USDA United States Department of Agriculture

Future of America's Forests and Rangelands

Update to the Forest Service 2010 Resources Planning Act Assessment

Forest Service | Research and Development | Gen. Tech. Rep. WO-94 | September 2016

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Abstract

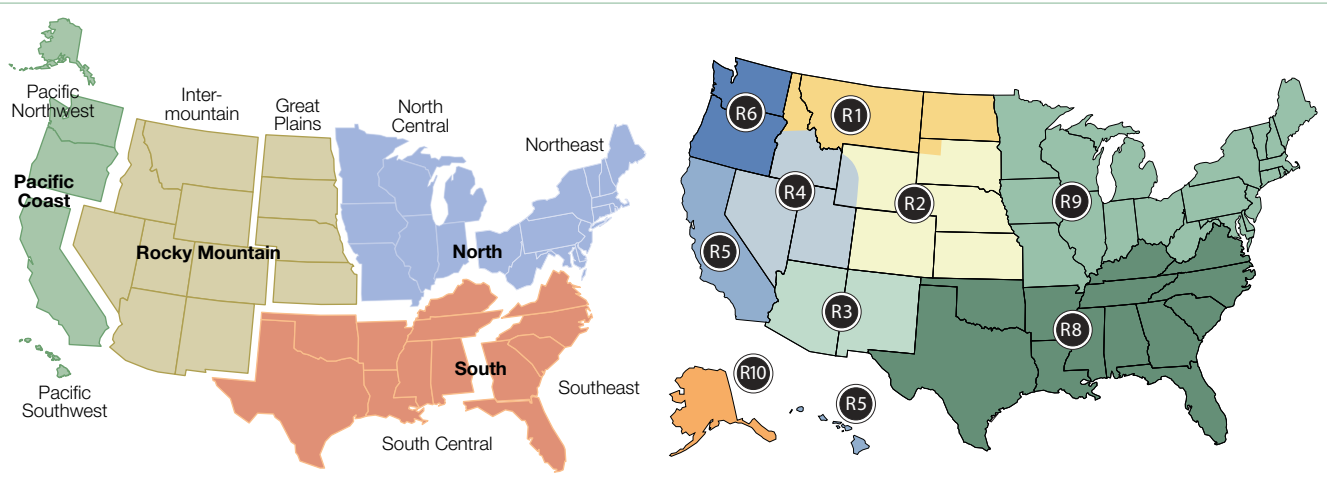
The Update to the 2010 Resources Planning Act (RPA) Assessment summarizes findings about the status, trends, and projected future of forests, rangelands, wildlife, biodiversity, water, outdoor recreation, and urban forests, as well as the effects of climate change upon these resources. Varying assumptions about population and economic growth, land use change, and global climate change from 2010 to 2060 largely influence the outlook for U.S. renewable resources. The key themes from the 2010 RPA Assessment remain relevant. Land development, climate change, and natural disturbances continue to influence the extent, pattern, and conditions of forest and rangeland ecosystems. The interaction of socioeconomic and biophysical drivers affects the productivity of forest and rangeland ecosystems and their ability to meet increasing demands for goods and services. These effects vary regionally and locally, requiring flexible adaptation and management strategies.

Contents

Chapter 12. Outdoor Recreation

Outdoor recreation is a key part of America's social and economic fabric. The 2010 Resources Planning Act (RPA) Assessment (2010 RPA) provided information about available outdoor recreation resources in the United States, described the status and historical trends in outdoor recreation participation, regionally and by different demographic groups, and projected national recreation participation through 2060. This RPA Update provides regional recreation participation projections for the four RPA regions—the North, South, Rocky Mountain, and Pacific Coast Regions (figure 12-1). In doing so, we are able to examine whether climate change is likely to have different impacts across both recreation activities and regions. We also examine recreation visitation to national forests and grasslands, summarizing regional and national estimates of visitation, activity participation, demographic characteristics, and perceptions of satisfaction and crowding among national forest visitors.

Figure 12-1. RPA Assessment regions and subregions (left) and National Forest System regions (right).



R1 = Region 1, Northern Region. R2 = Region 2, Rocky Mountain Region. R3 = Region 3, Southwestern Region. R4 = Region 4, Intermountain Region. R5 = Region 5, Pacific Southwest Region. R6 = Region 6, Pacific Northwest Region. R8 = Region 8, Southern Region. R9 = Region 9, Eastern Region. R10 = Region 10, Alaska Region. RPA = Resources Planning Act.

