INTRODUCTION

LEARNING FROM THE SOUND

Introducing This Place and This Volume

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WHEN THE *EXXON VALDEZ* oil tanker ran aground on Bligh Reef on March 24, 1989, spilling 11 million gallons of oil, it changed the future of Prince William Sound forever. This catastrophic event disrupted the region's biological system, directly killing countless individual birds, marine mammals, and fish, and poisoning habitats that to this day no longer support some of the species they did prior to the spill (EVOS Trustee Council 2010). Less well documented and poorly understood are the impacts that were felt by the region's human communities—impacts that have profoundly altered the way people use this region. Two decades later, changes in recreation use have run counter to what was expected in the months and early years following the spill.

People haven't avoided Prince William Sound as a legacy of this ecological disaster. In fact, the opposite has been true, particularly in the last two decades (Fay 2008). The terrible damage done to such a picturesque and seemingly pristine place captivated people from around Alaska, the United States, and the world. A region formerly known to few became a magnet for tourists and visitors (Twardock 2000), including some of the many thousands of folks who spent years attempting to clean oil from beaches following the spill. Subsequent efforts to boost the region's economic vitality resulted in increased access and the development of commercial enterprises focused on providing high quality nature tourism experiences in the area's remote bays and fjords (Colt et al. 2002). This increase in recreation caused many to worry that the very ability to experience wilderness or see plentiful wildlife in pristine settings may again be threatened—not by oil this time, but by the very humans seeking

those wilderness experiences (Murphy et al. 2004). Managers and communities in the region wrestle with these concerns, recognizing that increased use allows for more diverse community economies and grows a bond between this precious place and visitors who can become its future advocates.

INTRODUCTION

An enduring paradox for the management of public lands is the need to accommodate increasing levels of human uses while reducing the environmental impacts of those uses. This is the crux of managing sustainable human uses of natural environments (Keough and Blahna 2006). Managers must continue to protect these areas, simultaneously maximizing their use in order to promote their relevance and connections to broader societal goals. In so doing they can show how wildlands are linked to robust economies and promote health and well-being for sustainable communities (Meffe et al. 2002; Gunderson and Holling 2002). This is vital when land and resource managers are increasingly asked to prove the value of a system of largely undeveloped public lands and the agencies entrusted with their stewardship.

But how do we manage to accommodate human uses and protect environmental values at the same time? Historically, land management agencies used standard practices and principles of outdoor recreation management like recreation carrying capacity, limits of acceptable change, recreation opportunity spectrum, and scenery management system (Hendee et al. 1990; Manning 2007). But most of these principles are dated and focus on traditional forms of recreation like hunting, fishing, camping, and hiking (Stankey 1999; Cerveny et al. 2011). Current demands on natural environments are more diverse and often conflicting, and agency goals for managing human uses are far more complicated. Today's land managers are juggling requirements for cultural and historical preservation, Native American treaty rights, gathering of nontimber and other forest products, spiritual and symbolic meanings of special places, subsistence and traditional harvesting activities, and a history of roads, trails, and facilities systems that are no longer economically sustainable (Williams et al. 1992). Large-scale ecosystem stressors like climate change, invasive species, and widespread habitat loss and fragmentation further complicate the picture for public land managers (Cole and Yung 2010).

This book provides a case study of an integrated approach to understanding and planning for human uses in a large, natural ecosystem: Prince William Sound in Southcentral Alaska. It provides an ideal case study because it is a relatively intact wildland setting with few managing agencies, communities, and private companies. Due to the grounding of the *Exxon Valdez* and the ensuing environmental and socioeconomic disaster, a multitude of studies were conducted to help track environmental changes, human travel and use patterns, and the status of "injured" resources in the

Sound. This volume presents summaries of many of these studies and shows how the results were used in an issue-based planning process to develop recommendations for managing human uses in the Sound in an integrated and sustainable way. While this has been an evolving and exploratory effort, we believe it meets many objectives of sustainable human use planning, and offers lessons for public land management agencies and stakeholders to use in future planning efforts.

