Chapter 9.1—Broader Context for Social, Economic, and Cultural Components

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Summary

This chapter sets the context for the following sociocultural sections of the synthesis by providing information on the broader social, cultural, and economic patterns in the Sierra Nevada and southern Cascade Range. Demographic influences surrounding population change, including those accounted for through amenity migration, are examined. Social and cultural concerns surrounding place meanings and place attachments are reviewed next, including potential influences on responses to natural resource management. Managing for resilience includes effectively applying a "triple bottom line approach," presented in this chapter through a discussion of recreation and tourism, one of the ecosystem services of importance in the assessment region.

Introduction

Thousands of years of indigenous forest management, an influx of settlers during the gold rush, and, more recently, agricultural development and expansion of residential developments into foothill and forest communities, are some of the major human influences on the Sierra Nevada (Minnich and Padgett 2003). Cornell et al. (2010) suggested that to achieve a more integrated understanding of socioecological systems, it is important to study how human societies and individuals have adapted successfully to constraints. Understanding historical patterns of indigenous groups in the Sierra Nevada, including locations of settlements, seasonal migrations, and uses of the land (e.g., fishing, gathering, construction of structures), may be instructive in preparing approaches for mitigation and adaptation to expected stressors, because traditional cultures have developed lifeways to cope with variability and unpredictability (Berkes et al. 2000). This chapter begins by describing some of the recent demographic changes within the synthesis area, along with other social forces that influenced its development, since the Sierra Nevada Ecosystem Project

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(SNEP) report (Erman and SNEP Science Team 1997) was completed. Because much of the population growth in the synthesis area has been associated with amenity migration (i.e., movement to forested areas for their amenity values), this chapter briefly reviews specific impacts of growing amenity migration on social and ecological systems. Population increases within the synthesis area, along with other demographic, social, cultural, economic, and political changes occurring both within and outside of the area, are expected to continue into the future, including increasing ethnically diverse and elderly populations. Place meanings are briefly discussed in this chapter in terms of how they influence people's expectations for ecosystem services and their relationships to the synthesis area. Management of recreation and tourism is discussed using a triple bottom line approach to sustainability, and the chapter concludes by offering insights into managing for resilience.

Demographic Influences in the Synthesis Area

The area of focus for the sociocultural chapters of this report coincides with the region previously examined in the SNEP report. Stewart (1996) described that area as a 20-million-ac zone with mixed federal, state, county, regional, local, and private ownership and management areas. The SNEP assessment included 180 community aggregations and covered 160 unique ZIP codes.

The synthesis area boundaries contain 24 counties in full or in part, though some of these were characterized as having a small minority of their county population within the SNEP region (see table 2.1 in Stewart 1996). Based on the 12 counties that fall primarily within the SNEP region, the 1990 regional population was 563,000 (see table 2.3 in Stewart 1996). At the time of the SNEP assessment, the majority of populations in the remaining counties fell outside of the region, thus county-level data were less instructive.[5]

Population Change, 1990 to 2012

Population estimates for the 12 counties[6] reported by Stewart (1996) show a dramatic 49.8 percent increase in population since the SNEP assessment (table 1). However, regional variations within the assessment area are important to note. The overall increase in population is attributable primarily to increases in the north-central region, whereas a decrease has been documented in the northern

[5] Another consideration is the variation among communities within any one county, as characterized in the SNEP assessment.

[6] The majority of these counties' populations fall within the synthesis boundaries. This selection is not intended to diminish the importance of other counties in the region, but facilitates comparison with the Stewart (1996) chapter to document population change.

Table 1—Population changes between 1990 and 2012 in Sierra Nevada Ecosystem Project (SNEP) regions

County-based region	Counties	1990 population	2012 population	Percentage of change
North	Plumas, Sierra	23,300	22,870	-1.8
North-central	Nevada, Placer, El Dorado	383,400	633,222	65.2
South-central	Amador, Calaveras, Tuolumne, Mariposa	126,600	153,510	21.3
East	Alpine, Mono, Inyo	29,700	33,949	14.3
Total		563,000	843,551	49.8

Note: The regions, counties, and 1990 populations are taken from the SNEP assessment (Stewart 1996). The 2012 comparison populations were reported by the State of California Department of Finance (2012).

region. It is also important to consider potential methodological differences in the two assessments.[7]

Between 1990 and 2000, the vast majority of population growth in the Sierra Nevada and Sierra Nevada foothills occurred in the wildland-urban interface and intermix (Hammer et al. 2007).

Amenity Migration

Population growth and settlement in the Sierra Nevada continues to be influenced by an influx of seasonal and year-round residents who are drawn to the area by its unique features (Loeffler and Steinicke 2007). The process of new part-term or permanent residents settling in these areas, in part because of natural amenities, has been described as "amenity migration," or "counterurbanization (fig. 1)." This phenomenon has been abundant in the foothills of the central Sierra Nevada (Duane 1996) and in the high-altitude regions of the Lake Tahoe basin (Löffler and Steinicke 2006, Loeffler and Steinicke 2007, Raumann and Cablk 2008) and Mammoth Lakes (Löffler and Steinicke 2006, Loeffler and Steinicke 2007). A study of 62 years of land use in the Lake Tahoe basin revealed an increase in developed land and decreases in forests, wetlands, and shrublands, which the authors attributed to increased regional population and demand for recreation and tourism opportunities in the basin (Raumann and Cablk 2008). The expansion of human settlement into higher elevations has been particularly notable in the Lake Tahoe region, where the upper regions of settlement have moved up in elevation to almost 2400 m, compared to the limit of about 2200 m 30 years ago (Löffler and Steinicke 2006).

[7] Methodological differences will also be of concern in the assessment process, as each community may have its own approach to arriving at or selecting and then interpreting current and projected population numbers. Each reporting and forecasting agency provides a methodological description as well as a statement of assumptions and potential sources of error. This approach may be prudent for upcoming assessments.

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Figure 1—Cabins in Wilsonia, a community near the Sequoia National Forest, an example of amenity migration prompted by unique natural features in the area.

These increases in higher elevation year-round and seasonal residency may affect ecosystems in ways not seen in the past. Counterurbanization, or ex-urban migration, is often associated with impacts to ecosystems through habitat fragmentation, dispersal of invasive species, and changes in fire regimes (Abrams et al. 2012). Urban development has affected biodiversity in the area, as demonstrated by Manley et al. (2009), who found that even small degrees of development have dramatically reduced the proportion of habitat that might be suitable for the California spotted owl (*Strix occidentalis occidentalis*). Habitat fragmentation and impacts on wildlife as a consequence of amenity migration are further discussed in Haight and Gobster (2009).

Amenity migration has led to dramatic transformations in rural communities as traditional land uses, economic activities, and social relations transition from those associated with extractive industries to those associated with amenity values.

Amenity migration has led to dramatic transformations in rural communities as traditional land uses, economic activities, and social relations transition from those associated with extractive industries to those associated with amenity values (for a review, see Gosnell and Abrams 2011). Amenity migration is associated with shifts in local sociodemographics—for example, toward a younger, more affluent, more educated population (Loeffler and Steinicke 2007, Peterson et al. 2007). Housing values and overall costs of living have been shown to increase dramatically with ex-urban migration, sometimes outpacing the ability of long-standing residents to meet that increase (Loeffler and Steinicke 2007). Housing values have climbed above the housing affordability index in several parts of the synthesis area (Löffler and

Steinicke 2006). Many workers in the area are forced to commute owing to unaffordable housing costs (see box 9.1-1 for an example), and the most affected are Hispanic, Asian, and some younger workers (Löffler and Steinicke 2006). This brings to light one environmental justice issue related to amenity migration—that of disparate impacts on less affluent residents in an area, as well as those who are employed in an area but cannot afford to live there. (For further discussion of the benefits and impacts of recreation and tourism on local communities and economic conditions, see chapter 9.4, "Strategies for Job Creation Through Forest Management.")

Box 9.1-1

An Example of the Cost of Amenity Migration

A survey of workers and employers in Incline Village and Crystal Bay revealed fewer year-round residents and families with children, a near majority of workers in lower income sectors having commutes of 30 minutes or longer or living with many others to make housing affordable, and a toll on the local economy from lack of workforce housing. The analysis suggested that a median-priced townhouse or condominium in 2009 required a household income of $107,180. The median annual income in those areas in 2008 was $44,346, and in the entertainment, accommodation, and food services sector, the median annual income was $30,389. Even households with two full-time wage earners would find it difficult to afford the median price accommodations (Praxis Consulting Group 2009).

Although opportunities to develop additional physical infrastructure are associated with increased economic capacity through amenity migration, demands on local social systems and resources are increased (Kruger et al. 2008b). Substantial costs are associated with providing community services and social infrastructure (e.g., roads, sewage treatment, schools, fire protection) (Duane 1996, Gosnell and Abrams 2011). New residents bring with them different sets of values that may clash with those of long-term residents, making collaboration associated with natural resource management more challenging (Walker and Hurley 2004). The focus of management on private lands tends to shift as a result, from economic generation and family tradition to amenity and investment values (Ferranto et al. 2011), as well as to environmental protection (Jones et al. 2003). These changing private owner motivations and values require shifts in outreach and engagement (Ferranto et al. 2012), in part through the collaborative approaches presented in a subsequent chapter (9.6).

Attachment to the natural environment, influenced by natural landscapes and views, presence of wildlife, and opportunities for outdoor recreation, has been demonstrated as a component of community attachment and well-being (Brehm et al. 2004). Environmental quality contributes to sense of place (Stedman 2003). This factor is especially important in the Sierra Nevada because of the strong influence of amenity migration and the potential independence from length of residence.

Protecting scenery, outdoor recreation opportunities, and environmental quality will likely continue to encourage amenity migration (Cordell et al. 2011). Efforts to protect the unique features and opportunities on forest lands are more effective when partnered with a focus on maintaining community character and social fabric (Kruger et al. 2008b), although adaptation of a community and its character is likely. Amenity migration has both positive and negative impacts, and positive outcomes are reliant on local adaptive capacity to manage changes in both social and physical attributes of community (Krannich et al. 2006). This theme of capacity to change and adapt as part of resilience reflects the broader concept of socio-ecological resilience put forth in this synthesis. Inability of the system to adapt, whether it is physical or social, is viewed as a constraint to resilience. These same characteristics are needed to address threats from natural disturbances (Krishnaswamy et al. 2012). Whether all change is desirable cannot be determined here, and the quality of social fabric will remain of concern to residents of rural communities in the synthesis area.

Population Increases

Projections of population in 2050 for the same 12-county area described previously anticipate an additional 48.5 percent increase above 2012 levels, for an estimated total of 1,252,735 (State of California, Department of Finance 2012). Note that not all counties are expected to have steady-state increases during this period; in fact, some areas are projected to have declines in population.

