps were to be implemented over the 5-year life of the Plan.

The Plan was implemented in stages with reduced harvest (beginning in fall 1996) occurring before fertility control and translocation of subordinate wolves was initiated (fall 1997). The Board adopted the wolf predation reduction recommendations into regulation in 1996. Before the recommendations could be implemented, the Plan had to meet predator control criteria established by then Governor Tony Knowles: it was to be 1) based on solid science; 2) make economic sense for Alaskans; and 3) have broad public support. The governor had commissioned the National Academy of Sciences to summarize what was known about the impacts of predator control on both predator and prey populations, and to assess the economic value of and public support for predator control (National Research Council, 1997). The governor used these findings to make his decision and approved the Fortymile nonle-

thal wolf control program to begin in November 1997. This was the first time in more than 2 decades that a predator control program in Alaska had been endorsed by both the state and federal management agencies, and state government.

Implementation and monitoring

ADF&G developed a study design for implementing and evaluating the recommendations of the Plan (Boertje & Gardner, 1996). ADF&G, with funding from BLM and FWS, monitored the effects of the management actions not only on the Fortymile caribou herd, but also on wolves, moose and Dall sheep. The Team remained active during implementation, and using these data in combination with public comments, continued to evaluate the effects of the actions. Management actions were reopened for discussion but continued to weather criticism, demonstrating the effectiveness of the planning process (Todd, 2001). The Team assessed each new issue or comment by asking whether, during the Plan development phase, that particular issue had been discussed and included in the decision making process, and if that particular suggestion would improve the chances of Fortymile caribou recovery into traditional range. It was important for the Team to continue in this capacity so that the many interests who helped to develop the Plan understood that their concerns were still being treated fairly and not diluted.

Further increasing the Plan's stability were the several contingencies, or "safety valves," that had been incorporated into the final Plan. For example, the Plan was a package of recommendations to be taken as a whole, and it incorporated criteria for early termination if caribou survival and population size failed to improve after 3 winters of implementation. The research design also included criteria for terminating nonlethal wolf control if sterilized pairs did not maintain territories (Boertje & Gardner, 1996).

Additionally, a harvest plan was developed by a coalition of 5 advisory committees (Eagle, Upper Tanana–Fortymile, Delta, Fairbanks and Central) and the Eastern Interior Advisory Council, and endorsed by the regulatory boards (Fish and Game Advisory Committees, 1999). The advisory committees worked closely with the public and the Team to produce a 5-year plan that allowed a moderate increase in harvest opportunity beginning in fall 2001 but ensured continued herd growth and recovery to traditional ranges.

The Team became more active in habitat conservation issues, developed the "Fortymile Caribou Herd Habitat Management Needs Assessment," and worked actively with industry and others to assure maintenance of Fortymile caribou habitat (FCHPT, 2000). One of the most effective tools became a website developed by the Team and maintained by ADF&G, which documented the location of caribou during calving and postcalving. Exploration companies, miners, and the military used the information to help prevent their activities from disturbing caribou at these critical times. The response from these user groups was favorable, with many contacts indicating that they were taking pride in their efforts to protect recovery of the Fortymile Herd.

Evaluation of the plan

This Plan can be evaluated on both its success in facilitating growth of the Fortymile caribou herd and as a model for other complicated or controversial wildlife planning efforts in Alaska. In terms of public process, the Team was able to design a management program including predator and harvest management that was endorsed both politically and socially. Many factors worked in concert allowing the Fortymile process to succeed where other predator management plans had failed.

The Fortymile process included a broad representation of interests on the Team and worked within a consensus framework. These factors alone are not responsible for the success of this planning effort. ADF&G's previous statewide Wolf Management Team was also diverse and worked by consensus. However, 3 differences were very apparent between the 2 teams. First, the public started the Fortymile process and had a large role in selecting the Team members, while ADF&G initiated the Wolf Management Team and designated its members. Second, the Fortymile Team worked on only 1 issue—recovery of the Fortymile Herd—while the Wolf Management Team was trying to find compromises for the entire state. Third, and most important in the case of the Fortymile Plan, all the agencies involved in the process made, and honored, a commitment to support and implement the consensus reached by the group. ADF&G and the Board selectively adopted the recommendations of the Wolf Management Team, which undermined support for the consensus package.

