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# SUSTAINING WILDLANDS

*Integrating Science and Community in Prince William Sound*

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*We dedicate this book to the residents of the six key communities of Prince William Sound: Anchorage, Chenega Bay, Cordova, Tatitlek, Whittier, and Valdez. Your dependence on the region ranges from direct sustenance and economic gain to recreation, renewal, personal inspiration, and cultural vitality. You are an inextricable part of the Sound and have repeatedly demonstrated that to us through our work to understand human use of this landscape. It's our hope that in return, this volume helps show pathways by which managers and stakeholders can work together to develop the more rigorous and adaptive planning approaches needed to ensure a sustainable future for the Sound.*

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CHAPTER 19

# TOWARD SUSTAINABLE HUMAN USE MANAGEMENT IN PRINCE WILLIAM SOUND

*A Synthesis of Data and Management Recommendations*

AARON J. POE, COURTNEY BROWN, DALE J. BLAHNA, CLARE M. RYAN, AND RANDY GIMBLETT

## SOUND BITES

**THOUGH RECREATION USE** has increased in the Sound, it is not at a crisis point. This presents an opportunity to apply a proactive, systematic planning process focused on specific issues to promote sustainable human use strategies.

Management techniques implemented in partnership with stakeholders, including local residents, commercial operators, and other agencies, will be the most effective at addressing issues in a sprawling system like the Sound that is expensive and challenging to access.

Claims of adaptive management are impossible without deliberate investment in monitoring efforts designed to track progress on *specific* human use and resource management issues.

## INTRODUCTION

Since the *Exxon Valdez* oil spill, the Sound has experienced increased human use activity, especially activities occurring on salt water. The growth of the recreation and tourism sector statewide has been accompanied by improved access to the region. In the western Sound in particular, the opening of the Anton Anderson Memorial Tunnel (Whittier Tunnel) access road in 2000 has led to both increased personal and commercial recreation/tourism use (Colt et al. 2002). The previous chapters illustrate



that the human uses and benefits of the Sound are many and make clear the need for planning for sustainable human use.

Managers must address concerns about the implications of increasing human use (chapter 11) while at the same time finding ways to provide and protect the diversity of recreation opportunities described in chapter 7. Efforts have been made to identify potential effects of increased human use on wildlife species by exploring overlap at a regional scale (chapter 12) as well as evaluating potential impacts based on analyses of site characteristics for beaches favored by both humans and sensitive wildlife species (chapters 13 through 15). Such efforts are challenging and can yield more questions than answers when it comes to offering guidance on best approaches for species conservation. These investigations have been simultaneously considered alongside potential impacts to subsistence harvesters (chapter 9) and local community members (chapter 8) from new users coming from outside of the Sound.

Forest Service managers needed a way to get ahead of potentially controversial issues like hardening campsites to concentrate use in remote areas managed for "wilderness character" (chapter 16) and evaluating the likelihood of conflicts between bear hunters and other shoreline users (chapter 10). The Forest Service recognized the need for a planning process that could allow for, and even promote, opportunities for outfitters and guides to support the economic stability of the Sound's communities without impacting an ecosystem that had been so severely injured by the oil spill.

This chapter represents the culmination of the Prince William Sound Framework process that was initiated by Forest Service leadership in 2006 (chapter 4). The chapter presents how the data and context described in previous chapters were used to develop strategies to address human use management in the Sound through an issue-driven planning process. The results provide guidance for providing "keystone" recreation experiences in the Sound while simultaneously protecting social and ecological values of the region. The chapter also provides monitoring recommendations that can be used to inform an adaptive management strategy for human use. It is our hope that the process we describe can serve as a model for other managers struggling to balance simultaneous mandates for conservation and providing for human use of wildlands.

## EXISTING CHUGACH NATIONAL FOREST RECREATION MANAGEMENT DIRECTION

The Chugach National Forest manages about 80 percent of upland Prince William Sound, including the 2.1-million-acre Nellie Juan Wilderness Study Area. The state of Alaska and Alaska Native Corporations representing the Chenega, Tatitlek, and Eyak tribes manage about 20 percent of land in the region, with less than 1 percent owned by private individuals. The Sound is predominantly remote and wild. Road

access is limited to the communities of Whittier and Valdez, and the transportation corridors consist solely of marine waterways.

Most human use in the western Sound takes place from May through September. The majority of use takes place within one-half mile of the saltwater shoreline, which is primarily accessed by kayak or motorboat. Upland use is limited due to the boggy nature of most soils above the beaches and the steep, rugged terrain. Activities are mostly low impact, such as small group overnight use, day hiking, sightseeing, hunting, and fishing. Human use is not evenly distributed in the Sound, and certain locations are more desirable because of their distance from communities, presence of glaciers and postglacial landscapes, availability of landing areas, protected anchorages, sport fish streams, cabins and other recreation infrastructure, and wild game concentrations (chapter 6). Human use is often concentrated in locations that are physiographic bottlenecks, which restrict access to desirable intertidal areas and their associated accessible uplands.

Human use management on U.S. Forest Service lands within the Sound is broadly guided by the 2002 Land and Resource Management Plan, or Forest Plan, and two supporting carrying capacity analyses framed within the Recreational Opportunity Spectrum approach (chapter 4). These documents laid the foundation for human and resource management in the region but lacked the specificity necessary to address changing issues in the region and were inadequate to address what the Chugach National Forest Service saw as its evolving stewardship role within the Sound.