Counties and communities within the synthesis area will likely have their own projections and estimates to contribute to the plan revision process, similar to the assessment conducted by Struglia et al. (2003) for the southern region of the state. Thus, the projections offered here should not be viewed as definitive, but as demonstrative of what is anticipated by California's central planning and demographic resource. Projections have been the subject of debate and sometimes dispute (Struglia et al. 2003) because of their association with the allocation of resources from federal, state, and regional entities, and because of the local responsibilities that may result from them. Social and economic assessments would benefit from considering these multiple and sometimes conflicting sources and their implications, where applicable to regional and forest plans. An approach that provides multiple

perspectives mirrored after Struglia et al. (2003), wherein the multiple projections and their variations are presented and discussed, may help represent these debates and foster a continuing collaborative and adaptive approach to management of the synthesis area.

The Sierra Nevada contains features, species, and areas with heightened social value; these values present concerns that extend well beyond local communities.

Influences from outside of the synthesis area—
Increasing populations in metro areas surrounding the Sierra Nevada will continue to have both indirect and direct impacts, including, for example, demand for water (indirect; see box 9.1-2 for an example), and recreation and tourism (direct). The Sierra Nevada contains features, species, and areas with heightened social value; these values present concerns that extend well beyond local communities (see, for example, Kellert et al. 2000, and chapter 9.2, "Ecosystem Services").

Box 9.1-2

Value of Water to Southern California

The Los Angeles Department of Water and Power (LADWP 2010) outlines the significant value of water coming into the Los Angeles Aqueduct from the eastern and western watersheds of the Sierra Nevada and the regional benefit to southern California water supplies. A period of filling this demand at a cost to the Owens River and Mono Lake[8] ecosystems demonstrates the need to consider broader scale impacts of managing water as a valued ecosystem service in the state (see, for example, Fitzhugh and Richter 2004).

[8]See Wiens et al. (1993) for a detailed ecological impact assessment from Mono Lake.

Human activities some distance away also affect the ecological quality and viability of the Sierra Nevada. For example, chapter 8.1, "Air Quality," notes effects of airborne pollutants from other parts of California and even from across the globe. Drift of pesticides from agriculture in the Central Valley in California has been detected in various ecosystem components in the Sierra Nevada, raising particular concerns about the risks of these contaminants to sensitive amphibian populations (see chapter 6.4, "Lakes: Recent Research and Restoration Strategies"). These issues of influence from some distance away highlight the varying levels of scale that must be considered in managing for socioecological resilience (Engle 2011), and how larger scales of impact and interaction must be taken into account.

Influences at even larger scales have some relevance to natural resource management and decisionmaking in the Sierra Nevada. For example, community well-being must be considered in the context of global economic trends, and the effects of local ecological systems and resource management must be distilled from broader social forces (see Davidson 2010 and Jackson et al. 2004).

This is an important consideration in selecting indicators of well-being (e.g., for monitoring purposes) and measures that may be relied upon in an adaptive management approach. Changes observed in the sociocultural sphere must be carefully evaluated for their degree of association to management actions as well as inaction. Not all indicators of well-being are helpful to monitor from a forest management perspective. This is because not all indicators can be linked to land management through an analysis of cause and effect, or even strong association. Jackson et al. (2004) discussed a number of these issues regarding monitoring of community impacts. When relying on social indicators, there is a risk of selecting measures that are readily available but may not have verifiable linkages to management decisions or policies, that may not be at the appropriate scales (e.g., provided at the county level when forest boundaries do not align with the county), or that lead to reliance on numbers whose validity or reliability are not known or have been affected by changes over time. Comparing data across multiple years for even a single source can be complex, given changes in measurement or calculation (for further discussion, see Struglia et al. 2003). Longitudinal surveys and focus groups are recommended by Jackson et al. (2004) as the appropriate approach to monitoring and identification of more complex linkages between well-being and land management, although they note the barriers associated with establishing new information collections sponsored by federal agencies. Drawing from well-established efforts that provide information that is available, verifiable, well-supported, and captures multiple dimensions of well-being may be helpful, especially in cases where assistance to communities wishing to adopt these measures is offered.[9] Later in this report, chapter 9.4 presents issues of resilience and approaches to measurement of well-being in rural communities.

Based on larger socioeconomic trends across the United States, Cordell et al. (2004) laid out key implications for natural resources applicable to the Sierra Nevada, including a smaller and more fragmented rural land base (confirmed by patterns of land use reported by Ferranto et al. 2011), disproportionate pressures on public lands for recreation and raw materials, increased conflicts and competition

[9] See, for example, the County Health Rankings & Roadmaps report available from the University of Wisconsin and Robert Wood Johnson Foundation. http://www.countyhealthrankings.org.

for access, and less connection between people and the land. Place connections may have been supplanted among some segments of the population where connections of the digital age include virtual communities and virtual settings (Misra and Stokols 2012). These virtual connections may alter the development of place-based connections in ways not fully understood. Some authors have outlined concerns surrounding disconnections with natural spaces, especially for youth, who represent the future of how natural resources may be valued and how they may be used or preserved (see Louv 2006 and Schultz 2002).

Changes in ethnic composition within the regions surrounding the Sierra Nevada are worthy of note. In the Pacific Coast RPA (Resources Planning Act[10]) region (which includes California) between 1990 and 2008, there was an 80.4 percent increase in residents self-identifying as Latino or Hispanic, a 59 percent increase in those identifying as Asian or Pacific Islander, and an 8.9 percent increase in those identifying as African American (Cordell 2012). Research suggests that these demographic changes carry implications for natural resource management agencies. For example, some groups have stronger n ties with the Forest Service and other managing agencies, whereas others may have little if any established relationships, or even a negative history of relationships. Services offered through existing communication and information approaches and more direct opportunities, such as those represented in recreation and tourism, might be a poor fit to the populations that are increasing in the region and surrounding areas (see the recreation and tourism section of this chapter for further discussion).

Planning efforts for the management of forests in the synthesis area would benefit from considering these cultural shifts and how they may be met through adjustments in local and regional services, including communication and outreach to broader publics outside of the Sierra Nevada and southern Cascade Range (see Roberts et al. 2009 for a discussion of some of these service adjustments). For example, communication may need to be through ethnic media or key contacts within communities (Winter et al. 2008) rather than through mainstream English-speaking media. Research suggests that messaging that is culturally sensitive and addresses issues that matter to the particular community of interest will be more effective (Roberts et al. 2009). Sensitivity to cultural differences in relationships to government, the land, and land management will aid effective management in this diverse region (see Cheng and Daniels 2003). Increased cultural diversity in California will continue to be reflected through immigration of Latinos and Asians into

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[10] See http://www.fs.fed.us/research/rpa/.

Sierra Nevada communities, thus increasing the importance of attending to cultural influences and values of long-standing and newly immigrated residents (Sturtevant and Donoghue 2008).

These dimensions of diversity add to the already diverse demographic, economic, and ethnic profile of Sierra Nevada communities. Both new and existing populations will challenge modes of outreach, engagement, and approaches to public land management. Particular attention will need to be paid to groups who may be underserved or underrepresented in opportunities to have their opinions heard or their needs and interests represented in decisions about how places will be managed, and in opportunities to use their public lands. Some of these groups may not have opportunities to translate their "voice" and concerns through traditional mechanisms of power and influence in public land management planning, and issues of potential bias in participatory processes need to be considered and remedied (Brown and Donovan 2013).

Place Meanings Link to a Diverse and Growing Population

Because locations and places have substantial variation in meanings and interests, discussions of place are characterized by significant complexity and diversity (Patterson and Williams 2005). Relationships to natural spaces (such as traditions of viewing oneself and nature as part of a whole; see Turner and Berkes 2006, Wiggins et al. 2012) may be embedded in culture (Burn et al. 2012, Satterfield et al. 2013), religion, or personal experience (such as through recreation and tourism, see Wynveen et al. 2008); associated value sets (such as orientations toward the environment and nature; see de Groot and Steg 2010); and familial experiences or social constructions (see Stedman 2003). Two parties or groups may express a particular value or attitude toward a place or location, and these may distinctly differ (e.g., sacred area versus lovely place to build a structure; see McAvoy 2002). Place meanings and attachments and responses to proposed actions or natural resource management approaches will vary in response based on scale of place under consideration (Cheng and Daniels 2003, Hernández et al. 2007). Talking about landscape scale may result in stakeholders thinking more globally about ecosystem resilience, where issues surrounding distinct locations or places at smaller scales may reveal more specific issues surrounding place meanings and their importance. It is, however, necessary to address these more distinct scales because actions even across a landscape are likely to have an effect on areas of specific importance.

These divergent views may also vary in strength of impression and importance, as will the ways in which individuals respond to changes in forest management. For example, individuals with direct-vested interests in a place may have attitudes that are stronger than those whose interests may be equally satisfied by a comparable place (Wiggins et al. 2012). Ranges of relationships vary from contained or individualistic parts of association to those described as strong relationality, or embedded as the foundation of identity and existence (Wiggins et al. 2012). Seasonal residents, year-round residents, and visitors may vary in their place attachments and meanings (Stedman 2003), and the mechanisms by which these vary and the influence of each is still not entirely understood (Hernández et al. 2007).

Those whose connections or impressions of a place are intertwined with their sense of self are likely to hold much stronger attachments and may consider discussions of place as equal to discussions of self-determination and personal identity (Clayton and Myers 2009, Hernández et al. 2007, Huntsinger et al. 2010, Knez 2005). Public land management actions may be of significant concern when viewed as a threat to one's self, or a personal attack (Cheng et al. 2003). Likewise, group identities may be attached to a particular place, where meanings and management preferences for areas are intertwined with social identity (Cheng et al. 2003, Hull et al. 1994, Huntsinger et al. 2010, Opotow and Brook 2003, Schneider and Winter 1998). Debates over place and attached meanings may then also be interpreted as discrimination against a particular group; for example, debates over impacts of grazing may be viewed as embedded in discrimination against ranchers and ranching as a way of life (Huntsinger et al. 2010), a fear of loss of community (Miller and Sinclair 2012), and a request of a majority to have a minority (ranchers) bear the burden of protection (Opotow and Brook 2003).

An approach that incorporates diverse place meanings may benefit from collaborative stewardship of areas with symbolic or cultural significance for American Indians (McAvoy 2002, McAvoy et al. 2003). Tribal traditions and beliefs may be connected to active stewardship of lands to maintain place and culture. Taking this collaborative stewardship approach would allow for sometimes conflicting views and meanings of protected areas, including forestlands containing valued natural and cultural resources.