The commitment to a clear and shared focus on rebuilding the Fortymile Herd opened the doors for development of a package of compromises that most members could accept, one in which members could give on some issues in order to gain on issues of greater importance to them. It also lent power to maintaining the entire plan, thereby preventing any single management agency or regulatory board from dissecting any recommendations from the package.

These elements helped the Plan to gain endorsement and weather criticism.

Largely due to the skill of the facilitator and careful selection of team members during the planning phase, a functioning Team developed, whose members had mutual respect for and trust in one another. Additionally, the facilitator maintained contact with Team members between meetings and made sure everyone completed their assigned tasks. No decisions were made between meetings, and trust was maintained by ensuring that any new information collected between meetings was distributed to the entire Team. Another measure of the effectiveness of using a facilitated, consensus process was the shifting of these management issues from being contentious, front-page news to being reported more often as innovative management.

The Team requested that agency representatives participate fully as team members. Although agency personnel were cautious about being full members, this ultimately increased agency buy-in and strengthened managers support for the Plan package. Agency representatives were experienced enough in their respective agencies to take and maintain firm positions on recommendations. This was important because, as established in the ground rules, decisions were to be made following debate by the Team, rather than after members had conferred with their agency heads or constituents. This ground rule ensured that public and agency Team members decided direction based on information debated by the Team and not by political agendas.

The team actively sought and included input from the public. Meetings were open to the public and during the planning phase were held in Fortymile communities. This resulted in increased public and political awareness of concerns for the herd and its management. This awareness has made it possible to justify and defend regulatory actions and the need to maintain habitat. Communication through newsletters and websites also helped to develop informed consent from the public.

Extensive research results were used to develop and support Plan options. Experts on canid fertility control and predator–prey ecology participated in meetings. Independent expert peers reviewed the research design for reducing predation. "Safety valves" were inserted into the Plan to provide for uncertainties, such as compensatory predation on calves or failure of sterilized pairs to maintain territories.

Industry, the military, planners, and developers have shown support for rebuilding the herd by voluntarily incorporating new approaches to minimize impacts to the habitat and herd. The goals of Fortymile Herd recovery were also an important consideration in establishing land designations in the state's Upper Yukon Land Use Plan (Alaska Department of Natural Resources, 2003).

To ensure continued herd recovery, the Team recognized the need to develop a plan for managing harvest after completion of the implementation phase. The local advisory committees and regional council agreed to develop the harvest plan. This was a better division of duties, because to many Alaskans the Team would appear to be usurping the regulatory function of the advisory committees, advisory councils, and regulatory boards if the Team developed the harvest plan. The Fortymile Caribou Herd Harvest Plan became the first publicly created harvest plan developed in Alaska. The harvest plan allowed a moderate increase in harvest opportunity and ensured that harvest did not cause annual herd growth to decline below 10%. The authors equitably allocated harvest across the herd's range in Alaska and Yukon. This harvest plan also met both federal and state subsistence requirements, allowing a joint quota and permit that has further reduced the complexities of dual management and benefited both the herd and the hunters. The advisory committees are beginning to work on the next 5-year plan and the Board and Federal Subsistence Board are expected to continue their support.

The Team remained together through Plan implementation, largely with the same membership, which allowed for monitoring of the Plan and responding as issues developed. The Team was "sunsetted" in December 2000. Implementation of the Plan continued through June 2001. ADF&G, with additional funding support from BLM and FWS, continues to monitor the effectiveness of the implemented management actions (Boertje & Gardner, 2003).

Challenges in the process

One aspect of including a wide range of viewpoints in the planning process is that management actions will most likely not utilize the most aggressive (and potentially the most effective) management options. In the case of the Fortymile planning effort, the total number of wolf packs treated and the timing of treatment were less than optimal to ensure herd growth, as only packs on a portion of the calving and postcalving range were treated. Several important packs on territories that overlapped state lands and the national preserve were not treated. Additionally, the Fortymile Herd ranges across the territories of about 40 wolf packs. Even though the reduction of wolf numbers on the calving range was most important, these other wolves compensated and took more calves during the winter, thereby reducing the

effectiveness of wolf control. Also, the Team limited control activities to 7 packs per year, requiring 2-1/2 years to reach complete treatment. All these compromises were made to balance public acceptance with program success. This approach worked both politically and socially, as the Fortymile wolf control program was the first predator management program to be carried to completion in Alaska in more than 20 years. Biologically, however, the compromises slowed herd recovery and may have demonstrated, at least for large herds with large ranges, that controlling wolves only on a portion of the calving grounds may not be adequate.