A STARTING POINT: SUSTAINABLE RECREATION

A new initiative of the U.S. Forest Service called the Framework for Sustainable Recreation offers a unique policy solution to current recreation challenges by "providing desired benefits through the science of recreation management for present and future generations" (USDA Forest Service 2010). The goals of the strategy are to unite diverse interests, create and strengthen partnerships, focus scarce resources on mission-driven priorities, connect recreation benefits to communities, provide for changing urban populations, and most importantly, sustain and expand the benefits to America that quality recreation opportunities provide. Sustainable recreation planning recognizes that management should be driven by the landscape and its people—not administrative boundaries (internal or external)—and seeks to advance integrated and collaborative planning, and management through innovative approaches (USDA Forest Service 2010).

A critical requirement of the Sustainable Recreation Framework is the need to develop management plans at multiple scales of analysis. This is a major departure from traditional management that tends to focus on individual sites, trails, campgrounds, or other recreation settings. At the site level, for example, it may seem reasonable that restricting human use is the best way to protect environmental or social integrity. But looking at the landscape or regional implications of restricting use often results in the *opposite* conclusion; restricting access may exacerbate both physical and social impacts as use is displaced to more pristine or low use areas (Keough and Blahna 2006; Blahna 2007). Restricting users, or certain types of use, comes at a cost—not only in diversity of constituent support but also in unintended resource or social impacts on different parts of the managed landscape as use is shifted. It is vital to step back and take a broader view of both potential impacts and longer-term conservation benefits of allowing for sustainable use.

To accomplish sustainable human use planning, agencies and partners need rigorous characterizations of human use, including an understanding of spatial and temporal distribution of use, as well as a characterization of the motivations of users (McCool and Cole 2001). This type of information requires deliberate investments in social science investigations, which are often a lower priority for land managers and scientists alike (Endter-Wada et al. 1998; Sievanen et al. 2012). Furthermore, there is a

critical need for investigations of potential harm to biological and cultural resources that go beyond simple assumptions like *use-equals-impact* (McCool and Stankey 2004). An understanding of the timing, location, and specific effects of human interactions with species or sites of concern, as well as the specific mechanisms of those effects, should be of vital importance to managers attempting to balance use with ecosystem conservation (Keough and Blahna 2006).

Sustainable recreation planning also emphasizes that renewed efforts to manage increasing human use must be combined with greater efforts to educate and truly engage the public (USDA Forest Service 2010). Rapid changes in the Sound and its human use dynamics since the oil spill have not been accompanied by equivalent efforts to engage the public to reflect upon the future of the region. An effort to understand this region, the future sustainability of its communities, and the needs of its many users must involve data and scientific inquiry as well as opportunities for sharing individual perspectives.

In this volume we explore human use in the context of an *ecosystem service*—or the benefit that humans receive from naturally functioning ecosystems (Millenium Ecosystem Assessment 2005). Challenges for this approach abound, including what can appear to be a focus on commodification, or counting users instead of focusing on the benefits they derive from wildland settings (e.g., Chan et al. 2012). A few of our chapters (1, 16, and 18), and certainly our stakeholder essays, aim to go beyond counting users and look into the motivations, sense of place, and values they derive from the Sound. Ultimately, when it comes to decisions like those that managers must make about allocating use, there is very much a need for a rigorous description of the distribution and intensity of use *as well as* an understanding of the values derived from that use.

This book illustrates one approach for pairing rigorous and innovative research and empirical data with local ecological knowledge and community perspectives shared through stakeholder essays. Its hybridized content exemplifies the complex, multifaceted, and often value-laden challenges faced by managers seeking to make decisions in an absence of information and with broad diversity in public perspectives. It highlights how aspects of these decisions may be *informed* by data, but many will nonetheless revolve around human impressions and perceptions difficult to influence even with the best research and communication efforts.

WHAT IS THIS PLACE WE CALL "THE SOUND"?

In chapter 1, Alaskan author Marybeth Holleman describes Prince William Sound as "a place of extremes and convergences—of weather, geography, wildlife, and experiences. One of the most active seismic regions in the world, it anchors the eastern edge of the Ring of Fire; it's the northernmost reach for the temperate rain forest; it's rest

stop and destination for tens of thousands of migrating birds and marine mammals. Arctic terns fly in from South America; humpbacks swim from Baja California and Hawai'i. It's a biological and geographic center for the Pacific, where temperate and subarctic environmental conditions overlap. Like the center of a wheel, the Sound is the apex of Alaska's Pacific shores that curve from southeast Alaska to the Aleutian Islands. A 3,500-mile-long undulation of capes and fjords and islands and islets and sea stacks, Prince William Sound is encircled by three mountain ranges draped in ice fields from which more than 150 glaciers pour, dozens of them tidewater. It is an expansive, meandering maze."