Place-specific attachment has been shown to differ from conceptual attachment, which is held by more technical "experts" with knowledge of natural areas (Ryan 2005). Forms of attachment are associated with valuing various aspects or features of a place, and thus may be associated with preferences for management of that place and differences in how individuals and groups respond to change

Understanding meanings of place (e.g., places designated as sacred or otherwise valuable) is essential to discussions of socioecological resilience.

(Ryan 2005, Stedman 2003, Wagner and Gobster 2007, Yung et al. 2003). As a result, generic discussions of landscape scale present a challenge, and it is clear that discussions of management are enriched when they also focus on specific landscapes in order to be able to consider social and cultural dimensions (see Asah et al. 2012, Brown and Donovan 2013, Cheng and Daniels 2003, Diamant et al. 2003, Williams 2006), including place meanings and personal and social identities (Cheng et al. 2003, Kruger et al. 2008a, Yung et al. 2003). Understanding meanings of place (e.g., places designated as sacred or otherwise valuable) is essential to discussions of socioecological resilience (Berkes and Turner 2006, Clayton and Myers 2009, McAvoy 2002). This is in contrast to the landscape-scale approach that is needed for addressing ecosystem threats, such as climate change. A nested approach to forest planning and management may be needed to successfully negotiate the challenge of addressing large landscapes while recognizing the unique qualities of the places that are situated within that larger whole.

Place-based approaches to planning represent one means of incorporating these various place meanings (Hibbard and Madsen 2003), and they provide the path to consider "special places," along with their divergent meanings (Schroeder 2002). However, note that proximity is not the sole determinant of meaning. Individuals and groups some distance away must also be considered. (For an extended examination of sense of place and implications for management, see Farnum et al. 2005 and Kruger et al. 2008b.) This can complicate deliberations over management direction when particular groups are not represented in planning approaches that gather input through more conventional mechanisms, such as through inviting public comments or holding public input meetings (Brown and Donovan 2013, Cheng et al. 2003). Although technology can provide new avenues for public engagement, such tools may tend to limit the range and representativeness of participation in significant ways; for example, a recent study of public participation in using a geographic information system (GIS) demonstrated the importance of random sampling to ensure broader representation of publics than what would be derived from voluntary participation alone (Brown et al. 2013).

The population of the Sierra Nevada represents a small portion of the statewide population, and it is thus a numerical minority centered in a highly valued socioecological and historical context. Statewide decisions or regional decisions to address majority interests may adversely impact human and nonhuman populations and ecosystems in the Sierra Nevada, sometimes in ways that put long-term sustainability at risk (Mittelbach and Wambem 2003). Competition for scarce ecosystem services and opportunities will remain a challenge for management of the forests in the synthesis area.

For many of the state's residents and those who travel to the region from farther away, recreation and tourism in the Sierra Nevada are ways to learn about the area's many features and to develop a connection to places within it. These connections may be instrumental in efforts to reduce demand on ecosystem services delivered far downstream, such as water drawn from the Sierra Nevada to be used in southern California, or the need to manage transportation in ways that reduce the transport of pollutants into the synthesis area. Recreation and tourism also represent primary ecosystem services derived from the Sierra Nevada and southern Cascade Range. In light of the aforementioned population and sociodemographic changes and the interest in socioecological resilience, the next section examines recreation and tourism.

Recreation and Tourism

National trends in recreation use are examined in the National Survey on Recreation and the Environment (NSRE). Recreation use on forest lands is examined, by forest, every 5 years through the National Visitor Use Monitoring (NVUM) survey. Additional use trends are examined by agencies and organizations specific to interests, and sites or use-specific issues are at times addressed through studies conducted by researchers in academia, agencies, and not-for-profit organizations. Because of its national focus and ongoing collection, trends reported as part of RPA (Resources Planning Act) are derived primarily from NSRE and NVUM; both are available in reports and publications.

Across the United States, nature-based outdoor recreation increased in total number of participants (7.1 percent increase) as well as in number of activity days (40 percent increase) between 2000 and 2009 (Cordell 2012). Types of activities have changed over time, and the current mixture of reported outdoor activities is different from the past. An increased interest in nature was reflected in increased viewing and photographing of nature subjects, especially wildflowers, trees, natural scenery, and wildlife and birds (see box 9.1-3 on NVUM reports). This form of nature-based recreation showed the greatest increase among activity types over the last decade (fig. 2). During that same period, site-based activities, including camping in developed sites and family gatherings, increased. While other backcountry activities declined somewhat (e.g., horseback riding on trails and day hiking), off-highway vehicle (OHV) use levels held steady (see Cordell 2012 for additional national trends). Use has also been influenced by changes in technologies; for example, geocaching is a technology-based activity that has shown a great amount of growth nationally and internationally (Schneider and Chavez 2012). National participation levels in different types of activities varied among groups depending on gender, ethnicity and race, annual family income, place of residence, and residence status.

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Figure 2—Recreationists reading an interpretive sign at the Big Trees Trail, Sequoia National Park.

Box 9.1-3

NVUM Reported Activities in the Area

Visitor Use Reports from 2007 through 2011 (the most recent reports available for the 10 forests in the Sierra Nevada and southern Cascade Range) show similarities to national trends, but also reflect distinct patterns when considering a particular forest. For example, taking into account only those activities participated in by one-third or more of interviewees on the national forests reveals that fishing was frequently reported by visitors to the Sequoia and Plumas; downhill skiing was frequently reported on the Inyo, Eldorado, and the Lake Tahoe Basin Management Unit; and cross-country skiing was frequently listed on the Modoc.

Future projections for uses and interests are heavily influenced by population and sociodemographic projections and can be found in Bowker et al. (2012). Expected increases at the national level may show regional, forest, and site variability, and will be influenced by myriad forces, not all in the scope of influence of agency management. One trend that will remain important to management of recreation in the synthesis area is the shift in ethnic and cultural diversity. According to Roberts et al. (2009), cultural diversity will continue to increase in California, owing primarily to continuing growth of Latino and Asian populations, and this trend will have implications for outdoor recreation planning and management. A number of studies have revealed cultural variations within and between Latino and Asian populations, including recreation patterns and preferences for development, underrepresentation in some forested areas, and communication and information needs on and off site (Crano et al. 2008, Roberts et al. 2009, Winter et al. 2008).

Roberts et al. (2009) also suggested that California's senior population, which is already the largest in California's history, will continue to grow and settle in foothill and rural counties. Experts also anticipate increases in tourism and second-home development, related in part to trends in the senior population.

Among the shifts in land use associated with the aforementioned amenity migration are demographic differences in forms of recreation engagement that can cause conflicts between residents with varying degrees of tenure in an area. New recreation approaches may conflict with historical resource use and dependence in the region, and recreation management would benefit from understanding and considering these conflicts (Mekbeb et al. 2009). Another recreation-related shift

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associated with amenity migration is greater development in wildlands, which could affect public access to outdoor recreation areas (Peterson et al. 2007).

Considering increases in population, continuing increases in demand for recreation and tourism on forest lands, agency resources, and the importance of recreation and tourism to rural economies presses for a sustainable approach to the management of recreation and tourism in the Sierra Nevada and southern Cascade Range. The following section examines recreation and tourism in the synthesis area using a "triple bottom line" approach.

The triple bottom line and socioecological resilience—
Approaches to the triple bottom line (ecological, social, and economic components of sustainability) have been applied to discussions of recreation and tourism management. Deliberations surrounding management should, according to this body of literature, consider each component of the triple bottom line in some detail and in as balanced a manner as is possible (Bricker et al. 2010, Cottrell and Vaske 2006, Cottrell et al. 2007). Detailed analyses of recreation and tourism sustainability incorporate cultural considerations into the social component of sustainability, and institutional and organizational considerations are brought into both the social and economic components (see, for example, Bricker et al. 2010 and Winter et al. 2013). The triple bottom line approach is modeled in this discussion for purposes of demonstrating how it might work in forest planning and management of opportunities in the synthesis area; however, the review here is by no means exhaustive regarding the scope of information that might be brought to bear on sustainability practices. Key to all of these is an incorporation of immediate and longer term impacts, with the longer term being essential to our focus on socioecological resilience throughout this report (see Heal 2012 for a discussion of measurement and long-term considerations surrounding sustainability). Although each component is discussed separately, there are clearly interactions between components; for example, ecological condition can significantly influence other components, such as diminished cultural experiences derived from gathering of forest products when the products or their surroundings are degraded.

Social and cultural components—
Social dimensions of sustainability include benefits to recreationists from being able to engage in desired activities, the ability of the area to sustain a particular level of use (social carrying capacity), and the fit between various uses proposed for an area (where social conflicts would come into consideration). Cultural dimensions include things like historical traditions and uses, preservation of the culture of a community that might be affected by recreation and tourism, and protection

of cultural resources. California has a rich cultural and natural history that may be of value for recreation and tourism. For example, the heritage of California Indians can offer recreationists and tourists opportunities to learn about the cultures that shaped California's ecosystems (Evans 1986).

There are myriad social and cultural benefits to managing for quality outdoor recreation experiences. Outdoor locations offer unique opportunities for engaging in active living through recreation and leisure, thus providing a benefit to physical, mental, and social health (Cronan et al. 2008, Gobster 2005b, Kil et al. 2012, Pretty et al. 2007, Rosenberger et al. 2005). Physical health benefits of outdoor recreation have been documented, including reduced body mass index of those who engage more frequently in outdoor activities (Cronan et al. 2008, Kruger et al. 2010). However, the Cronan et al. (2008) study identified variations across ethnic groups; e.g., Latino recreationists, especially women, were observed engaging in more sedentary activities than white recreationists. These patterns may reflect cultural values (e.g., a focus on connecting with family as central to leisure) and structural issues (for example, Latino women were observed taking care of young children). What this means is that outdoor recreation participation does not necessarily equate to the same degree and type of physical benefits for all participants.

Physical risks are also present in the recreation setting, and these can be mitigated either through management (such as increasing visitor safety by managing criminal activity in an area) or through increasing visitor awareness that effectively results in behavior change (see, for example, Walkosz et al. 2008). Furthermore, not all individuals find outdoor natural spaces pleasant to be in (Bixler and Floyd 1997), nor are all interested in outdoor recreation activities located on forest lands (Crano et al. 2008, Tierney et al. 1998).