Forest-wide direction applicable to Prince William Sound is guided by the 2002 Forest Plan. Specifically, desired conditions are described as "*managed primarily to maintain the wild character of this area and its unique wildlife. Human access will remain almost exclusively by boat or aircraft with the exception of the road accessed portals of Whittier and Valdez.*" Of particular significance is the fact that about 54 percent of the land in the region is currently designated as Recommended Wilderness (USDA Forest Service 2002). The majority of the western Sound area falls within the 2,116,000-acre Nellie Juan-College Fjord Wilderness Study Area. Desired future conditions for this part of the Sound are identified as "providing outstanding opportunities for solitude, quiet and isolation when traveling cross-country. Scenery will be natural in appearance. . . . People should expect to use primitive skills in an environment that offers a moderate to high level of challenge and risk."

The Forest Plan established the fundamental values for which uplands were to be managed but in many cases failed to take into consideration activity occurring in adjacent areas, including the salt water that supports the majority of human use activity in the region. Furthermore, the management prescriptions defined by the Forest Plan are generalizations that pertain to large spatial extents and do not specifically attempt to address the variation in uses between specific areas. The supporting carrying capacity documents had similar limitations and were developed in the absence of specific information about existing patterns of human use within the region. The existing carrying capacity analyses were developed to spread out human use throughout the Sound as the number of visitors increased by limiting use in higher-use areas (chapter 4). This can increase the ecological impacts of human uses as visitors are displaced to pristine, sensitive areas and can produce social impacts, as visitors with relatively high contact thresholds move into low-use areas that put them in conflict with visitors who went there specifically for solitude. In this way, carrying capacity could eventually homogenize the human use experiences offered in the Sound, rather than provide for a spectrum of recreational use and solitude experiences.



## EVOLVING RECREATION MANAGEMENT DIRECTION

In national discussions regarding visitor management, the Forest Service recognizes that protecting resources and visitor experiences requires going beyond specifying how much visitor use is too much. It requires understanding visitor experiences and user activity types; predicting and monitoring effects on resources, social settings, and economic conditions; and identifying and employing a variety of management strategies and tools. In order to meet ecosystem management goals, recreation resource literature emphasizes the need to incorporate relevant social and biophysical data and to understand the importance of strong connections between humans and their environment rather than focusing solely on humans as disturbance factors to the environment (Meffe et al. 2002; Keough and Blahna 2006; Blahna 2007).

The Forest Service has a national and regional focus on promoting sustainable recreation, and reconnecting people to nature is an important theme (Kimbell et al. 2009; Collins and Brown 2007). Several studies show declining contacts with nature in American society, and specifically declining rates of visitation to National Park Service, Forest Service, and state parks lands since the early 1990s (Louv 2005; Pergams and Zaradic 2008; Walls and Siikamaki 2010). Pergams and Zaradic (2008) also found declining sales of fishing licenses and several other indicators of decreasing rates of outdoor participation. Some long-term ramifications of these trends may include decreasing health and well-being of citizens, reductions in proenvironmental behaviors, and declining support for conservation and land management activities (Collins and Brown 2007). While there is some debate about these trends (Cordell 2008), what is clear is that encouraging outdoor recreation activities and contact with nature has become a goal of Forest Service leadership and even the Obama administration (Walls and Siikamaki 2010).

From a land management perspective, the challenge is to provide exceptional recreational opportunities and high-quality experiences while simultaneously protecting resources (Keough and Blahna 2006; Blahna 2007). This is the essence and challenge

of sustainable human use, which is the goal of the Forest Service Sustainable Recreation Framework (USDA Forest Service 2010). The Sustainable Recreation Framework also identifies the need for regional-scale, integrative analyses; public engagement and partnerships; and restoration of impacted sites. But it does not provide a process or method for meeting these critical needs. Nor do existing recreation planning and management tools, most of which were developed decades ago or focus on specific site or recreation experience needs (McCool et al. 2007; Cerveny et al. 2011). Existing forest planning tools tend to be highly detailed, environmentally focused, data-driven methods that rarely provide specific guidance or the monitoring necessary for implementing adaptive management. As a result, the Prince William Sound Framework, or "the Framework," was born out of the Chugach National Forest Service's need for refined management to address what it saw as emerging human use issues in the Sound at multiple scales and a national push to move to more sophisticated models of recreation planning.

## APPROACH

A regional-scale, issue-driven planning approach was adopted to develop a framework for sustainably managing commercial and noncommercial visitors to the Sound. The process for developing the Prince William Sound Framework focused on identifying issues and framing each problem to determine its causal factors in order to build an understanding of the problem (Clark and Stankey 2006). Inadequate problem framing can result in managers addressing the wrong problem, collecting the wrong data, or stating the problem so it cannot be solved (Bardwell 1991). Issue-driven planning can more effectively consider all management tools before selecting the most appropriate tool for the problem. This approach allows managers to frame the scope and focus the analysis for identifying data needs and monitoring efforts. It also avoids the sometimes complex technical-rational planning process that can be too broad, diffuse, and nontargeted to achieve meaningful results that can be used by managers.