Highlights

- Growth in outdoor recreation participation will vary across activities and regions.
- Climate change could have large effects on participation in some outdoor recreation activities.
- Future recreation activity participation will be highly influenced by minority population growth, increasing age levels, increasing urbanization, and changes in economic conditions.
- Minority recreation visitors, both racial and ethnic, continue to be underrepresented relative to the general population in their use of national forests for outdoor recreation.
- Overall, recreation visitors to national forests, nationwide and across the RPA regions, judged their experience as satisfactory.

Regional Recreation Participation in the Future

- ❖ Outdoor recreation participation will continue to grow nationwide and across the RPA regions, but rates will vary across regions.
- ❖ Climate change is expected to have varying effects on recreation participation; participation in a few activities could change by large amounts because climate differences impact both opportunities and demand.
- ❖ Population growth drives participant increases in many outdoor recreation activities, but increasing population density and diminishing access have negative effects on participation in many activities.
- ❖ Future recreation activity participation will be highly influenced by minority population growth, increasing age levels, increasing urbanization, and changes in economic conditions.

Adult recreation participation (ages 16 and above) was examined for 17 recreation activity composites organized into 7 activity groups (table 12-1). Per capita participation and average annual days per participant were modeled and simulated for each of the four RPA regions (figure 12-1) and at the national level. The total number of participants and total annual days of participation were estimated by multiplying each of the RPA scenario population projections by corresponding projections of scenario participation rates and average days per participant. Activity-specific numbers of participants, per capita participation, total activity days, and days per participant were projected through 2060 for the three RPA scenarios without climate variables (i.e., assuming historical climate). The models were then run with climate variables for each of the nine RPA scenario-climate combinations (see table 1-2 in chapter 1), allowing for a comparison of the potential effects of climate change on recreation participation (Bowker and Askew 2012; Bowker et al. 2012).

Projection models relate recreation participation directly to factors known to correlate with recreation choices. The rate of outdoor recreation participation and also the participation intensity, or consumption, are correlated with multiple factors, including race, ethnicity, gender, age, income, and supply or proximity to settings (Bowker et al. 1999; Bowker et al.

Table 12-1. Total number of participants in outdoor recreation activities, 2008.[a]

Outdoor recreation activity group	2008 total number of participants (millions)				
	RPA North Region	RPA South Region	RPA Rocky Mountain Region	RPA Pacific Coast Region	Nation
Developed site usage					
Visiting developed sites: family gatherings, picnicking, developed camping	81	63	17	31	194
Visiting interpretive sites: nature centers, zoos, historic sites, prehistoric sites	67	51	15	26	158
Observing nature					
Birding: viewing and/or photographing birds	37	27	7	13	82
Nature viewing: viewing, photographing, studying, or nature gathering related to fauna, flora, or natural settings	80	63	18	31	190
Backcountry activities					
Challenge activities: caving, mountain biking, mountain climbing, rock climbing	9	7	4	5	25
Horseback riding on trails	6	6	2	3	16
Day hiking	33	20	10	17	79
Primitive area use: backpacking, primitive camping, wilderness	36	28	12	18	91
Motorized activities					
Motorized off-roading	17	17	6	9	48
Motorized water activities	26	21	5	10	62
Motorized snow activities	7	1	1	1	9
Consumptive activities					
Hunting: small game, big game, migratory birds, other	11	11	3	3	28
Fishing: anadromous, coldwater, saltwater, warmwater	29	28	7	10	73
Nonmotorized winter activities					
Developed skiing: downhill skiing, snowboarding	12	4	3	5	24
Undeveloped skiing: cross-country skiing, snowshoeing	5	1	1	1	8
Nonmotorized water activities					
Swimming: swimming, snorkeling, surfing, diving, visiting beaches or watersides	62	47	11	25	144
Floating: canoeing, kayaking, rafting	18	12	3	6	40

RPA = Resources Planning Act.

[a] Activities are individual or activity composites derived from the National Survey of Recreation and the Environment (NSRE). Participants are determined by the average weighted frequency of participation by activity for NSRE data from 2005 to 2009 and the adult (>16) population in the United States in 2008 (235.4 million).

2006; Cicchetti 1973; Hof and Kaiser 1983; Leeworthy et al. 2005). The projection models incorporate this information in conjunction with external projections of other relevant factors over time, including population growth, to simulate future recreation participation and consumption. Such modeling allows for changes in recreation participation and consumption behavior over time to be assessed in light of previously unseen changes in factors driving this behavior; e.g., large changes in demographic, economic, land use, and climate factors.