Additional social and cultural benefits include a chance to develop connections to natural spaces, thus offering a place to develop bases for stewardship and caring that further protection of the physical environment and contribute to resilience (Clayton and Myers 2009, Crompton and Kasser 2009, Williams 2006, Winter and Chavez 2008, Zavaleta and Chapin 2010); a place to celebrate culture and family (see, for example, Anderson et al. 2000, Gunderson and Watson 2007); an opportunity for social bonding (Kil et al. 2012); a place for restorative and spiritual experiences (Kaplan 1995, Winter 2013); and myriad other important benefits too numerous to list here (for reviews, see Clayton and Myers 2009, and specific to wilderness, Cordell et al. 2005; for urban wilderness, Winter 2013). Not all recreation uses, patterns of use, and activities result in the same outcomes linked to connection with nature, leading to stewardship and conservation (Cordell et al. 2005, Kil et al. 2012, Winter 2013, Zaradic et al. 2009); however, an array of benefits and

opportunities are important to consider in a discussion of sustainable recreation and tourism.

Constraints to participation are sometimes common across groups (e.g., lack of time for recreation), whereas others are more likely to be reported among disadvantaged populations. Of particular importance in this synthesis are those barriers that can be changed by public land management agencies. Awareness of these barriers may lead to changes in communication approaches on and off site, site design and the types of opportunities presented, management interactions with visitors, signage, and increases in the presence and number of agency personnel that are from underrepresented groups (for reviews, see Chavez 2012, Tierney et al. 1998, Winter 2007, Winter et al. 2004). A sustainable future incorporates considerations of how to ensure the social and cultural benefits of recreation and tourism are available across populations, especially for groups characterized by socioeconomic disadvantage that may in effect be in greater need of such benefits because of their known vulnerabilities in multiple areas of social concern. A number of partnerships are aimed at reconnecting the public, especially youth, with nature (Kruger et al. 2010), and these have been designed in part to address some of these vulnerabilities.

Economic components—Economic dimensions include benefits to local communities from outside visitation of surrounding areas, economic benefits of recreation from local residents, and costs of managing and regulating impacts on the community itself (e.g., through increased traffic on local roads; Bricker et al. 2010). Chapter 9.4 further examines the economic effects of recreation and tourism on Sierra Nevada communities. Although they will not be reviewed here, visitor expenditures are gathered as part of NVUM data and are available by forest. Regardless of approach to analysis, outdoor recreation is an important economic contributor to the local, regional, and state economy (see box 9.1-4). A per-person, per-trip estimate of $43 has been reported (Stynes and White 2005), though type of use showed variation in these estimates. Note that whereas many analyses present visitor expenditures by recreation use types, recent work suggests that specific trip characteristics (e.g., local/non-local visitor, day or overnight trip, primary or secondary purpose of trip) have a greater influence on visitor expenditures (White and Stynes 2008).

Economic components also consider costs the agency may impose, for example, for using a particular resource or engaging in an opportunity. Economic considerations incorporate nonmarket values to allow for contributions of goods that do not directly generate income. These then serve as a proxy for social value of places and opportunities. Incorporating nonmarket values helps to capture a more complete picture of the contribution of a resilient system, and may help highlight the value of maintaining or restoring quality of an area. These nonmarket values are sometimes

Box 9.1-4

Reports Estimating Economic Benefits of Outdoor Recreation

Annual benefit to the state of California from outdoor recreation on federally managed lands in the Sierra Nevada region was estimated at $333 million in 2008 and another $441 for northern California (BBC Research & Consulting 2010) (county areas and geographic regions overlap the synthesis area but do not directly align). Almost three-fourths of the recreation occurring on federally managed lands is managed by the U.S. Forest Service and National Park Service (BBC Research & Consulting 2010). Although an NVUM report provides data on visitor expenditures, the estimates have been examined as an upper-end cost compared to other comparable sources (BBC Research & Consulting 2010). Tourism represents a major component of the Sierra Nevada economy, accounting for over $3.2 billion in 2000 (Mittelbach and Wambem 2003). The statewide numbers are different from an estimate provided by Richardson (2002), which estimated the economic benefits of wildlands in the eastern Sierra Nevada region alone at $700 million per year and showed wildlands to be associated with more than 2,800 jobs in Mono and Inyo Counties.

identified through willingness to pay, or contingent valuation. For example, Colby and Smith-Incer (2005) conducted a survey of visitors to examine visitor values and economic impacts of riparian habitat preservation on the Kern River Preserve. They surveyed visitors to the preserve to explore willingness to pay for preservation, and they reported an annual average of $467,000[11] (sic) to $616,000 per year in willingness to pay for preservation based on average payments and visitation levels. Furthermore, they found that visitor expenditures in the Kern Valley represent $1.3 million in local business activity.[12] Respondents indicated that failure to maintain and preserve the ecosystem would likely result in decisions to not visit the area at all, or to significantly reduce the number and length of their visits.

The approach can also be used to quantify "existence" and "bequest values" to the non-visiting general public (González-Cabán and Loomis 1997: 64). For example, González-Cabán and Loomis (1997) assessed annual willingness to pay

[11] The low-end estimate of willingness to pay (WTP) based on 6,000 visitors at a mean of $77 per visitor would be $462,000.

[12] This amount is the resulting multiplier effect of the initial recreation expenditure. That is, the initial expenditure generates additional economic activity in the community and the total aggregate economic impact on the community of their visits is $1.3 million.

amounts to preserve the Río Mameyes and Río Fajardo, both in Puerto Rico, by conducting a survey of residents through face-to-face interviews conducted house-to-house. For protection of both rivers across all households on the island, they estimated a total willingness to pay ranging from approximately $13 million on the low end to approximately $33 million on the high end. In both the Colby and Smith-Incer study and the González-Cabán and Loomis study, nonmarket values were identified related to continued protection and preservation. Both demonstrate that economic considerations are not constrained to direct and incidental economic generation to an area from a particular use or range of uses. Furthermore, the approach has become an accepted standard in valuing natural resources that have sustained damages and as a starting point for administrative and judicial determinations, and it has been upheld by the federal courts (U.S. Department of the Interior 1986 and U.S. District Court of Appeals 1989, both cited in González-Cabán and Loomis 1997).

Economic considerations also include the economic capacity of the Forest Service and other managing agencies to maintain personnel and physical settings where recreation and tourism occur. This was often cited as a primary concern of managers with recreation and tourism management responsibilities (Bricker et al. 2010). Sustainably managed recreation and tourism includes the use of partnerships and volunteerism to broaden supporting resources and capacity (Bricker et al. 2010). Partnership and volunteerism are frequently reported as tools in use by managers, though partnerships between businesses or corporations and recreation and tourism were less frequently used among respondents in the Bricker et al. (2010) study.

Degraded ecological quality diminishes the ability of the environment to continue providing the vast array of ecosystem services, thus, the concern here is not just in maintaining current states, but improving conditions and resilience for the longer term.

Ecological components—

Ecological sustainability incorporates several considerations, including the impacts on an ecosystem from various uses and ways to manage those impacts that consider the other components of sustainability, as well as the ability to take an approach that examines feedback between social and ecological systems to adaptively manage resources and opportunities over time.[13] Decisions addressing ecological considerations in isolation are typically not as effective or equitable as those that consider the other dimensions of sustainability. As stated previously, increases in recreation demand are anticipated, as are concerns regarding access, and the need to maintain and restore resilient systems. With these issues in mind, this chapter presents research on ecological impacts and how they may be managed. Degraded ecological quality diminishes the ability of the environment to continue providing

[13] The Global Sustainable Tourism Council (http://www.gstcouncil.org/) has supported development of criteria for sustainable tourism and facilitates certification efforts. Though the work is concentrated on recreation and tourism, the context is much larger.

the vast array of ecosystem services, as previously discussed in this and other chapters (see also the following chapters); thus, the concern here is not just in maintaining current states, but improving conditions and resilience for the longer term.

Box 9.1-5

Collaborative Development of Sustainability Metrics

Recent adoption of the Global Sustainable Tourism Council's Criteria in Wyoming parks is a specific application of sustainability metrics. Multiple stakeholders worked in tandem to establish and commit to criteria for sustainability. This type of approach might be considered for the synthesis area.

Ecological impacts of recreation and tourism are examined from the field of recreation ecology, with degree of impact, approaches to monitoring, and approaches to mitigation characterizing this line of inquiry. In summary, "The most important factors are amount of use, type and behavior of use, timing of use, resistance and resilience of the environment, and the spatial distribution of use" (Cole 2004: 110–111; see also Monz et al. 2010). Recreation ecology examines ecological impacts on physical settings and wildlife, though longer term impacts and broader ranges of impacts (at larger scales) have been less well studied (Monz et al. 2010). According to Cole (2004), one of the most important and consistent findings from recreation ecology points to the benefits of concentrating use in specific areas, except in the circumstances where use levels are so low or the environment is so resistant that recreation impacts would have little to no effect. In that same review, Cole points to qualitative impacts among the same types of uses (e.g., hikers staying on the trail have different impacts than those going off established trails), and quantitative differences linked to type of use (e.g., equestrian use was found to have more trail erosion impacts than are typically caused by hiking, mountain biking, or llamas). Timing of use is influenced by seasonality; for example, physical impacts may be related to soil moisture (though this is affected by soil type; see Chavez et al. 1993 for an example of how soil type was related to perceived impacts of mountain biking), and for wildlife, there are greater sensitivities during breeding or nesting season or at times of day when feeding occurs (Cole 2004).

Developing and applying approaches to recreation and tourism management requires consideration of human response to management actions. Studies have examined recreationist perceptions of appropriate management actions to address recreation uses and impacts. For example, one of these (Martin et al. 2009) revealed

Box 9.1-6

Reviews of Recreation Use and Impacts

Recent reviews of published research, including peer-reviewed work, offer updates on recreation use and impacts. Among these is a review by Wimpey (2010), which captures ongoing work in various areas across the United States. Another is an extensive review by Marzano and Dandy (2012) of completed studies on walking and hiking, equestrian use, camping, observing nature, cycling and mountain biking, and off-roading. The latter calls for additional research on the sociocultural dimensions of managing recreation use impacts in order to inform interventions.

differences by settings classified under the recreation opportunity spectrum, where direct or regulatory management actions were least supported among respondents who recreated in semiprimitive motorized settings. Another reported differences in support for direct management of impacts from hiking and mountain biking associated with salience of leisure identity (Schneider and Winter 1998). Yet another revealed commonalities and differences in support for management actions designed to address impacts on habitat for threatened and endangered species, based in part on levels of trust held by publics toward the managing agency (Winter and Cvetkovich 2008). Although this collection of work is beyond the scope of this review, these selected studies point to an array of influences on public response to proposed or actual management actions, and public response is an important factor in addressing sustainable recreation management.