During the initial scoping meetings, many issues were identified that merited representation by some group or individual. The Team decided that some of these issues could be represented by individuals on the Team because they were members of a formal group or were very knowledgeable on the issue. This decision meant that all of the public members on the Team potentially represented more than one interest group. This worked well throughout the process except with decisions that dealt with trapping. Although members of the Team who were active trappers represented trapper's views, the Alaska Trapper's Association (ATA) was not formally on the Team. ATA did not support nonlethal wolf control and lobbied against the plan. ATA believed that a trapping program would be sufficient to allow the herd to recover. The Team asked ATA to help write the language managing trapping once wolves were sterilized. ATA did help craft the language, but never supported it because of their disagreement with the method used to achieve reduced predation. ATA, the Tanana Valley Sportsmen's Association, and the Caribou Calf Protection Association petitioned the Board to halt fertility control in 1997. However, the strengths of Team diversity, including the presence of several respected trappers, the consensus approach, and broad public support were the basis for the Board denying the petition after carefully considering ATA's arguments.

ATA was asked to be a member of the Team during the implementation phase but declined because of its continued opposition to nonlethal wolf control. ATA remained a vocal opponent of the Plan throughout the Plan's life. Since trapping was an important issue for both the success and acceptance of the Plan, formal representation by ATA would have been desirable.

The Alaska Wildlife Alliance (an animal welfare group) agreed with the vision of Fortymile Herd recovery but eventually "took a seat in the audience" because its leadership did not agree with the recommendation of using nonlethal wolf control as one of the tools. Without animal welfare involvement on the Team, the Plan could have lost strength. However, an animal welfare advocate who had followed development of the Plan came forward to represent that interest. In a press conference in November 1997, she stated that this process diverted from "management by decibel" to focus on the big picture of what actions would benefit the herd and its ecosystem.

Native representatives approached fertility control with caution, viewing it as disrespectful to the animals. Many came to support fertility control because they could see the connection to traditional practices, such as "pupping" (the traditional practice of killing wolf pups in dens). Others agreed with fertility control because as one member expressed it, "When our main source of food (moose and caribou) is in jeopardy, you try to solve the problem in any way necessary to put dinner on the table."

Another aspect of the Team process that was not clearly foreseen, which caused delays and membership changes, was the effects of constituent pressure on Team members. The ground rules stated that, following discussion, decisions were to be made at the meetings so that all the Team members had the same information and that these decisions would not be changed unless it was recognized that pertinent information had been overlooked. This was an important ground rule because it instilled trust in the Team that important compromises were not going to be changed. What was not fully anticipated, however, was the intense pressure some Team members encountered outside the process from their constituents who did not agree with Team decisions that appeared to conflict with their ideals. These conflicts threatened friendships and caused some Team members to be dropped from groups in which they were formerly very active. Some Team members could not face those pressures, and decided either to renege on previous decisions or to stop participating in the process.

The Habitat Management Needs Assessment became and continues to be a valuable habitat management tool, but it has no authority, and no habitat protection was designated in Alaska. The authors of the state's Upper Yukon Land Management Plan (Alaska Department of Natural Resources, 2003) used the needs assessment as a planning tool and incorporated protection from future development within the calving and summer ranges of the herd. Debate is ongoing in Yukon on how to protect the Fortymile range in Canada.

Recovery of the herd

The Fortymile Herd increased by 78% during the life of the Plan (Table 1) and began expanding its

Table 1. Fortymile caribou population estimates, harvest allocations and reported harvest, 1995–2003.