The Prince William Sound Framework approach is based on four planning principles: integrating data from social and ecological systems; using multiple analytic scales of analysis (ranging from regional- to landscape- to site-specific levels); applying an issue-based planning approach; and using stakeholder collaboration. We begin by identifying the relevant spatial and temporal scales of analysis. Then we identify key recreation experiences and critical human use issues based on the social and ecological information covered in previous chapters. The resulting analysis of issues leads to recommended management strategies and practical monitoring measures and practices that can be used to evaluate effectiveness and implement adaptive management.



### ANALYSIS SCALES

The Prince William Sound Framework considers three scales of analysis: regional (the Sound as a whole); landscape (Analysis Areas); and site level (General Areas). The use of physiographic boundaries relevant to use patterns, which also allowed summary of existing human use data sets maintained by various land and resource managers in the region, was key to our multiple-scale approach (chapter 6). The results of that effort divided the study area into 31 Analysis Areas and 552 General Areas. Human use of Prince William Sound is strongly seasonal due to variable weather and extreme winter conditions. Recreational use of uplands (excluding hunting), recreational boating, and sportfishing occurs mainly from May through September, with the bulk of use occurring June 15 to August 31 (chapter 6 and chapter 7); therefore, summer became the focal season for analysis.

## IDENTIFYING KEYSTONE RECREATION EXPERIENCES

We identified four key recreation activities, or "keystone" experiences, based on existing literature and the recreation use data collected with questionnaires and focus groups (chapter 5; chapter 7; chapter 8; Colt et al. 2002). Managing for "special" or "unique" experiences is a common theme in the literature, but there is no widely accepted definition. For the purposes of this project, we defined *keystone experience* as a relatively specific and popular visitor activity that is unique to the area and a primary visitor attraction rather than something people do as they travel to some other destination. In short, it is what makes the area a special place to visit and provides experiences that are rare or not readily found elsewhere. Borrowing from the wildlife literature on keystone species, managing for keystone recreation experiences allows managers to protect critical and potentially scarce experiences first and secondarily to manage for other activities that are less critical. This approach recognizes that it is impossible to manage for all activities and experiences simultaneously and that judgment must be used to identify an area's critical contribution (or niche) in the provision of recreation and tourism opportunities in the broader region. It also recognizes that focusing on a relatively few specific recreation experiences is necessary for establishing management direction and setting standards, as well as implementing practical recreation monitoring efforts.

Four keystone experiences were identified for the Sound: tidewater glacier day trip; overnight tidewater glacier and solitude; big game hunting; and wildlife watching. These experiences have a seasonal component, and many areas likely offer varying levels of quality of experience and may simultaneously offer more than one key experience.

### TIDEWATER GLACIER DAY TRIP

Visiting tidewater glaciers is a primary goal for many day trip visitors out of Whittier or Valdez. During the summer months, three to four tour boats provide these opportunities daily, and passengers can view one or more tidewater glaciers with a relatively short time investment. Similarly, this is an experience sought by some special use permit holder kayak and charter boat clients in Blackstone and Columbia Bays. Comparable opportunities are available at Shoup Bay inside the port of Valdez (chapter 7). Additionally, significant numbers of private recreationists are accessing some of these areas, especially Blackstone Bay, by motorboat (chapter 8).

### OVERNIGHT TIDEWATER GLACIER AND SOLITUDE

The opportunity to camp or anchor overnight in the vicinity of a tidewater glacier is a key experience sought by kayakers and recreational boaters (chapters 7 and 8). An integral component of this experience, particularly for kayakers, is a complementary feeling of relative solitude. The noise and wakes emitted by motorized vessels have negative impacts on feelings of solitude, especially in the perception of kayakers. Of primary concern are the presence and availability of adequate campsites and overnight anchorages. This was evaluated using a relative numeric range of campsite and anchorages from GIS layers synthesized in chapter 6.

An additional concern relative to solitude as a component of these overnight experiences comes from the overall vessel activity within an area. In each Analysis Area with overnight tidewater camping or anchoring opportunities, the potential for solitude was characterized as (1) *unlikely*, (2) *potential*, and (3) *likely*. This was evaluated using a relative ranking system (i.e., *high*, *medium*, *low*) applied to each Analysis Area based on overall vessel density predictions from chapter 7. Areas with high vessel activity were considered to have *unlikely opportunities for solitude* whereas medium offered *potential solitude* and low offered areas of *likely solitude*.

Further consideration was given to the presence and relative number of known daily tour or cruise boats and commercial fishing fleets given the noise footprint and large size of these vessels. In cases where more than two tour vessels were likely per day in an Analysis Area (chapter 6) with otherwise low or medium vessel density (College Fjord and Columbia Bay, respectively), the potential for solitude was considered to be diminished to the next categorical level. This was also considered to be true if commercial fishing activity category was defined as high or highest within the Analysis Area (chapter 6).

### BIG GAME HUNTING

Analyses of recreation use patterns from chapter 6, as well as data collected by the household harvest study in chapter 9, clearly demonstrate that hunting is a key



experience for many users of the Sound. During spring and fall months this group represents the majority of recreation use occurring in the region. Focus group discussions conducted with hunters (chapter 8) show that this group seeks areas with plentiful game, has a preference for reduced overall competition from other hunters, and also desires areas with reduced overall use (i.e., solitude).