In chapter 3, Paul Twardock, chair of the Outdoor Studies Department at Alaska Pacific University, explores the history of human use and recreation in the region. He concludes that there has been a long tradition of human use in the Sound, a place inhabited for some 5,000 years, with the label of wilderness applied only recently. During the late 1960s, recreationists seeking wilderness explored the Sound, leading to resurgence in human use during the 1970s and 1980s. The *Exxon Valdez* oil spill of 1989 had major short- and long-term impacts on tourism and recreation.

Human use and recreation tourism in the Sound have increased and changed over time—as, for example, cruise ships altered their routes and glacier tour operators added trips. Recreational boating, kayaking, and sport fishing have increased dramatically in the last decade and are expected to continue increasing (Bowker 2001). With continuing importance of commercial and subsistence fishing, there is growing concern among management agencies that increased competition and conflict may threaten the ability of the region to sustain increasing uses.

WHAT PROCESSES ARE AT WORK IN THE SOUND AND HOW DO THEY AFFECT HUMAN USE?

In chapter 1, Marybeth Holleman describes how water shapes Prince William Sound: "water sustains it, creates and contains it. Glaciers pouring to sea, pushing rock before them and carving U-shaped valleys from solid rock; streams rocketing down from the mountains to the sea, carving and carrying silt; rains stippling rock and nurturing a dense rain forest growing on the thinnest of soils, all weathering and shaping the Sound. Water links land and sea, where Sitka black-tailed deer, brown and black bears, and river otters come to the shore to feed, and seabirds come to the land to nest. And water is how people get here, how they navigate this place. There are no roads and very few trails; it's by boat that people enjoy what water has created."

In chapter 2, oceanographer Ted Cooney describes the relationships between the living and nonliving parts of the system and concludes that they "portray a complicated set of dependent populations and processes that result in the annually pulsed

production of organic matter, which is then moved through an immense food web, with consequences for both marine and freshwater environments." This rich food web provides a unique resource that supports many species of marine mammals and their freshwater counterparts in this ecosystem that is still recovering from the *Exxon Valdez* oil spill.

The Sound is a place of many extremes; it is not a place for the weak of heart. In chapter 5, social scientist Greg Brown suggests that many who are fortunate enough to have visited the Sound recognize it as a very special place and even become its advocates. Scenic beauty, biological richness, and seemingly limitless nature-based recreation opportunities combine to make the Sound a Mecca for outdoor enthusiasts, offering a valuable economic service to the region's communities. Alaskans who live in or near the Sound experience a relationship characterized by multiple meanings embedded within social, ecological, historical, and cultural values. The intersection of these values with the need to derive an economic benefit from sharing this special place with "outsiders" remains a constant source of dynamic tension for residents of local communities.

WHY IS THIS WILDLAND SETTING SO VALUABLE?

The voices from a dozen essays—contributed by stakeholders who live, work, and play in the Sound—help to answer this important question. Key among them is Marybeth Holleman, who opens the book in chapter 1 by reminding us how significant and unique each and every experience can be when visiting the Sound. She describes a vast, open, and unique landscape where one can get lost, out of sight and out of contact with others. She concludes that everyone who chooses to visit the Sound does so because of "the desire to be in a place where the human footprint is negligible, where wildlife abounds unfettered, where wilderness still reigns." Subsistence harvest is also a critical part of the rural Alaskan lifestyle for Prince William Sound residents and is specifically protected under U.S. law. It is widely recognized in Alaskan land and wildlife management that subsistence harvest provides irreplaceable cultural, spiritual, personal, and sustenance value—a relationship described eloquently by an Eyak tribal elder, Patience Andersen-Faulkner (chapter 9).

Confirming what Holleman intuitively describes, Randy Gimblett (chapter 7), social scientist, finds that many Prince William Sound visitors seek solitude. But more specific choices about destinations were made based on good fishing, glacier viewing, and wildlife viewing. The ability to view wildlife was the only activity identified as "very important" to all users. Similarly, solitude was a strong motivator for survey respondents, but only 10 percent identified it as a prominent reason for choosing their destination.