Cole (2004) suggests that each of the factors associated with recreation use impacts can be managed, manipulated, and limited in order to continue to provide recreation and tourism opportunities. A large collection of resources to inform limiting recreation impacts is located at the Leave No Trace research website (http://lnt.org/teach/research), where research has culminated in ongoing programs to limit impacts, including educational and outreach programs. Additional tools and guides address specific categories of use, including off-road vehicle use (Wildlands CPR and Wild Utah Project 2008) and mountain biking (Marion and Wimpey 2007). A handbook has been developed to address these issues; the handbook is widely applicable (i.e., not specific to certain use types), and it outlines the diverse influences on recreationist behavior and how to approach analysis in different settings, identifies barriers and facilitators to desired actions, develops interventions specific to type of barrier, and monitors effectiveness of those interventions (Burn and Winter

2008). The basis of this handbook is the Proenvironmental Behavior Change Model, which reflects on the influence of norms, attitudes, habits, knowledge, and setting in determining human behavior (Burn and Winter 2007, 2008; Winter and Burn 2010). The handbook is of significant value, as it points to steps beyond site and trail design and visitor education that may be essential to effective management. Monitoring impacts and detecting change, then adjusting management approach accordingly (also known as adaptive management), is increasing in importance as climate change is associated with effects not previously addressed (Chapin et al. 2010). (For additional discussion of climate change effects, see chapters 9.3, "Socio-cultural Perspectives on Threats, Risks, and Health," and 1.4, "Synopsis of Climate Change"). Monz et al. (2010) discuss the need for expanded research related to recreation ecology, including finer scales than previously addressed, hypothesis-based experimental studies, and development of predictive approaches. Meanwhile, decisions can be based on the best available science to address concerns related to impacts and potential impacts (De Leo and Levin 1997) and strive for a balanced approach to socioecological resilience.

Managing for resilience—

Managing for resilience linked to recreation and tourism requires consideration of the multiple components of sustainability, as presented previously in this chapter, as well as examination of multiple perspectives within each component.

Fees linked to particular types of use may aid sustainability, such as those described in box 9.1-7:

As previously described, sustainability includes volunteerism and partnerships in recreation and tourism management, and both have made a significant contribution to the management of forests and grasslands, including management of the Sierra Nevada and southern Cascade Range (see boxes 9.1-8 and 9.1-9 on volunteerism).

Box 9.1-7

Use-Generated Fees

Some types of use generate specific funding from user fees that then can be used to address issues of sustainability, including acquisitions, maintenance, and restoration. For example, the off-highway vehicle trust fund in California is generated from user fees, including fuel taxes, registration fees, and entrance fees. According to the most recent report, the Forest Service has benefited from restoration funding through the grants program, which has totaled approximately $11.4 million since 2004 (CSP OHMVR 2011).

Box 9.1-8

Volunteerism in the Sierra Nevada and Southern Cascade Range

The 2012 Volunteers and Partners Accomplishment Report for the Pacific Southwest Region showed about 467,448 (rounded up to whole number) accumulated hours from individual and group volunteers overall, with approximately 70 percent of the hours within the recreation management functional area. At $21.79 per hour, the appraised value for recreation management was $7,167,051, which represents a significant contribution to sustainability of recreation and tourism in the region (FS-1800-16, Pacific Southwest Region, FY 2012). However, variations by forest are considerable. For example, though the Inyo National Forest total was 42,867 volunteer hours in 2012, the Plumas National Forest reported 1,396 hours. Using the 2012 National Visitor Use Monitoring master report for the Inyo provided an estimate of between 2,529.656 and 2,530,344 forest visits; the Plumas between 525,867 and 526,133. Thus, the Inyo, which has a much higher number of estimated recreation visits, also benefits from the higher level of contributed hours towards recreation management.

Box 9.1-9

Volunteerism and Partnerships on the Inyo National Forest

Following the Devil's Windstorm (November 30, 2011), employees and volunteers worked to clear 290 mi of trail and 4,700 downed trees. The forest estimated the value of this effort at $617,160, and 60 percent of the work was accomplished through partnerships and volunteers. Groups cited by the forest as contributing to this specific effort included the American Conservation Experience, Backcountry Horsemen of California, Friends of the Inyo, the Pacific Crest Trail Association, the Student Conservation Association, and a variety of USDA-affiliated groups, including smoke jumpers, fire crews, trail crews, and packers. This example demonstrates an essential and continuing role for volunteers and partners in addressing urgent needs and facilitating support of multiple ecosystem services and supporting benefits, including the "tourist-based economy" (USDA FS 2012).

Many partnerships to engage the public—and especially youth—in nature have provided programs of value in the synthesis area (Kruger et al. 2010). Boyers et al. (2000) reported on effectiveness of volunteers in restoration of wilderness campsites in Yosemite National Park, and Eagan et al. (2000) reported on effective restoration of trails in Tuolumne Meadows, also in Yosemite National Park. Because both studies examined restoration efforts across multiple years, they represent longitudinal examinations (thus long-term monitoring) of restoration efforts and effectiveness, mentioned as an area requiring additional study in chapter 6.3, "Wet Meadows."

Participating in hands-on restoration and conservation activities has multiple benefits. From an agency perspective, ecological restoration offers an opportunity to communicate positive messages, values, and activities to the public while addressing ecosystem threats (Egan et al. 2011, Gobster 2005a), and addresses essential functions that may be beyond agency capacity alone. From a community standpoint, participating in restoration enables people to develop or renew their connections and relationships to the land and to a place (Eagan et al. 2000). Participation in ecological restoration can also be an empowering and positive experience because participants take personal action to address problems and discover successful solutions together with managing agencies (Westphal 2003). It may also foster active conservation behavior and supporting norms that further behavior change (Schultz 2011), helping to close the gap between attitudes and action (Heberlein 2012a and 2012b). Further, by engaging in restoration with others, collective identities that form around improving ecosystems and caring for the land can be developed and supported (Clayton and Myers 2009). Engagement may also help increase trust in the managing agency and therefore social capital (Yung 2007). However, the success of ecological restoration efforts in positively influencing sociocultural aspects of human-environment interactions depends in part on the degree of trust that develops between the agencies managing the land, other stakeholder organizations involved, and the public (Winter and Cvetkovich 2010), as well as the perceived benefit and contribution to the social or ethnic community with which participants identify (Marcus et al. 2011).

Participation in ecological restoration can be an empowering and positive experience because participants take personal action to address problems and discover successful solutions together with managing agencies.

Agency management and coordination of volunteerism and voluntary associations requires commitment of resources and staff time (Absher 2009), and associations may not always share the same interests and views of desired management (Lu and Schuett 2012). For example, the vast majority of respondents to a visitor management survey identified barriers or concerns related to partnership-based volunteers, including monitoring, training of volunteers, supporting resources, agreements and paperwork, special training, and performance reporting (Absher 2009).

Recent work points to primary motivations for engagement of volunteer associations with the Forest Service, including promotion of recreation through stewardship activities, public education and communication on recreation and conservation, and engagement to influence natural resource decisionmaking (Lu and Schuett 2012). If association motives and interests are not compatible with agency direction, conflicts and disagreements may ensue, and it would be important to address these issues in order to avoid dampening of relationships (Lu and Schuett 2012).

Recreation and tourism provide valuable examples of steps for increasing socioecological resilience (see section 9 preface, "Social/Economic/Cultural Components"). Effects of development are in the hands of responsible agencies and surrounding human institutions and communities (Heckmann et al. 2008). Recognizing that ecosystems involve communal places that meet basic human needs and are central to planning and development may aid environmental protection efforts (Kaplan and Austin 2004, Kaplan and Kaplan 2003). Organizational boundaries must be bridged to address issues of shared concern (Barbour and Kueppers 2012, Dietz et al. 2003), and institutional supports must be provided. Decisions have to move beyond steady states and across scales, and allow for adaptive learning and flexibility. Folke (2006) referred to this as adaptive governance. Defining resilience and desired outcomes may be informed through active dialogue with stakeholders to inform an understanding of desired states and services (De Leo and Levin 1997). Forms of active dialogue and how values are defined require flexibility in order to effectively incorporate diverse cultural perspectives (Satterfield et al. 2013).

Multiple approaches have been discussed for improving socioecological resilience. Schlüter et al. (2011) offered a dynamic approach that represents feedbacks between social and ecological systems; they proposed that social changes affect ecological systems, then ecological systems further affect social systems (Berkes and Turner 2006). This "codynamic approach" posits a coupling of both systems, and considers the resilience or agency of each system to adapt (Engle 2011).

Adaptive cycle functioning requires system-level awareness and an ability to adapt factors that feed back into the next cycle (Folke 2006). The challenge of managing for resilience is compounded by increasing populations in areas already exhibiting high degrees of stress or impending stresses, such as continuing population increases, increased demands for ecosystem services, and larger global threats like climate change (further addressed in chapter 9.3).

Individual sections in this synthesis address uncertainty within and interrelation among system components. These underscore the importance of clarity and full-system description in being able to identify and employ the broadest range of management options, and manage for ecosystem service scarcity and disruption

(Patterson and Coelho 2009). As demonstrated in chapter 9.2, "Ecosystem Services," addressing gaps and updating information about the importance and value of off-site uses of ecosystem services will be increasingly important in light of projections of future population growth and the continuing need to manage for resilience.

Literature Cited

Abrams, J.B.; Gosnell, H.; Gill, N.J.; Klepeis, P.J. 2012. Re-creating the rural, reconstructing nature: an international literature review of the environmental implications of amenity migration. Conservation & Society. 10(3): 270–284.

Absher, J.D. 2009. Partnerships and volunteers in the U.S. Forest Service. In: Klenosky, D.B.; Fisher, C.L., eds. Proceedings of the 2008 northeastern recreation research symposium. Gen. Tech. Rep. NRS-P-42. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station: 110–114.

Anderson, J.A.; Blahna, D.J.; Chavez, D.J. 2000. Fern gathering on the San Bernardino National Forest: cultural versus commercial values among Korean and Japanese participants. Society & Natural Resources. 13(8): 747–762.

Asah, S.T.; Blahna, D.J.; Ryan, C.M. 2012. Involving forest communities in identifying and constructing ecosystem services: millennium assessment and place specificity. Journal of Forestry. 110(3): 149–156.

Barbour, E.; Kueppers, L.M. 2012. Conservation and management of ecological systems in a changing California. Climatic Change. 111(1): 135–163.

BBC Research & Consulting. 2010. California outdoor recreation economic study: statewide contribution and benefits. http://www.parks.ca.gov/pages/795/files/ca%20outdoor%20rec%20econ%20study-statewide%2011-10-11%20for%20posting.pdf. (9 March 2013).

Berkes, F.; Colding, J.; Folke, C. 2000. Rediscovery of traditional ecological knowledge as adaptive management. Ecological Applications. 10(5): 1251–1262.