### WILDLIFE WATCHING

While wildlife viewing is not a rare activity, the Sound provides opportunities to view rare and distinctive wildlife, especially for visitors from outside of Alaska (e.g., grizzly bears, walruses, sea otters, humpback whales, and orcas). All recreation user groups identified wildlife watching as a *very important* aspect of their recreation experience in Prince William Sound (chapter 7). Certainly, wildlife abounds throughout the region, though specific General Areas were identified in the human use hot spots project (chapter 6) as having known optimal wildlife watching opportunities.

## ISSUE FRAMING

We framed the issues in two steps—issue identification and issue analysis—by considering the Framework management goals and objectives (chapter 4), available data and insights from analyses presented in previous chapters, and manager judgment. A number of issues were considered based on (1) the perceived level of threat; (2) the ability to rigorously define the issue, identify objectives, and monitor indicators of progress; and (3) Forest Service ability to implement management to address the issue given Forest Service jurisdiction and capacity. The issue-framing process was designed to help managers deal with three basic challenges inherent to recreation management planning: (1) identifying a manageable number of priority problems or issues (identification); (2) determining the underlying causal factors of each problem (description); and (3) selecting management tools that address the specific problems and meet regional and site specific management objectives (management and monitoring). The description of the issues incorporated management judgment, stakeholder input, and results of data presented in previous chapters of this volume. Throughout this process, special attention was paid to consideration of the regional context and the inclusion of managing for both resource protection and providing quality recreation experiences.

The five specific management issues selected are listed in table 19.1. One topic that was identified as a potential issue but was not fully developed for inclusion in this process relates to potential impacts of human use on wildlife species. The research efforts in chapters 13 and 15 demonstrate the difficulty of equating use overlap with disturbance effect and, in fact, in multiple instances indicate this may not be a problem under current human use regimes. Though the efforts described in chapter 14

TABLE 19.1. Five visitor management issues to be addressed by the Chugach National Forest in Prince William Sound

| PWS VISITOR MANAGEMENT KEY ISSUES |
|---|
| 1. Reduce degradation at culturally sensitive sites |
| 2. Protect solitude opportunities in tidewater glacier areas |
| 3. Maintain large-scale, regional solitude opportunities |
| 4. Assess and collaboratively manage big game hunting |
| 5. Develop comprehensive commercial outfitter-guide use allocation |

indicate there are some species that may be at risk from recreation, Forest Service managers did not feel they had enough information to develop the issue and follow it with specific management or monitoring action. Though the results of the effort described in chapter 12 could inform the development of disturbance studies, Forest Service managers felt that specific information about disturbance effects could not be clearly linked to recreation. Furthermore, many of the species *potentially* being impacted are marine species, managed by other agencies. Similarly, the regulation of saltwater boat traffic is not a focus of the Forest Service. As a result, managers felt that it would be inappropriate for a single agency to develop the issue, propose management actions, and conduct follow-up monitoring for success.

## ISSUE ANALYSIS: DESCRIPTION, MANAGEMENT, AND MONITORING

### REDUCE DEGRADATION AT CULTURALLY SENSITIVE SITES

Analysis of GIS human use layers produced in chapter 6 and completed by Fidel (chapter 16) showed nine primitive campsites on the Chugach National Forest that overlap with historic or otherwise culturally sensitive sites. An additional 49 inventoried primitive campsites are adjacent to private lands owned by Alaska Native entities—the majority of which are also of cultural significance to the tribes of the Sound. The management objective is to decrease overall visitor use at these shoreline sites beginning with those at greatest risk for degradation. This will be accomplished by working in collaboration with Alaska Native entities in the region and using data, including human use density layers (chapter 7) and the campsite hardening analysis completed by Fidel (chapter 16), as well as local knowledge to set priorities for management actions.

One management option includes restoring campsites overlapping with heritage sites to natural conditions, so that each becomes a less desirable site for camping.



Nearby alternative campsites could be hardened in order to concentrate use in areas that protect cultural sites and are resilient to recreational use (chapter 16). If necessary, new primitive campsites could be established to concentrate use in areas away from sensitive sites. Finally, Forest Service staff and partners can work to publicize these more appropriate campsites to shoreline recreationists, further ensuring that use is directed away from sensitive sites.

Monitoring activities linked to this management issue could include (1) soliciting annual reports from key informants (water taxi operators, outfitters and guides, Forest Service law enforcement staff, backcountry rangers, etc.) regarding observations of site use; (2) conducting annual visual site inspections by kayak rangers and partners (ideally including Alaska Native entities) using the protocol developed for campsite monitoring like those described in chapter 17 (e.g., evidence of fires, garbage, trampled vegetation, bare soil, etc.); (3) measuring cultural site degradation at the Forest Service–managed cultural sites; and (4) conducting annual surveys of key stakeholder perspectives (e.g., Alaska Native groups) to assess whether use levels are perceived to have changed following implementation of management actions.