The Sound is more than a beautiful and scenic landscape. It is the ideal mirror to reflect the complexity of Alaskan identity that has been forged while living in a challenging and inspirational northern environment. Alaskans perceive themselves as more resourceful, risk taking, independent, and wilderness seeking than "outsiders," aka non-Alaskans. Greg Brown (chapter 5) reminds us that there are many values associated with the Sound, but not surprisingly, the values of the greatest importance are its scenic beauty, recreational opportunities, and biological richness. Brown's mapping work also reveals economic opportunities are dominant in parts of the Sound, and he identified "hot spots" that are associated with these values and revealed in clusters near prominent natural landscape features, such as Columbia Bay and Montague Island, and the communities of Cordova, Valdez, Whittier, Tatitlek, and Chenega Bay.

WHAT IMPACT DID THE *EXXON VALDEZ* OIL SPILL HAVE ON HUMAN USE IN THE SOUND?

In the years since the *Exxon Valdez* oil spill (EVOS), the Sound has experienced numerous changes. The immediate effects on the environment are well documented: thousands of animals and birds perished, and thousands of miles of shoreline were oiled. In 2014, 10 of 28 injured resources were considered to have recovered from the effects of the spill, while 13 resources were believed to still be recovering. Though much has been documented with respect to the effects on biological communities and resources impacted by the spill, impacts to the culture and economies as well as the sociological well-being of Prince William Sound communities are less well understood.

The Sound also supports significant subsistence and private sport harvest activities as well as a thriving commercial industry for fish and game. There are perceptions from subsistence users and other harvesters that the effects of the oil spill have reduced wildlife productivity in the Sound. Wildlife biologist Aaron Poe and colleagues undertook a study (chapter 9) to characterize harvest patterns to provide managers with contemporary insights into the recovery of the subsistence human service that was injured by the oil spill.

The cleanup also brought social impacts. Over 10,000 people worked on the cleanup as spill responders, resulting in a long-term increase in the population of Valdez (Wooley and Haggerty 1993). Community impacts are described for the small remote community of Chenega Bay by resident and researcher Kate McLaughlin (chapter 4). She describes a new infusion of cash into the community as they assisted with the spill cleanup, combined with a fear of depending on the harvest of species contaminated by the spill that had sustained this community for generations.

A novel type of social impact is described by Twardock (chapter 3), who documents how many cleanup workers experienced the Sound for the first time and later

returned to experience the Sound as a destination for recreation. Exxon settled with the state and federal governments, paying $100 million in criminal charges and $900 million in a civil settlement. The money funded extensive biological studies, which brought more people to the region to study the effects of the spill. It also funded infrastructure improvements that allowed greater access, including state park cabins. The increased publicity, easier access, and better facilities contributed to a steady increase in recreation use since the spill.

In chapter 4, Poe and Gimblett document a transition of looking at direct effects from the oil spill to the indirect effects of increased human use following the spill—and the potential concern for cumulative effects (i.e., the oil spill plus new human use) on the Sound's ecosystem. They suggest that successful recovery of recreation in the Sound is likely dependent on recognizing and facilitating key recreation opportunities sought by users in the region while maintaining a spectrum of available other experiences appropriate for wildland settings. They conclude that by allowing use from diverse groups of stakeholders, a broader section of society will come to support the region's resources—ultimately improving their odds for recovery and persistence into the future.

WHAT ARE THE CURRENT HUMAN USE DYNAMICS IN THE SOUND?

The Prince William Sound region includes the towns of Whittier, Valdez, and Cordova, as well as the Alaska Native villages of Tatitlek and Chenega Bay. As Twardock describes in chapter 3, these communities combined have fewer than 7,000 residents—though Anchorage, which has about 40 percent of Alaska's population, is within close proximity.

Over the past decade, the Sound has continued to experience increased human use. The growth of the recreation and tourism sector in Alaska has been accompanied by improved access to the region. In the western Sound in particular, the opening of the Whittier access road in 2000 has led to both increased personal and commercial recreation/tourism use. In 2001, there were 180,000 vehicles going through the tunnel to Whittier, and that increased to over 240,000 by 2007. More dramatic is the number of visitors entering the Sound, which has increased from 250,000 in 2001 to over 475,000 in 2007 (Fay 2008).