Year	Population estimate	Harvest allocation	Estimated harvest[a]	
			M	F[b]
1995	22 558	450	203	22
1996	23 458	150	138	7
1997	25 910	150	143	8
1998	31 029	150	151	3
1999	33 110	150	142	5
2000	34 640	150	142	3
2001	40 204	850	493	200
2002	No estimate	950	667	197
2003	43 375	950	613	181

[a] From 1 July to 30 June of the next year.

[b] Bag limit was bulls only regulatory years 1995–1996 through 2000–2001.

range eastward into Yukon and westward to the Steese Highway in Alaska. These biological successes were not just the product of the Plan's management actions. The Caribou Calf Protection Association trapping effort, promoted and financed by a Fairbanks group, contributed to reducing wolf numbers in the winter range and near the periphery of the range for the Fortymile Herd early in the planning process. The availability of Nelchina Herd caribou to local hunters lessened the impacts of the Fortymile caribou harvest allocation reductions and helped to avoid conflicts with state and federal subsistence laws. Moist summers and mild winters in Fortymile country during the planning and implementation phases also probably increased productivity and facilitated herd growth.

During the late 1990s the recovery of the Fortymile Herd was becoming apparent to residents of eastern Alaska and western Yukon. By 2002–2003, Fortymile caribou were regularly crossing the Steese Highway in Alaska into the Preacher Creek drainage for the first time since 1967. Thousands of Fortymile caribou wintered in Yukon in 2002–2003, crossing the Yukon River for the first time in over 30 years. The herd's arrival made national news and drew many people to the area to view the herd. The Tr'ondëk Hwëch'in First Nation could have hunted the herd but instead chose not to, allowing the herd to once again establish its traditional migration patterns. A quota of 300 animals had been established for Yukon residents, yet hunting remained closed throughout Yukon, further allocating those animals to herd growth.

Wolf numbers have been increasing in the control area and as of 2004 are at about 60% of pretreatment levels. Research has shown that wolf relocation combined with public trapping can be effective in reducing wolf numbers >75% and that sterilization can maintain reduced wolf numbers for a period of years (Boertje & Gardner, 2003). Sterilized pairs continued to hold territories for periods ranging from 1 to 6 years. As long as the sterilized wolves held their territories, the positive effects of the program continued.

Conclusions

Prior to the creation of the Team, many attempts had been made to rebuild the Fortymile caribou herd. None of them was fully implemented or accepted by all interest groups or resource managers. A large measure of the success of this process was its conceptual origin with Yukon and Alaska local residents. Perhaps most importantly, the diverse group of Team members was willing to work together, try new approaches, and take some criticism from their constituents, because they believed in the vision and the process.

This effort has shown that when resource management issues are controversial, as is predator reduction, a process involving diverse public interests, identifying the common vision, and working within a consensus framework can yield management recommendations that are endorsable by decision makers and they can be implemented successfully. In this case, involving environmental, animal welfare, and outdoor recreation and ecotourism groups in the planning process, along with the harvesters and managers, diffused contentiousness and minimized controversy. The Team included many "safety valves" in the Plan that also prevented critical recommendations from being sabotaged during the implementation phases.

The following factors were keys to success:

Team composition: The Team assembled a diverse group of strong-minded people who all had an intense interest in wildlife. Team members were willing to work together, make compromises, and recognize compromises made by others.

Strong facilitators: Facilitators were experienced in natural resource issues and were not afraid to stir the pot while maintaining strict ground rules. Facilitators pushed the Team to think outside the box, while remaining focused on the primary goals and objectives.

Agency support: The Team had adequate financial support and sufficient data to develop informed recommendations. The agency representatives were careful to explain to the Team

what mandates and financial realities agencies had to meet. Because agency representatives were members of the Team, agencies had buy-in during the planning phase. The agencies stood by the Team's decisions because they were both biologically and financially feasible, even when actions were politically uncomfortable.

Public awareness: The public was continually informed and updated on management direction and outcomes, and asked to provide comments and ideas. These steps helped create and maintain public support for the Plan recommendations.

A little bit of luck: The combination of the right mix of players, a political climate in Alaska and Yukon receptive to such a planning effort, availability of Nelchina caribou as an alternative source of subsistence harvest, and favorable weather for the herd to grow all helped with the success of the process and implementation of the plan.

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