### PROTECT SOLITUDE OPPORTUNITIES IN TIDEWATER GLACIER AREAS

In tidewater glacier areas, solitude is a keystone experience for the kayak user group and is also important for recreational boaters. Literature suggests that, like resource management in general, key experiences can be lost through incremental decision-making over time (Kahn 1966; Odum 1982). Kayakers who camp overnight are especially sensitive to and dependent on solitude (i.e., quiet, low boat wake, low number of motorized users) for their overall satisfaction levels. To retain solitude experiences for kayakers, managers should manage certain areas *explicitly* to prevent the loss of solitude and to preserve low density visitor opportunities. Based on summer vessel density predictions in chapter 7 and known areas of commercial fishing and tourism traffic identified in chapter 6, key areas where solitude is likely include Icy Bay and Port Nellie Juan. Harriman Fjord/Barry Arm, College Fjord, and Unakwik Inlet represent areas where solitude is potential. Three areas where solitude is unlikely are Blackstone Bay, Columbia Bay, and Shoup Bay in Valdez Arm; each of these is within relatively close proximity to port access from Whittier or Valdez.

Many individuals visiting the Sound want to be able to visit and experience the natural beauty and ecological setting of a tidewater glacier as part of a day trip. This experience is only available within one day's travel distance from Whittier or Valdez, and as a result, these areas (Blackstone Bay, Columbia Bay, and Shoup Bay in Valdez Arm) typically receive a high amount of vessel traffic. Individuals experiencing these areas are not necessarily dependent on the availability of infrastructure (i.e., overnight anchorages or campsites) and many spend no time or very limited time on

shore. Promoting day use at tidewater glacier areas where solitude is unlikely could concentrate use and limit dispersion of visitor use into tidewater glacier areas with greater potential for solitude. This strategy could also include permitting additional outfitter and guide use into these same higher-use areas for day use and for overnight use if adequate campsites are available. An additional action would be to allow non-motorized use (primarily kayaks) to increase up to thresholds consistent with Forest Service guidance for the Wilderness Study Area, at least in areas where adequate numbers of campsites exist in order to provide for this keystone experience. Similarly, ensuring that adequate numbers of campsites and overnight anchorages exist in high-use areas is another way to keep use from spilling into other areas that currently have better potential for solitude.

In areas identified as having likely or potential solitude, measures can be taken to avoid the development of facilities such as permanent camps, cabins, group sites, and trails unless they are specifically employed to concentrate use and promote solitude within that area. Managers should also scrutinize additional proposed motorized uses of likely and potential solitude areas. For example, when making decisions about newly proposed charter boat use, they might consider the levels of use in these areas according to work in chapters 6 and 7. Those contemporary numbers could be considered as maximum thresholds for allocation of new use to avoid increasing the overall volume of motorized traffic in these areas with higher potential for solitude.

Monitoring activities linked to this management issue could include (1) conducting an annual summary of visitor use data reported by outfitters and guides for seven tidewater glacier areas, as part of Chugach National Forest's annual commercial use monitoring, as well as yearly data from water taxi operators and transporters who drop clients in these areas; (2) conducting a user experience survey every five years targeting individuals using the seven tidewater glacier areas to evaluate visitor expectations relative to the ability to experience solitude (and other factors considered important relative to the availability of solitude); (3) conducting summer vessel density surveys every five years using randomly established transects stratified along a gradient of use (high, medium, low) to detect changes in vessel activity in tidewater glacier areas; and (4) conducting seasonal ambient noise monitoring in a subset of these seven tidewater locations stratified along a gradient of solitude potential (likely, potential, unlikely).

### MAINTAIN LARGE-SCALE REGIONAL SOLITUDE OPPORTUNITIES

Beyond the site-specific scale of tidewater glaciers, managers need to explicitly plan for protecting large regions of solitude so that these regions do not disappear incrementally through site-by-site decision-making processes. The analysis of recreation vessel density discussed in chapter 7 indicates that the majority of the eastern and



southern parts of the Sound have overall low levels of human activity. Access to this area is difficult, resulting in a "natural" overall lower level of use. Such large regions where use is not encouraged allow for the maintenance of diversity in recreation user experiences and offer opportunities for individuals (such as hunters and solitude-seeking kayakers) in search of highly solitude-oriented experiences with very low contact levels. They also provide an area where a greater focus can be given to ecological values.

To maintain a large contiguous region of relatively low levels of human use while simultaneously directing use to areas of high and some medium use, managers should concentrate use in high- and some medium-use areas to avoid spreading use into low-use areas. This includes allowing an increase in commercial outfitter and guide use in those areas, but also employing indirect management techniques such as outreach/education and promotion of recreation opportunities in high- and some medium-use areas. In areas with low overall use, managers should avoid advertising these areas and developing facilities that may impact the potential for solitude, such as permanent camps, cabins, group sites, and trails, unless they are specifically employed to concentrate use and promote solitude within that area.

Monitoring activities linked with this management issue should include (1) conducting annual summary of visitor use data reported by permitted commercial outfitters and guides for low-use areas as part of Chugach's annual commercial use monitoring; (2) collecting annual data from water taxi operators and transporters who drop clients to these areas; and (3) periodically conducting vessel density surveys using randomly established transects stratified along a gradient of use (high, medium, low) to detect changes in vessel activity in areas currently defined as low.

### ASSESS AND COLLABORATIVELY MANAGE BIG GAME HUNTING

Big game hunting is a contentious issue in the Sound, in part due to competition over what some perceive as limited resources. Jurisdictional considerations between the Forest Service and the Alaska Department of Fish and Game (ADF&G), and differing norms of sport and subsistence hunters, further complicates management. There are also different social norms associated with local hunters from communities in the Sound compared to others from outside the region and concerns about commercial hunting permit allocations and locations of use. Furthermore, species availability is restricted to particular locations in the Sound, which can cause bottlenecking and crowding issues for hunters. For example, goat hunting opportunities are limited by accessible goat habitat (Columbia Bay and Port Bainbridge) as well as administratively by a limited number of harvest tags that hunters are competing to fill. This leads to intense pressure to be the first to harvest in a particular game management unit and increases the potential for conflict.