The geographic pattern of recreation use is not evenly dispersed across the Sound, but concentrated near destination landscape features like the tidewater glaciers of Columbia Bay, Harriman Fjord, and Blackstone Bay, as well as at key seasonal fishing locations. Use is also concentrated near the access communities of Whittier, Valdez, and Cordova. Some of the earliest use mapping efforts in the region by Brown

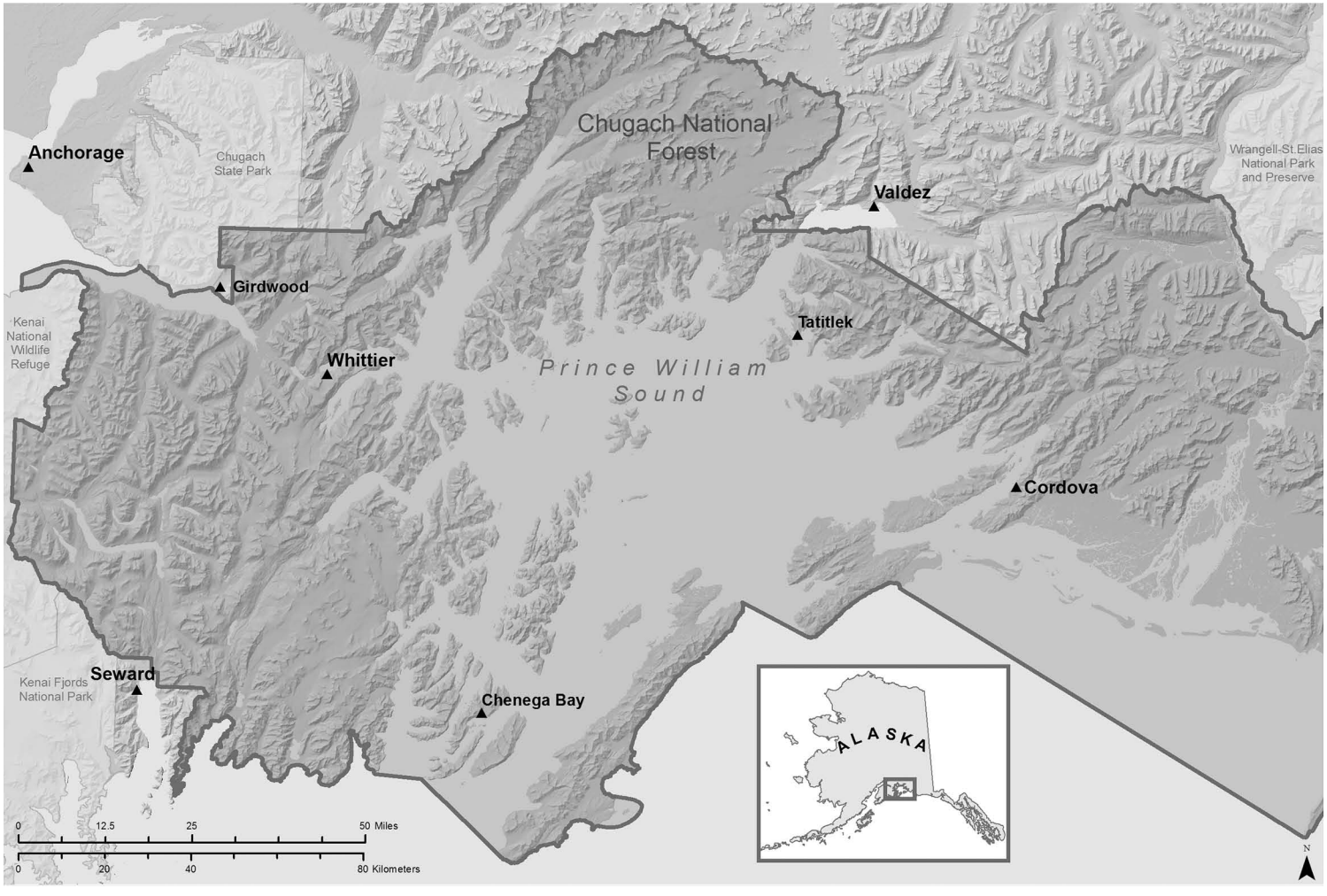

FIGURE I.1. The communities of Prince William Sound.