Berkes, F.; Turner, N.J. 2006. Knowledge, learning, and the evolution of conservation practice for social-ecological system resilience. Human Ecology. 34(4): 479–494.

Bixler, R.D.; Floyd, M.F. 1997. Nature is scary, disgusting, and uncomfortable. Environment and Behavior. 29(4): 443–467.

Bowker, J.M.; Askew, A.E.; Cordell, H.K; Betz, C.J.; Zarnoch, S.J.; Seymour, L. 2012. Outdoor recreation participation in the United States—projections to 2060: a technical document supporting the Forest Service 2010 RPA assessment. Gen. Tech. Rep. SRS-GTR-160. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 34 p.

Boyers, L.; Fincher, M.; van Wagtendonk, J. 2000. Twenty-eight years of wilderness campsite monitoring in Yosemite National Park. In: Cole, D.N.; McCool, S.F.; Borrie, W.T.; O'Loughlin, J., comps. Wilderness science in a time of change conference—Vol. 5. Wilderness ecosystems, threats, and management. Proceedings RMRS-P-15-Vol-5. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 105–109.

Brehm, J.M.; Eisenhauer, B.W.; Krannich, R.S. 2004. Dimensions of community attachment and their relationship to well-being in the amenity-rich rural west. Rural Sociology. 69(3): 405–429.

Bricker, K.S.; Winter, P.L.; Schultz, J.R. 2010. Health, economy & community: USDA Forest Service managers' perspectives on sustainable outdoor recreation. Rural Connections. September: 38–42.

Brown, G.G.; Donovan, S. 2013. Escaping the National Forest planning quagmire: using public participation GIS to assess acceptable national forest use. Journal of Forestry. 111(2): 115–125.

Brown, G.; Kelly, M.; Whitall, D. 2013. Which 'public'? Sampling effects in public participation GIS (PPGIS) and volunteered geographic information (VGI) systems for public lands management. Journal of Environmental Planning and Management. 57(2): 190–215. doi:10.1080/09640568.2012.741045.

Burn, S.M.; Winter, P.L. 2007. Environmental intervention handbook for resource managers: a tool for proenvironmental behavior change. 2nd ed. Riverside, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 47 p. http://digitalcommons.calpoly.edu/psycd_fac/29/. (13 March 2013).

Burn, S.M.; Winter, P.L. 2008. A behavioral intervention tool for recreation managers. Park Science. 25(1): 66–68.

Burn, S.M.; Winter, P.L.; Hori, B.; Silver, N.C. 2012. Gender, ethnic identity, and environmental concern in Asian Americans and European Americans. Human Ecology Review. 19(2): 136–145.

California State Parks, Off-Highway Motor Vehicle Recreation Division [CSP OHMVR]. 2011. Off-highway vehicle recreation commission program report: 2011. Sacramento, CA. 216 p. http://ohv.parks.ca.gov/pages/1140/files/ohmvr%20 2011%20report%20-%20final-web.pdf. (5 June 2013).

Chapin, F.S., III; Zavaleta, E.S.; Welling, L.A.; Deprey, P.; Yung, L. 2010. Planning in the context of uncertainty: flexibility for adapting to change. In: Cole, D.N.; Yung, L., eds. Beyond naturalness: rethinking park and wilderness stewardship in an era of rapid change. Washington, DC: Island Press: 216–233.

Chavez, D.J. 2012. Latinos and outdoor recreation. In: Cordell, H.K., ed. Outdoor recreation trends and futures: a technical document supporting the Forest Service 2010 RPA assessment. Gen. Tech. Rep. SRS-GTR-150. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station: 74–77.

Chavez, D.J.; Winter, P.L.; Baas J.M. 1993. Recreational mountain biking: a management perspective. Journal of Park and Recreation Administration. 11(3): 29–36.

Cheng, A.S.; Daniels, S.E. 2003. Examining the interaction between geographic scale and ways of knowing in ecosystem management: a case study of place-based collaborative planning. Forest Science. 49(6): 841–854.

Cheng, A.S.; Kruger, L.E.; Daniels, S.E. 2003. "Place" as an integrating concept in natural resource politics: propositions for a social science research agenda. Society & Natural Resources. 16(2): 87–104.

Clayton, S.; Myers, G. 2009. Conservation psychology: understanding and promoting human care for nature. Chichester, West Sussex, United Kingdom: Wiley-Blackwell. 264 p.

Colby, B.; Smith-Incer, E. 2005. Visitor values and local economic impacts of riparian habitat preservation: California's Kern River Preserve. Journal of the American Water Resources Association. 41(3): 709–717.

Cole, D.N. 2004. Environmental impacts of outdoor recreation in wildlands. In: Manfredo, M.J.; Vaske, J.J.; Bruyere, B.L.; Field, D.R.; Brown, P.J., eds. Society and natural resources: a summary of knowledge. Jefferson City, MO: Modern Litho: 107–116.

Cordell, H.K. 2012. Outdoor recreation trends and futures: a technical document supporting the Forest Service 2010 RPA assessment. Gen. Tech. Rep. SRS-GTR-150. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 167 p.

Cordell, H.K.; Bergstrom, J.C.; Betz, C.J.; Green, G.T. 2004. Dominant socioeconomic forces shaping the future of the United States. In: Manfredo, M.J.; Vaske, J.J.; Bruyere, B.L.; Field, D.R.; Brown, P.J., eds. Society and natural resources: a summary of knowledge. Jefferson City, MO: Modern Litho: 349–361.

Cordell, H.K.; Bergstrom, J.C.; Bowker, J.M., eds. 2005. The multiple values of wilderness. State College, PA: Venture Publishing, Inc. 297 p.

Cordell, H.K.; Heboyan, V.; Santos, F.; Bergstrom, J.C. 2011. Natural amenities and rural population migration: a technical document supporting the Forest Service 2010 RPA assessment. Gen. Tech. Rep. SRS-GTR-146. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 23 p.

Cornell, S.; Costanza, R.; Sörlin, S.; Leeuw, S.v.d. 2010. Developing a systematic "science of the past" to create our future. Global Environmental Change. 20(3): 426–427.

Cottrell, S.P.; Vaske, J.J. 2006. A framework for monitoring and modeling sustainable tourism. E-Review of Tourism Research. 4(4): 74–84.

Cottrell, S.P.; Vaske, J.J.; Shen, F.; Ritter, P. 2007. Resident perceptions of sustainable tourism in Chongdugou, China. Society & Natural Resources. 20(6): 511–525.

Crano, W.; Quist, R.; Winter, P.L. 2008. Forest visitation, media consumption, and diverse publics: lessons for outreach. In: Chavez, D.J.; Winter, P.L.; Absher, J.D., eds. Recreation visitor research: studies of diversity. Gen. Tech. Rep. PSW-GTR-210. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station: 177–194.

Cronan, M.K.; Shinew, K.J.; Schneider, I.; Wilhelm Stanis, S.A.; Chavez, D. 2008. Physical activity patterns and preferences among Latinos in different types of public parks. Journal of Physical Activity and Health. 5(6): 894–908.

Crompton, T.; Kasser, T. 2009. Meeting environmental challenges: the role of human identity. Godalming, Surrey, United Kingdom: World Wildlife Fund-United Kingdom. 81 p. http://assets.wwf.org.uk/downloads/meeting_environmental_challenges___the_role_of_human_identity.pdf. (10 June 2013).

Davidson, D.J. 2010. The applicability of the concept of resilience to social systems: some sources of optimism and nagging doubts. Society & Natural Resources. 23(12): 1135–1149.

de Groot, J.I.M.; Steg, L. 2010. Relationships between value orientations, self-determined motivational types and pro-environmental behavioural intentions. Journal of Environmental Psychology. 30(4): 368–378.

De Leo, G.A.; Levin, S. 1997. The multifaceted aspects of ecosystem integrity. Conservation Ecology. 1(1): article 3. http://www.consecol.org/vol1/iss1/art3/. (27 July 2012).

Diamant, R.; Eugster, J.G.; Mitchell, N.J. 2003. Reinventing conservation: a practitioner's view. In: Minteer, B.A.; Manning, R.E., eds. Reconstructing conservation: finding common ground. Washington, DC: Island Press: 313–326.

Dietz, T.; Ostrom, E.; Stern, P.C. 2003. The struggle to govern the commons. Science. 302(5652): 1907–1912.

Duane, T.P. 1996. Human settlement, 1850–2040. In: Sierra Nevada Ecosystem Project final report to Congress. Vol. II: Assessments and scientific basis for management options. Report No. 37. Davis, CA: Centers for Water and Wildland Resources, University of California–Davis: 235–360.

Eagan, S.; Newman, P.; Fritzke, S.; Johnson, L. 2000. Restoration of multiple-rut trails in the Tuolumne Meadows of Yosemite National Park. In: Cole, D.N.; McCool, S.F.; Borrie, W.T.; O'Loughlin, J., comps. Wilderness science in a time of change conference-Vol. 5. Wilderness ecosystems, threats, and management. RMRS-P-15-Vol-5. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 188–192.

Egan, D.; Hjerpe, E.E.; Abrams, J. 2011. Human dimensions of ecological restoration: integrating science, nature, and culture. Washington, DC: Island Press. 432 p.

Engle, N.L. 2011. Adaptive capacity and its assessment. Global Environmental Change. 21(2): 647–656.

Erman, D.C.; SNEP Science Team, eds. 1997. Status of the Sierra Nevada: the Sierra Nevada Ecosystem Project [CD-ROM]. Digital Data Series DDS-43. Denver, CO: U.S. Department of the Interior, Geological Survey. http://pubs.usgs.gov/dds/dds-43/DDS_43.PDF. (14 May 2013).

Evans, N. 1986. The tourism of Indian California—a neglected legacy. Annals of Tourism Research. 13: 435–450.

Farnum, J.; Hall, T.; Kruger, L.E. 2005. Sense of place in natural resource recreation and tourism: an evaluation and assessment of research findings. Gen. Tech. Rep. PNW-GTR-660. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 59 p.

Ferranto, S.; Huntsinger, L.; Getz, C.; Nakamura, G.; Stewart, W.; Drill, S.; Valachovic, Y.; DeLasaux, M.; Kelly, M. 2011. Forest and rangeland owners value land for natural amenities and as financial investment. California Agriculture. 65(4): 184–191.

Ferranto, S.; Huntsinger, L.; Stewart, W.; Getz, C.; Nakamura, G.; Kelly, M. 2012. Consider the source: the impact of media and authority in outreach to private forest and rangeland owners. Journal of Environmental Management. 97(1): 131–140.