Competition between user groups occurs in the spring between kayak use and black bear hunting in the western Sound (chapter 10). New hunting pressure has occurred here as a result of increased access through Whittier. This has resulted in new hunters to the area with different behavioral norms and expectations relative to Sound-resident hunters which may increase intragroup conflict (chapter 8). This influx of new users may also increase potential for conflicts between kayakers and hunters (chapter 10). A Forest Service moratorium on issuance of new permits for commercial hunting in the eastern Sound has also resulted in demand displacement, increasing commercial hunting permit requests in the western Sound (chapter 4). Most of the large game species harvest is by private individuals, but Chugach National Forest decisions on commercial permit allocations may increase competition for game, reduce hunters' feelings of solitude, and compromise user experience. This is probably most important in areas where there is limited overall use, as well as those areas used most heavily by local community residents, as identified in chapter 9.

Land and resource managers need to develop a more comprehensive understanding of hunting practices in the Sound for at least three specialized groups: subsistence/local sport hunters, commercial sport hunters, and sport hunters from outside the Sound communities. They all have different motivations, expectations, and norms. Managers must work to understand the differences between these groups and assist in developing a code of practice *with* the hunting community that complements local traditional hunting and fishing practices. The Chugach National Forest has limited contact with this important group of stakeholders; therefore, efforts are needed (ideally in partnership with ADF&G) to engage them in a dialogue in order to better understand use patterns and hunter expectations.

In order to provide for this keystone recreation experience, a management partnership should be initiated between ADF&G and the Chugach National Forest with the aim of promoting both sustainable harvest and quality recreation hunter experiences. Some joint activities could include (1) identifying areas of high hunting use and concentrate other uses in different locations during hunting seasons to avoid potential conflicts between these user groups; (2) elevating awareness of the timing and locations of hunting use within other recreation user groups; (3) identifying areas with high likely hunter competition for key species and attempting to balance use between guided and private hunters in those areas; (4) conducting an assessment of hunting behavioral norms to identify potential causes of conflict; and (5) providing training for commercial operators in local hunting norms to help reduce conflict between them and private users in the Sound.

Monitoring activities should also be a cooperative effort between ADF&G and Forest Service, and could include (1) annually refreshing spatial information about household harvest of big game species using the spatial and seasonal framework and



procedures identified in chapter 6; (2) engaging with key informants, including commercial outfitters and guides and experienced private hunters, about the quality and management of hunter experiences; and (3) conducting a targeted, representative survey of all hunter groups within the Sound to establish a baseline user experience for this key recreation group.

## DEVELOP COMPREHENSIVE OUTFITTER-GUIDE COMMERCIAL USE ALLOCATION PROCESS

The methods used by the Forest Service to allocate commercial use across the Sound are inconsistent. Due to the different approaches in use allocation, a higher number of permits are being issued in the western Sound, which is managed as a Wilderness Study Area (chapter 4). Due to the more restrictive management style of the eastern Sound, the indirect effect has been to displace many permit holders' use to the western Sound. Site- and area-specific decisions have regional implications and consequences and therefore need to be coordinated.

While there is controversy about the amount of permitted guiding in the Sound, new social and biophysical data, and a better understanding of visitor use density, provide important information for managers. Special use permit holders represent a small part (less than 10 percent) of overall use during summer months, and visitors do not feel crowded in the Sound during the summer (chapter 7). These results suggest that commercial use permitted by the Chugach is unlikely to have wide-ranging negative effects on user experiences in the region. In fact, guides may play an integral and positive role in providing the public access to recreation opportunities in the challenging conditions of the Sound. Additionally, outfitters and guides can serve to demonstrate proper behavior to their clients with Leave No Trace principles and responsible wildlife viewing practices. Commercial use also contributes to the economic sustainability of local communities, which is a Forest Service priority for the region.

Therefore, we recommend the Chugach develop a plan for sustainable *growth* of outfitter and guide opportunities during the summer months, with a consistent and transparent commercial permit allocation process for charter and kayak outfitters and guides for the peak summer months. The process should be developed collaboratively and based on current human use data described in this volume (principally chapters 6 and 7). Drawing from those efforts, special use permit allocation could be based on a combination of existing total-use thresholds (high, medium, low), key recreation experiences, and new information about the availability of anchorages and campsites, as well as the presence of other commercial activity. Finally, managers should strive towards standardized use reporting, data entry, and summary to feed into monitoring efforts, allowing permit allocations that can be revisited as needed.

Monitoring activities linked to this management issue could include (1) annually summarizing use reported by permitted outfitter and guides to Analysis Areas to ensure commercial use levels do not exceed Wilderness Study Area standards; (2) conducting social survey and boat counts every five years in order to validate classification of high, medium, and low for total use comparison to commercial use; and (3) analyzing public use relative to commercial use to measure effectiveness of management and use allocation strategies.