(chapter 5) provide this understanding with similar conclusions about human use concentrations documented by spatial analysts Chandra Poe and Samantha Greenwood in their human use hot spots study (chapter 6). They found a strong seasonal pattern of use, with the vast majority of recreation happening during summer months, with an exception for hunting in the fall and spring.

With a 100 percent increase in black bear sport harvest between 1995 and 2001 (ADF&G 2008), bear hunting is a significant example of increasing recreation activity in the Sound with the potential for user conflict. Spatial analyst Spencer Lace explores the use of geographic information systems (or GIS) with bear harvest data sets and a contemporary spatial summary of other recreation use in the Sound. He concludes that interaction between bear hunting activities and kayaking is not a widespread problem across the Sound, but that there are some key areas where bear hunter/kayaker interactions are likely to occur. Hunting is described by Poe and colleagues (chapter 19) as a "key experience" sought by individuals using the uplands of the Sound. They fear that U.S. Forest Service managers' lack of knowledge associated with hunters and the sensitivity of this group to changes in use levels, competition, and other recreation groups make them especially vulnerable to experiencing declines in quality of experience in the Sound.

The Alaska National Interest Lands Conservation Act (ANILCA) requires that federal land managers consider the effects of management on subsistence activities. Subsistence-eligible residents in the Sound include people of Alaska Native heritage and other rural residents from the communities of Chenega Bay, Cordova, Tatitlek, and Whittier. Fish comprise the majority of resources taken, but there is also significant use of other species, including Sitka black-tailed deer, black bear, marine mammals, mountain goats, waterfowl, seabirds, river otters, and mink. Research conducted by Poe and colleagues (chapter 9) summarizes the spatial and seasonal distribution as well as the intensity of subsistence harvest. They found the majority of subsistence harvest happens in relatively close proximity to communities in the region and that participation in subsistence harvest appeared to be on the decline.

ARE THERE IMPACTS RESULTING FROM INCREASED VISITOR USE OF THE SOUND?

Increasingly, some managers want to demonstrate the relevance of the wildlands by sustaining robust and diverse stakeholder constituencies. This can present potential challenges relative to environmental impacts as well as social impacts stemming from crowding at key landscape destinations, or conflicts from overlapping uses by incompatible user groups (i.e., classic disputes between motorized and nonmotorized users).

A scientific survey conducted by Gimblett and colleagues (chapter 7) found that despite management concerns about the negative effects of increasing use, crowding was not a problem for most visitors. No respondents reported displacement as a result of interactions with others, and an overwhelming proportion (95 percent) of visitors reported experiences that were as good, or better, than expected. However, in focus groups of longtime Sound users, Bob Itami and colleagues (chapter 8) found that hunters and some kayakers were negatively impacted by increasing numbers of specific user types—but those impacts had more to do with specific behaviors than use density per se. An essay from Anchorage resident Lynn Highland (chapter 8) is a window into some of these perspectives held by longer-term Sound users that were also documented by Itami.

Poe and colleagues (chapter 9) evaluate the overlap of subsistence harvest with recreation activity in the Sound in order to evaluate potential competition or displacement resulting from other human uses. The study's authors found a low level of displacement was occurring mostly in immediate proximity to communities, and this displacement is caused primarily by other local harvesters. The study concludes that reduced household subsistence harvest effort in recent years is caused more by individual lifestyle changes and perceptions about lack of resources than by concerns about competition or user conflict.

Managers find campsite assessment studies useful for looking at resource impacts from increasing use and have studied site degradation in an attempt to understand potential decreases in quality of recreation user experience. In chapter 17, social scientists Paul Twardock and Christopher Monz describe extensive work studying recreation impacts in backcountry situations. Their pioneering work in measuring campsite impacts in the Sound since the 1990s suggests that there have been significant changes in conditions at campsites. With this study documenting an increase in the number and size of sites, the management practice of "hardening" primitive campsites is explored by Maryann Fidel (chapter 16). Her study points to the tradeoffs between developing campsites with the intent of concentrating use or preventing resource impacts with the cost of changing the character of a wildland setting.

ARE THERE HUMAN-CAUSED WILDLIFE DISTURBANCES IN THE SOUND?