Fitzhugh, T.W.; Richter, B.D. 2004. Quenching urban thirst: growing cities and their impacts on freshwater ecosystems. BioScience. 54(8): 741–754.

Folke, C. 2006. Resilience: the emergence of a perspective for social-ecological systems analysis. Global Environmental Change. 16(3): 253–267.

Gobster, P.H. 2005a. Invasive species as ecological threat: Is restoration an alternative to fear-based resource management? Ecological Restoration. 23(4): 261–270.

Gobster, P.H. 2005b. Recreation and leisure research from an active living perspective: taking a second look at urban trail use data. Leisure Sciences. 27(5): 367–383.

González-Cabán, A.; Loomis, J. 1997. Economic benefits of maintaining ecological integrity of Río Mameyes, in Puerto Rico. Ecological Economics. 21: 63–75.

Gosnell, H.; Abrams, J. 2011. Amenity migration: diverse conceptualizations of drivers, socioeconomic dimensions, and emerging challenges. GeoJournal. 76(4): 303–322.

Gunderson, K.; Watson, A. 2007. Understanding place meanings on the Bitterroot National Forest, Montana. Society & Natural Resources. 20(8): 705–721.

Haight, R.G.; Gobster, P.H. 2009. Social and economic considerations for planning wildlife conservation in large landscapes. In: Millspaugh, J.J.; Thompson, F.R., III, eds. Models for planning wildlife conservation in large landscapes. Burlington, MA: Elsevier: 123–152.

Hammer, R.B.; Radeloff, V.C.; Fried, J.S.; Stewart, S.I. 2007. Wildland-urban interface housing growth during the 1990s in California, Oregon, and Washington. International Journal of Wildland Fire. 16(3): 255–265.

Heal, G. 2012. Reflections—defining and measuring sustainability. Review of Environmental Economics and Policy. 6(1): 147–163.

Heberlein, T.A. 2012a. Navigating environmental attitudes. Conservation Biology. 26(4): 583–585.

Heberlein, T.A. 2012b. Navigating environmental attitudes. New York: Oxford University Press. 228 p.

Heckmann, K.E.; Manley, P.N.; Schlesinger, M.D. 2008. Ecological integrity of remnant montane forests along an urban gradient in the Sierra Nevada. Forest Ecology and Management. 255(7): 2453–2466.

Hernández, B.; Hidalgo, M.C.; Salazar-Laplace, M.E.; Hess, S. 2007. Place attachment and place identity in natives and non-natives. Journal of Environmental Psychology. 27: 310–319.

Hibbard, M.; Madsen, J. 2003. Environmental resistance to place-based collaboration in the U.S. West. Society & Natural Resources. 16(8): 703–718.

Hull, R.B., IV; Lam, M; Vigo, G. 1994. Place identity: symbols of self in the urban fabric. Landscape and Urban Planning. 28: 109–120.

Huntsinger, L.; Johnson, M.; Stafford, M.; Fried, J. 2010. Hardwood rangeland landowners in California from 1985 to 2004: production, ecosystem services, and permanence. Rangeland Ecology and Management. 63(3): 324–334.

Jackson, J.E.; Lee, R.G.; Sommers, P. 2004. Monitoring the community impacts of the Northwest Forest Plan: an alternative to social indicators. Society and Natural Resources. 17(3): 223–233.

Jones, R.E.; Fly, J.M.; Talley, J.; Cordell, H.K. 2003. Green migration into rural America: The new frontier of environmentalism? Society and Natural Resources. 16(3): 221–238.

Kaplan, S. 1995. The restorative benefits of nature: toward an integrative framework. Journal of Environmental Psychology. 15(3): 169–182.

Kaplan, R.; Austin, M.E. 2004. Out in the country: sprawl and the quest for nature nearby. Landscape and Urban Planning. 69(2–3): 235–243.

Kaplan, S.; Kaplan, R. 2003. Health, supportive environments, and the reasonable person model. American Journal of Public Health. 93(9): 1484–1489.

Kellert, S.R.; Mehta, J.N.; Ebbin, S.A.; Lichtenfeld, L.L. 2000. Community natural resource management: promise, rhetoric, and reality. Society and Natural Resources. 13(8): 705–715.

Kil, N.; Holland, S.M.; Stein, T.V. 2012. Identifying differences between off-highway vehicle (OHV) and non-OHV user groups for recreation resource planning. Environmental Management. 50: 365–380.

Knez, I. 2005. Attachment and identity as related to a place and its perceived climate. Journal of Environmental Psychology. 25(2): 207–218.

Krannich, R.S.; Petrzelka, P.; Brehm, J.M. 2006. Social change and well-being in western amenity-growth communities. In: Kandel, W.A.; Brown, D.L., eds. Population change and rural society. 16: Dordrecht, The Netherlands: Springer: 311–331. Chapter 15.

Krishnaswamy, A.; Simmons, E.; Joseph, L. 2012. Increasing the resilience of British Columbia's rural communities to natural disturbances and climate change. BC Journal of Ecosystems and Management. 13(1): 1–15.

Kruger, J.; Nelson, K.; Klein, P.; McCurdy, L.E.; Pride, P.; Ady, J.C. 2010. Building on partnerships: reconnecting kids with nature for health benefits. Health Promotion Practice. 11(3): 340–346.

Kruger, L.E.; Hall, T.E.; Stiefel, M.C.; tech. eds. 2008a. Understanding concepts of place in recreation research and management. Gen. Tech. Rep. PNW-GTR-744. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 204 p.

Kruger, L.E.; Mazza, R.; Stiefel, M. 2008b. Amenity migration, rural communities, and public lands. In: Sturtevant, V.E.; Donoghue, E.M., eds. Forest community connections: implications for research, management, and governance. Washington, DC: Resources for the Future: 127–142.

Loeffler, R.; Steinicke, E. 2007. Amenity migration in the U.S. Sierra Nevada. The Geographical Review. 97(1): 67–88.

Löffler, R.; Steinicke, E. 2006. Counterurbanization and its socioeconomic effects in high mountain areas of the Sierra Nevada (California/Nevada). Mountain Research and Development. 26(1): 64–71.

Los Angeles Department of Water and Power [LADWP]. 2010. Urban water management plan. Los Angeles, CA: Department of Water and Power. 539 p. http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Los%20Angeles%20Department%20of%20Water%20and%20Power/LADWP%20UWMP_2010_LowRes.pdf. (19 December 2013.)

Louv, R. 2006. Last child in the woods: saving our children from nature-deficit disorder. Chapel Hill, NC: Algonquin Books of Chapel Hill. 390 p.

Lu, J.; Schuett, M.A. 2012. Examining the role of voluntary associations in environmental management: the case of the Sam Houston National Forest. Environmental Management. 49: 334–346.

Manley, P.N.; Parks, S.A.; Campbell, L.A.; Schlesinger, M.D. 2009. Modeling urban land development as a continuum to address fine-grained habitat heterogeneity. Landscape and Urban Planning. 89(1–2): 28–36.

Marcus, B.J.; Omoto, A.M.; Winter, P.L. 2011. Environmentalism and community: connections and implications for social action. Ecopsychology. 3(1): 11–24.

Marion, J.; Wimpey, J. 2007. Environmental impacts of mountain biking: science review and best practices. http://www.imba.com/resources/research/trail-science/environmental-impacts-mountain-biking-science-review-and-best-practices. (13 March 2013).

Martin, S.R.; Marsolais, J.; Rolloff, D. 2009. Visitor perceptions of appropriate management actions across the recreation opportunity spectrum. Journal of Park and Recreation Administration. 27(1): 56–69.

Marzano, M.; Dandy, N. 2012. Recreational use of forests and disturbance of wildlife: a literature review. Edinburgh, Scotland: Forestry Commission. 40 p.

McAvoy, L. 2002. American Indians, place meanings and the old/new west. Journal of Leisure Research. 34(4): 383–396.

McAvoy, L.; McDonald, D.; Carlson, M. 2003. American Indian/first nation place attachment to park lands: the case of the Nuu-chah-nulth of British Columbia. Journal of Park and Recreation Administration. 21(2): 84–104.

Mekbeb, E.T.; Lilieholm, R.J.; Blahna, D.J.; Kruger, L.E. 2009. Resource use, dependence and vulnerability: community-resource linkages on Alaska's Tongass National Forest. Ecosystems and Sustainable Development. 122: 263–272.

Miller, B.; Sinclair, J. 2012. Risk perceptions in a resource community and communication implications: emotion, stigma, and identity. Risk Analysis. 32(3): 483–495.

Minnich, R.A.; Padgett, P.E. 2003. Geology, climate and vegetation of the Sierra Nevada and the mixed-conifer zone: an introduction to the ecosystem. In: Bytnerowicz, A.; Arbaugh, M.J.; Alonso, R., eds. Ozone air pollution in the Sierra Nevada: distribution and effects on forests. Oxford, United Kingdom: Elsevier: 1–31.

Misra, S.; Stokols, D. 2012. A typology of people-environment relationships in the Digital Age. Technology in Society. 34: 311–325.

Mittelbach, F.; Wambem, D.B. 2003. Six: competition for natural resources in California's Sierra Nevada. Los Angeles, CA: University of California–Los Angeles: 89–109.

Monz, C.A.; Cole, D.N.; Leung, Y.; Marion, J.L. 2010. Sustaining visitor use in protected areas: future opportunities in recreation ecology research based on the USA experience. Environmental Management. 45: 551–562.

Opotow, S.; Brook, A. 2003. Identity and exclusion in rangeland conflict. In: Clayton, S.; Opotow, S., eds. Identity and the natural environment: the psychological significance of nature. Cambridge, MA: The MIT Press: 249–272.

Patterson, M.E.; Williams, D.R. 2005. Maintaining research traditions on place: diversity of thought and scientific progress. Journal of Environmental Psychology. 25(4): 361–380.

Patterson, T.M.; Coelho, D.I. 2009. Ecosystem services: foundations, opportunities, and challenges for the forest products sector. Forest Ecology and Management. 257: 1637–1646.

Peterson, M.N.; Mertig, A.G.; Liu, J. 2007. Influence of urban immigrants on outdoor recreation and land use in Teton Valley. Journal of Park and Recreation Administration. 25(4): 25–38.

Praxis Consulting Group, LLC. 2009. Workforce housing needs assessment of Incline Village and Crystal Bay. http://praxisreno.com/Resources/InclineStudyFinal12_18C.pdf. (29 November 2012.)

Pretty, J.; Peacock, J.; Hine, R.; Sellens, M.; South, N.; Griffin, M. 2007. Green exercise in the UK countryside: effects on health and psychological well-being, and implications for policy and planning. Journal of Environmental Planning and Management. 50(2): 211–231.