## DISCUSSION

Throughout the issue analysis process, four broader management themes emerged as necessary to address the issues: (1) managing for user expectations about their experience; (2) concentrating recreation use where appropriate; (3) forming management partnerships with other agencies and stakeholders; and (4) recognizing that progress on the issues can't be demonstrated without investments in practical and targeted monitoring. These same themes likely underscore a number of the issues faced by land and resource managers in other wildland settings and warrant further deliberation.

### MANAGING FOR USER EXPECTATIONS

Much of wilderness recreation research and management focuses on evaluating or limiting numbers of individuals using the landscape in order to reduce social and resource impacts. The Prince William Sound Framework highlights some of the complexities that can be missed by taking such a singular focus. In the Sound, the perception of crowding is not a widespread issue, nor does it negatively impact user experiences, even during peak use summer months. Visitor perceptions of satisfaction and solitude have more do with their expectations, behaviors of others, and the spectrum of opportunities available to them. These dynamics go beyond simple measures for user experience that often focus on numbers of encounters with other recreationists. Managers should (1) help visitors to the region understand seasonal and geographic patterns of use so that they can develop realistic expectations about their recreation experience relative to the other users they may encounter and (2) promote awareness of the types of diverse experience opportunities sought by different groups using the Sound and how they contribute to the region's unique working wilderness character and add to the ranks of those invested in its conservation future.

### CONCENTRATING RECREATION USE

Too often wildland managers let a couple of normative experiences, based largely on keeping different groups of people from coming into contact with one another,



drive planning efforts (Blahna 2007, McCool and Cole 2001; Borrie et al. 1999). This results in the temptation to distribute use relatively equally throughout a region, an approach that had been used by the Forest Service in Prince William Sound in the past (chapter 4). With a better understanding of existing use dynamics (chapters 6 and 7) the Chugach National Forest can find ways to concentrate recreation in areas already experiencing relatively high levels of human use. Specific actions could include the following:

1. Increases should be allowed in permitted commercial operator use in areas that have already high relative overall vessel density up to 30 percent of overall use (per existing Forest Plan guidelines), if adequate anchorages and campsites exist.
2. The existence of campsites in high- and medium-use Analysis Areas should be published and publicized to identify those sites capable of supporting more use based on the analysis by Fidel (chapter 16) and using a platform like that described in chapter 18 so it can be readily available to those planning trips to the region.
3. Analyses described in chapters 7 and 16 should be used to guide a program of targeted campsite hardening in high- and medium-use Analysis Areas. This might include partnering with other land managers and stakeholders to develop or enhance a few targeted multigroup camp or day use sites in high-use Analysis Areas on nonnational forest lands. Such developments might deflect large groups from the Chugach National Forest's more primitive and low-use shoreline sites.
4. Collaboration with regional partners and other managers should be sought to encourage the use of vessel traffic routes within Analysis Areas with existing high and medium levels of use.

### ESTABLISH MANAGEMENT PARTNERSHIPS

A key to managing for sustainable human uses in such a huge region with challenging access and multiple jurisdictions is better collaboration with other land managers and key stakeholders. Some specific partnerships could include the following:

1. Engagement should be sought with commercial operators in regular moderated sessions to detect potential changes in use dynamics and identify possible areas or user behaviors of concern within the region. The forums should be two-way information exchange, encouraging the sharing of management concerns and perspectives. Incentives offered for participation could include sponsored guide training or additional access to the latest mapped information about human use patterns, resource distribution, or other value-added information.
2. The perspectives and advice of local citizens in best-use practices should be shared to help guide newer users of the Sound. Such an effort could be combined with collecting systematic input on emerging issues in the region from local experts or key informants

3. Special use permit operators should be trained to engage their clients in the use of citizen science techniques to collect simple data to help meet issue monitoring identified above.
4. Citizen science partnerships should be incentivized and the value of data contributions from these efforts should be demonstrated by formally recognizing participants.

### COMMITMENTS TO TARGETED MONITORING

The Forest Service is one of three *Exxon Valdez* oil spill federal trustees and is responsible for oversight of the recovery of resources and human services injured by the spill. In this role, the U.S. Forest Service is able to initiate monitoring and recovery efforts that look beyond the forest boundary for a more regional perspective—an approach now mandated by the agency under its new planning regulations. In the years since the spill, substantial resources have been expended monitoring species and habitat condition, but little effort has been spent to monitor patterns of human use. The Chugach National Forest has a significant opportunity and obligation to play a role in human use monitoring of the region in support of their management objectives and continuing spill recovery efforts.

Some components of the efforts proposed under this section could be conducted in association with the monitoring being developed in accordance with the Chugach Forest Plan revision launched in 2012. The issue monitoring efforts in this chapter, identified through issue analysis, would help the Forest Service implement a model of sustainable recreation management. These efforts range in rigor from key informant and visual inspections conducted in a consistent and repeatable way to statistically representative sampling of the region and its recreation users. Suggested data collection approaches common to addressing a number of the issues in this chapter include (1) gaining assistance in data collection from the many commercial operators active in the region and working in partnership with agency and university scientists with experience and a demonstrated interest in the region to complete analyses; (2) linking monitoring efforts to the comprehensive databases created and used in chapters 6 through 10 and 12 through 14 to assess overall recreation use and sensitive resource areas in the Sound; and (3) making specific efforts to share the results of monitoring efforts with regional managers to better inform the decisions that *all* managers make in the Sound relative to human use.