Since many species injured by the *Exxon Valdez* oil spill have been slow to recover, some scientists are also concerned that human use could be a cumulative impact on species affected by the spill. These concerns helped launch an early effort by wildlife ecologist Lowell Suring and colleagues (chapter 11) focused on evaluating potential future levels of human use relative to two species also harmed by the spill (harbor

seals and pigeon guillemots). Suring and Poe (chapter 12) conducted a contemporary spatial analysis and report that there are relatively few areas—19 primary hot spots representing less than 1 percent of the Sound—where high-intensity recreational boating activity overlaps with species assemblages that were also affected by the oil spill. They also identified 182 secondary hot spots that may warrant future monitoring or study of potential recreation impacts. When making disturbance risk assessments, they advocate for the need for spatially explicit characterizations of human use intensity—equivalent in rigor to those traditionally used by ecologists to characterize species distribution and habitat use.

Graduate student Jessica Fraver (chapter 13) investigated the influence of a suite of human activities common along protected Alaskan shorelines—such as regulated harvest, commercial fishing, and recreation—on river otter abundance and behavior. Though field observations suggested that otters use beaches that were also used by campers, results of more rigorous spatial analyses indicated limited potential for interactions between river otters and campers based on shoreline feature preferences. Similarly, Poe and colleagues (chapter 15), concerned about beach campsites near nesting black oystercatchers, found that though such an association was true at the landscape scale, substantial separation occurred at the site level—with separation distances averaging more than one mile. In contrast, graduate student Laura Kennedy (chapter 14) found that human use overlapped with shoreline features associated with the presence of harlequin ducks (a species still recovering from the oil spill) and common mergansers. Her spatial analysis was paired with empirical observation of behavioral disturbance at those sites, which indicated the potential for disturbance to these sea duck species.

These three studies exemplify the type of research needed by wildland managers facing questions about the sustainability of human use and wildlife impacts. Spatially explicit analyses and monitoring of specific human-wildlife interactions are needed to corroborate managers' concerns that tend to be based on anecdotal evidence or individual field observations. The nuances associated with place-specific variables and species-specific responses, including the potential for habituation, are further complicated when considered alongside impacts from other environmental stressors which *could* be far greater. It is important to point out that very little is known about many of these other potential stressors on wildlife in the Sound—making conclusions about the ultimate effects of human interactions with wildlife very challenging.

HOW CAN SUSTAINABLE HUMAN USE MANAGEMENT BE ACHIEVED IN THE SOUND?

Although the U.S. Forest Service (specifically the Chugach National Forest) manages approximately 80 percent of the land in the Sound, land and human use management

is shared by local, state, and private landowners, among them the Eyak, Chenega, Tatitlek, and Chugach Alaska Native Corporations. Consequently, there is no single unified policy direction nor is there one overarching approach to management. The Prince William Sound Framework or "the Framework" initiated by the Chugach National Forest is the largest interdisciplinary planning effort attempted in the Sound since the oil spill restoration plan was completed in the 1990s. Poe and Gimblett (chapter 4) describe how this effort grew out of the Chugach's need to improve its management of recreation and tourism in the Sound based on perceptions of increased use and potential for user conflict. It evolved into an approach based on ecosystem management principles that parallels the Forest Service's 2010 Recreation Sustainability Framework (USDA Forest Service 2010).

Poe and colleagues (chapter 19) demonstrate how these broad principles of sustainable recreation can be put into practice through integration of social and ecological information, analysis at multiple spatial scales (ranging from regional to landscape to site-specific levels), issue-based planning, and collaboration with stakeholders. They recommend changes in operational approaches that would encourage the Forest Service to focus on managing user expectations relative to issues like crowding or user conflict. They suggest that if users have realistic expectations about the experience they should expect in wildland settings, as well as good information about the other types of users they are likely to encounter, there is less potential for low-quality user experiences. Furthermore, they suggest an approach of concentrating human use rather than dispersing it across the Sound in order to minimize impacts and maximize opportunities for a greater diversity of individuals to use and enjoy wildland settings. Finally, they recommend establishing management partnerships that can leverage the assets of stakeholders *and* increase opportunities for citizen involvement. Such partnerships help managers meet targeted needs relative to resource monitoring or environmental education while, simultaneously, truly engaging stakeholders in helping to sustain wildlands.