Raumann, C.G.; Cablk, M.E. 2008. Change in the forested and developed landscape of the Lake Tahoe basin, California and Nevada, USA, 1940–2002. Forest Ecology and Management. 255(8–9): 3424–3439.

Richardson, R.B. 2002. The economic benefits of wildlands in the eastern Sierra Nevada region of California. San Francisco, CA: The Wilderness Society. 39 p. http://www.sierraforestlegacy.org/Resources/Conservation/FireForestEcology/ForestEconomics/Economics-Richardson02.pdf. (11 March 2013.)

Roberts, N.S.; Chavez, D.J.; Lara, B.M.; Sheffield, E.A. 2009. Serving culturally diverse visitors to forests in California: a resource guide. Gen. Tech. Rep. PSW-GTR-222. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 76 p.

Rosenberger, R.S.; Sneh, Y.; Phipps, T.T.; Gurvitch, R. 2005. A spatial analysis of linkages between health care expenditures, physical inactivity, obesity, and recreation supply. Journal of Leisure Research. 37(2): 216–235.

Ryan, R.L. 2005. Exploring the effects of environmental experience on attachment to urban natural areas. Environment and Behavior. 37(1): 3–42.

Satterfield, T.; Gregory, R.; Klain, S.; Roberts, M.; Chan, K.M. 2013. Culture, intangibles and metrics in environmental management. Journal of Environmental Management. 117: 103–114.

Schlüter, M.; Mcallister, R.R.J.; Arlinghaus, R.; Bunnefeld, N.; Eisenack, K.; Hölker, F.; Milner-Gulland, E.J.; Müller, B.; Nicholson, E.; Quaas, M.; Stöven, M. 2011. New horizons for managing the environment: a review of coupled social-ecological systems modeling. Natural Resource Modeling. 25(1): 219–272.

Schneider, I.E.; Chavez, D.J. 2012. Geocaching: form, function, and opportunity. In: Cordell, H.K. Outdoor recreation trends and futures: a technical document supporting the Forest Service 2010 RPA assessment. Gen. Tech. Rep. SRS-GTR-150. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station: 55–58.

Schneider, I.E.; Winter, P.B.[14] **1998.** Multiple use management preferences by visitors with differing leisure identity salience. Journal of Park and Recreation Administration. 16(4): 22–38.

[14] Sic; should be Winter, P.L.

Schroeder, H. 2002. Experiencing nature in special places: surveys in the north-central region. Journal of Forestry. 100(5): 8–14.

Schultz, P.W. 2002. Inclusion with nature: understanding the psychology of human-nature interactions. In: Schmuck, P.; Schultz, P.W., eds. The psychology of sustainable development. Boston, MA: Kluwer Academic Publishers: 3–17.

Schultz, P.W. 2011. Conservation means behavior. Conservation Biology. 25(6): 1080–1083.

State of California, Department of Finance. 2012. E-1 state/county population estimates with annual percent change—January 1, 2011 and 2012. Sacramento, CA, May 2012.

Stedman, R.C. 2003. Is it really just a social construction: the contribution of physical environment to sense of place. Society and Natural Resources. 16(8): 671–685.

Stewart, W.C. 1996. Economic assessment of the ecosystem. Sierra Nevada Ecosystem Project: final report to Congress. Vol. III: Assessments, commissioned reports, and background information. Report No. 38. Davis, CA: Centers for Water and Wildland Resources, University of California–Davis. Chapter 23.

Struglia, R.; Winter, P.L.; Meyer, A. 2003. Southern California socioeconomic assessment: sociodemographic conditions, projections, and quality of life indices. Gen. Tech. Rep. PSW-GTR-187. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 418 p.

Sturtevant, V.E.; Donoghue, E.M. 2008. Community and forest connections: continuity and change. In: Sturtevant, V.E.; Donoghue, E.M., eds. Forest community connections: implications for research, management, and governance. Washington, DC: Resources for the Future: 3–24.

Stynes, D.J.; White, E.M. 2005. Spending profiles of National Forest visitors, NVUM four year report. http://www.fs.fed.us/recreation/programs/nvum/NVUM4YrSpending.pdf. (11 March 2013).

Tierney, P.T.; Dahl, R.F.; Chavez, D.J. 1998. Cultural diversity of Los Angeles County residents using undeveloped natural areas. Res. Pap. PSW-RP-236. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 76 p.

Turner, N.J.; Berkes, F. 2006. Coming to understanding: developing conservation through incremental learning in the Pacific Northwest. Human Ecology Review. 34(4): 495–513.

U.S. Department of Agriculture, Forest Service [USDA FS]. 2012. Forest Service recreation and natural resources briefing paper. Clearing after the devil's windstorm—cutting blowdown trees from trails, Inyo National Forest, California. October 24, 2012.

Wagner, M.M.; Gobster, P.H. 2007. Interpreting landscape change: measured biophysical change and surrounding social context. Landscape and Urban Planning. 81(1–2): 67–80.

Walker, P.A.; Hurley, P.T. 2004. Collaboration derailed: the politics of "community-based" resource management in Nevada County. Society and Natural Resources. 17(8): 735–751.

Walkosz, B.J.; Buller, D.B.; Anderson, P.A.; Scott, M.D.; Dignan, M.B.; Cutter, G.R.; Maloy, J.A. 2008. Increasing sun protection in winter outdoor recreation: a theory-based health communication program. American Journal of Preventive Medicine. 34(6): 502–509.

Westphal, L.M. 2003. Urban greening and social benefits: a study of empowerment outcomes. Journal of Aboriculture. 29(3): 137–147.

White, E.M.; Stynes, D.J. 2008. National forest visitor spending averages and the influence of trip-type and recreation activity. Journal of Forestry. 106(1): 17–24.

Wiens, J.A.; Patten, D.T.; Botkin, D.B. 1993. Assessing ecological impact assessment: lessons from Mono Lake, California. Ecological Applications. 3(4): 595–609.

Wiggins, B.J.; Ostenson, J.A.; Wendt, D.C. 2012. The relational foundations of conservation psychology. Ecopsychology. 4(3): 209–215.

Wildlands CPR and Wild Utah Project. 2008. Best management practices for off-road vehicle use on forestlands: a guide for designating and managing off-road vehicle routes. Missoula, MT: Wildlands CPR. http://www.wildlandscpr.org/files/ORV_BMP_2008.pdf. (10 June 2013).

Williams, D.R. 2006. Leisure, environment, and the quality of life. In: Jackson, E.L., ed. Leisure and the quality of life: impacts on social, economic and cultural development. Hangzhhou, China: Zhejiang University Press: 146–163.

Wimpey, J. 2010. Environmental impacts of mountain biking: an update on scientific research. IMBA World Summit 2010 Resources. http://www.imba.com/resources/research/environmental-impacts. (13 March 2013).

Winter, P.L. 2007. Equity in access to recreation opportunities: a synthesis of research and management implications. In: Kruger, L.E., Mazza, R., Lawrence, K., eds. Proceedings: national workshop on recreation research and management. Gen. Tech. Rep. PNW-GTR-698. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 167–180.

Winter, P.L. 2013. Values of the urban wilderness. In: Cordell, H.K.; Betz, C.J.; Zarnoch, S.J. 2013. Recreation and protected land resources in the United States: a technical document supporting the Forest Service 2010 RPA Assessment. Gen. Tech. Rep. SRS-GTR-169. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station: 68–70.

Winter, P.L.; Bricker, K.; Schultz, J. 2013. The sustainability of outdoor recreation and tourism: findings from a survey of Forest Service managers. In: Cordell H.K.; Betz, C.J.; Zarnoch, S.J., eds. Recreation and protected land resources in the United States: a technical document supporting the Forest Service 2010 RPA assessment. Gen. Tech. Rep. SRS-GTR-169. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 11 p. http://www.srs.fs.fed.us/pubs/gtr/gtr_srs169/gtr_srs169_appendix_papers.pdf. (23 December 2013).

Winter, P.L.; Burn, S.M. 2010. Fostering sustainable operations in a natural resource management agency: insights from the field. Journal of Forestry. 108(2): 86–92.

Winter, P.L.; Chavez, D.J. 2008. Wildland recreationists' natural resource management purposes and preferences: a connection to environmental identity. In: Chavez, D.J.; Winter, P.L.; Absher, J.D., eds. Recreation visitor research: studies of diversity. Gen. Tech. Rep. PSW-GTR-210. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station: 163–174.

Winter, P.L.; Cvetkovich, G.T. 2008. Southwesterners' views of threatened and endangered species management: Does racial/ethnic diversity make a difference? In: Chavez, D.J.; Winter, P.L.; Absher, J.D., eds. Recreation visitor research: studies of diversity. Gen. Tech. Rep. PSW-GTR-210. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station: 97–111.

Winter, P.L.; Cvetkovich, G.T. 2010. Trust mediates conservation-related behaviors. Ecopsychology. 2(4): 211–219.

Winter, P.L.; Jeong, W.C.; Godbey, G.C. 2004. Outdoor recreation among Asian Americans: a case study of San Francisco Bay area residents. Journal of Park and Recreation Administration. 22(3): 114–136.

Winter, P.L.; Skenderian, J.; Crano, W. 2008. Routes to communicating about outdoor recreation with diverse publics: what we know about media. In: Chavez, D.J.; Winter, P.L.; Absher, J.D., eds. Recreation visitor research: studies of diversity. Gen. Tech. Rep. PSW-GTR-210. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station: 195–204.

Wynveen, C.J.; Kyle, G.T.; Hammitt, W.E.; Absher, J.D. 2008. Exploring the effect of experience use history and place bonding on resource substitution. In: LeBlanc, C.; Vogt, C., comp., eds. Proceedings of the 2007 northeastern recreation research symposium. Gen. Tech. Rep. NRS-P-23. Newton Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station: 114–122.

Yung, L. 2007. Citizen monitoring and restoration: volunteers and community involvement in wilderness stewardship. In: Watson, A.; Sproull, J.; Dean, L., comps. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 101–106.

Yung, L.; Freimund, W.A.; Belsky, J.M. 2003. The politics of place: understanding meaning, common ground, and political difference on the Rocky Mountain Front. Forest Science. 49(6): 855–866.

Zaradic, P.A.; Pergams, O.R.W.; Kareiva, P. 2009. The impact of nature experience on willingness to support conservation. PLoS ONE. 4(10): e7367. doi:10/1371/journal.pone.0007367.

Zavaleta, E.S.; Chapin, F.S., III. 2010. Resilience frameworks: enhancing the capacity to adapt to change. In: Cole, D.N.; Yung, L., eds. Beyond naturalness: rethinking park and wilderness stewardship in an era of rapid change. Washington, DC: Island Press: 142–161.