## LESSONS LEARNED

In developing the Prince William Sound Framework, we realized there were several other broad lessons learned that apply to human use and recreation sustainability planning in general. These lessons also apply to other large landscape conservation



planning situations, regardless of purpose, ranging from timber sales to state and federal wildlife habitat plans to national park area and management plans. The process we recommended in this chapter illustrates the many and varied social, economic, and environmental factors that must be considered in planning for the human uses of natural landscapes.

No quantitative process can weigh or "balance" the wide range of complex factors nor include the diversity of human values and value judgments necessary to address the multitude of social and environmental needs. Instead, we developed a broader, process-oriented framework that we believe can be tailored to other large landscape conservation situations and contexts. In our framework, identifying keystone human activities played a central role in allowing us to work through an issue-driven, rather than data-driven, process. This allowed us to identify the most relevant data to consider that could help address specific objectives and management strategies—then link those to related monitoring needs. We did not try to cover *all* needs, quantify *all* values, and simulate *all* outcomes. Such approaches too often lead down data-driven rabbit holes of "analysis paralysis," the likes of which have plagued natural resource agency planning for decades (Blahna 2007).

We believe this framework meets many of the ideals of planning processes that are rarely incorporated in large-scale conservation planning. First, it is both strategic and tactical. There are broad and general objectives for human use throughout the Sound and very specific recommendations for how to meet those goals. Second, it is (or can be) a living document, not a static plan that is difficult to implement and update. It is possible to track the specific issues, and management assumptions can be tested. Third, it is truly interdisciplinary, with a multitude of empirical data across many disciplines being used together in the framing and analysis of specific issues. Fourth, it provides practical monitoring guidance so that adaptive management is really possible. Finally, it combines, rather than conflates, social science *and* public engagement. Both were used in the development of the Framework, and each is identified as having complementary but different roles in supporting future management efforts.

Some of the issues and strategies identified in the Framework are straightforward and likely can be adopted immediately. Others can be partially adopted, while more controversial aspects of the issues will likely enter the formal planning process. Still other issues will require additional analysis, broad community engagement, and thoughtful collaboration with key stakeholders. Assuming some of the issues identified in this volume are carried forward and addressed (ideally in partnership with other managers and stakeholders), the effectiveness of the Prince William Sound Framework can be evaluated. The evaluation will show that some issues were successfully addressed, some partially addressed, and some not so well addressed—but the key is that this information *enters the next round of planning*, along with new issues

that emerge. This is the *ideal* of adaptive management, and it is the last and most critical planning step that too often eludes natural resources managers.

We believe it's vital for the Sound communities, federal and state managers, industry, and visitors to the Sound to continue engaging in a comprehensive, proactive planning process that seeks to protect the diverse ways in which this region is valued by all. Without a serious dialogue and visioning about the sustainable growth of human use, incremental changes made by individual actors may overwhelm the very attributes of the Sound that make it so special to residents and visitors. The Chugach National Forest's Prince William Sound Framework, built upon the knowledge contained in this volume, provides a beginning point for an effort to ensure this unique and special place continues to be a "working wilderness."

STAKEHOLDER ESSAY

# THINKING AND MANAGING ON A WATERSHED SCALE

KRISTIN CARPENTER

MY HUSBAND WEARS A SUIT TO WORK. His commute ranges from 60 to 120 miles. Sometimes he's away for days, or a month, at a time. Most of the time, he runs his small business by himself, though at times he has help from his sister and their nephew.

My daily orbit is a bit smaller, more on the order of within a mile or so. I walk down the hill to my office, around town at lunchtime to go to the post office and run other errands, and back to the house after work to get the dog and continue farther up to the ski hill for some exercise.

Pacific salmon travel hundreds and possibly thousands of miles during their migrations. Their lives begin in small streams that are freshwater tributaries to larger rivers. In this part of Southcentral Alaska, salmon fry migrate several hundred miles downstream to the saltwater Gulf of Alaska and Prince William Sound. From there, we don't know how far they travel in the ocean during their two- to five-year adult lives. Their annual migrations, which occurred throughout the North Pacific and southern Arctic oceans for centuries, follow a vast sweep of topography, and season and tide cycles.

At my office at 511 First Street in Cordova, I am asked frequently how much oil from the *Exxon Valdez* washed up on Cordova's shores. Cordova sits on the eastern edge of Prince William Sound, 80 miles as the crow flies southeast of Bligh Reef, where the *Exxon Valdez* struck a charted rock. Oil flowed south and west from the ship's cargo hold.

The answer to spilled oil on Cordova beaches is "none"—that should be good, right? No, it was devastating. Cordova lost three of its six processing plants after the spill. Families and businesses fled from town because they had lost their livelihoods.

Getting back to that suit my husband wears: it's safety-orange rain gear, because he is a commercial fisherman. He goes where the fish are, and that could be miles afield. Parts of western Prince William Sound, where he often fishes for sockeye salmon, were oiled by the *Exxon Valdez*, and the Cordova fishing fleet lost its buyer markets that summer of 1989. In 1991 and 1992, herring and pink salmon returns, which typically had made up 30 to 100 percent of many Cordova families' income, failed completely.

While our human scale of daily routine is generally limited to a handful of miles, the natural resource world—on which we depend for food, the water cycle, and building materials—functions on a watershed scale. Watershed drainage patterns are what drive nutrient