USING THIS VOLUME

This volume is grounded in the science foundations of its technical chapters. In total, 28 scientists and managers made contributions. Their work is joined by perspectives from a dozen residents of the region who share local knowledge reflecting the values of the region through a series of invited essays and research notes. These are the perspectives of the individuals who live, work, and play in the Sound and who are on the receiving end of the science and management endeavors described in this book's technical chapters. Their perspectives complement those chapters by underscoring the difficulty of managing such a region sustainably, and at the same time help make the compelling case for doing so.

Another reason for integrating research results, management tools, and individual public perspectives is to help remove communication barriers between managers and stakeholders—a vital step toward sustainable recreation management. Stakeholder reflections serve to expand the perspectives of managers and researchers looking for new tools and approaches among the book's pages—reminding them of the societal complexities associated with the wildland systems they are attempting to understand and manage. Similarly, by providing short, descriptive essays that intersect with research and management chapters, a broader public audience can be invited into the volume's content and the issues facing the Sound. Ultimately it is our hope that this approach, combined with concise introductions and conclusions for the book's technical chapters ("Sound Bites" and "Lessons Learned") will broaden the audience beyond managers, researchers, academics, students, and conservation organizations—to include public stakeholders for wildlands.

Chapter 1 describes the study area using a first-person look at what it means to experience the Sound. This individual narrative shows how individual experiences interact to shape complex perceptions about the value of wilderness. It is followed by chapter 2, a thorough characterization of the geophysical setting of the region and its ecological processes. Chapter 3 provides a brief history of human use in the region and concludes with the disaster of the *Exxon Valdez* oil spill; chapter 4 explores the impacts that the spill had on social and economic services in the region and the resulting management responses. Chapters 5 through 19 are technical chapters contributed by researchers and managers working in the region and are presented as complete works, including orientation to the region. We understand that this comes with some potential price in content redundancy as individual authors introduce the Sound within the context of the specific management issues they are attempting to address. Given that this volume is also available as an e-book through which readers are encouraged to download individual technical chapters for their electronic libraries and share essays by e-mail and social media, this self-contained approach to content pieces is necessary.

Some readers may prefer to focus on individual research and management chapters or only skim those in favor of stakeholder reflections shared in essays. We hope to lure those casual readers into technical chapter content through the Sound Bites and Lessons Learned that share the key results and broad themes resulting from the work described. Likewise, we hope scientists and managers may gain perspective from individual stakeholder essays which allow them to better understand the diversity of stakeholder needs and motivations that must be considered for a truly integrated approach to managing landscapes like Prince William Sound.

This volume's goal is to help broaden the conversation about the science that informs management of wildlands like the Sound. We hope that the examples shared

elevate the level of sophistication in which human use can be studied as a way to improve future recreation management efforts while engaging stakeholders. We hope these techniques will ultimately allow managers to move beyond simple number-based recreation capacity schemes and address these complex systems using social science with the same level of rigor currently applied to other ecosystem components.

We also hope to convey an appreciation for the challenges of applying science to the management of human use in wildlands. Even when management can be informed by rigorous social and ecological science, managers must recognize that these settings are depended upon by stakeholders who may operate from a different base of knowledge. In order to be sustainable, the policies that managers put in place must deftly navigate the complexities of science and individual human experience—truly honoring the contributions and understanding the limitations of each. Success in this endeavor requires regular and meaningful engagement with stakeholders of public lands. The complexities associated with sustainable management of wildland settings necessitate true, two-way exchanges of knowledge that go beyond public testimony proceedings and 90-day comment periods.

Finally, we hope to convey the need for a profound change in perspective as managers approach questions of human use of wildlands. Too often, human use is only thought of in terms of the disruptive impact that it can have on "pristine" settings or sensitive species. While certainly there are legitimate concerns about environmental impacts, this default approach can result in managers having the mindset of consistently looking only for ways to reduce human use. This can result in artificial caps on the numbers of users or types of activities allowed on public lands, which in turn decrease the overall societal relevance of those lands and the agencies tasked with their management. In an era of increased scrutiny of public investments and overall shrinking budgets, managers can't afford decreased public support. A shift in perspective that recognizes restrictions in use as having long-term potential harm toward the societal value of wildlands must be weighed against concerns about potential impacts from human use.