Key variables drive the future trends in recreation participation. Population growth often is the most important driver and, therefore, RPA A2, with the largest projected population growth, often has the greatest changes, whereas RPA B2 has the smallest. Income growth also has differential effects on participation. In activities that require more capital or income for effective participation, such as developed skiing, challenge activities, horseback riding activities, hunting, and motorized activities, the combination of moderate population growth and higher income growth in RPA A1B results in larger participation changes than in RPA A2.

The effects of population growth are often offset by more indirect effects. Land and water availability positively influences activity participation. A growing population, combined with an assumed stable public land base and declining private natural land base, results in declines in per capita recreation opportunities. Those declines tend to have negative effects on recreation participation. For example, declines in the per capita availability of forest land, rangeland, and Federal land correlate positively with participation declines in spatially extensive activities such as horseback riding, hunting, motorized off-road driving, visiting primitive areas, and viewing and photographing nature. Increasing population density tends to have a negative effect on recreation participation as a result of crowding. In most cases, population growth is sufficient to result in overall growth in the total number of participants and total days of participation, even when participation rates and/or average days of participation are projected to decline.

Climate variables were added to the projection models to test whether participation and participation intensity were sensitive to climate change effects. Temperature, precipitation, and evapotranspiration variables were tested, with a single climate variable introduced into each recreation activity model. The effectiveness of the climate variables is limited because they represent climate within specified distances from the residence of the recreationist, not at the recreation destination. Research has shown, however, that the vast majority of outdoor recreation takes place within a few hours' drive of one's residence (Hall and Page 1999). Therefore, for most recreation visits, the origin and destination are within the same geographic area as the climate data. For others, the relevance of the climate data is likely to vary by activity and could be sensitive to locations where the climate has significant variation across the recreation market area (e.g., mountainous areas). The "with climate change" model results reported here represent the average of the activity projection results from the three general circulation model (GCM) climate outcomes for each RPA scenario. More details about the GCMs selected for each RPA scenario and the selection and use of climate variables in the participation models are addressed in Bowker et al. 2012.

Adding climate variables to the national projection models (Bowker et al. 2012) resulted in a slight increase or decrease in the metrics compared with the "no climate change" projection for most recreation activities, although more substantial negative effects were found for snowmobiling and undeveloped skiing. The climate variables also resulted in some substantial differences across the RPA regions in comparison with the results without including climate effects. These differences can be attributed in part to unique region-specific climate variables that led to differential effects across regional and national models.

Regional Activity Projections

Detailed results for participation rates, participants, days per participant, and total days of participation by RPA region and activity for each of the RPA scenarios and their associated climate models are reported in Bowker and Askew (In press). The following discussion presents projected participation rates and mean days of participation per participant across each of the RPA scenarios with no climate change (i.e., historical climate trends are assumed to continue) and with climate change (represented by the average of projection results from the three GCMs). Results are shown for each RPA region along with the national estimate for comparison across the 17 activity combinations. Climate models for the South Region were not estimated for winter recreation activities. Projected total participants and total days across regions, RPA scenarios, and activities are summarized after the participation rate and days per participant discussion.

Developed Site Usage

Activities qualifying as developed site usage are grouped into two aggregates: visiting developed sites and visiting interpretative sites. Visiting developed sites was among the most popular of the 17 activities analyzed, with participation rates in 2008 near or exceeding 80 percent for all four regions and the Nation (table 12-2). Participation rates grow slightly without climate change. Including climate effects associated with warmer and drier conditions leads to rate declines in the North and South Regions. For the Pacific Coast Region, growth in annual days per participant is positive and considerably higher than for all other regions. Increased household income in that region associated with RPA A1B appears to be the factor most likely

driving this change. All the projections at the national level and for the North and Rocky Mountain Regions show declines in days per participant. In nearly all region and scenario combinations, the declines are intensified by the impact of climate change.

Another popular recreation activity accessible to most people is visiting interpretive sites, specifically natural, historic, and prehistoric sites. At the regional level, 2008 participation rates ranged from 64 percent for the South Region to 71 percent for the Rocky Mountain Region; the national rate was 70 percent (table 12-3). Projections show growth across all scenarios, with the most growth in RPA A1B, the scenario with the highest income growth. Climate change has a relatively minor effect on participation rate projections in all regions except the North Region, which shows no change. Moderate growth in the annual days per participant is projected for all regions. Projections for the Pacific Coast Region are highest, ranging between 15 and 25 percent. The influence of climate change marginally boosts the days per participant projected for the Nation and in the North Region, decreases the number of days for the Pacific Coast and South Regions, and has almost no effect in the Rocky Mountain Region. Warmer and drier conditions increase the days per participant in the North Region, and higher summer temperatures decrease the number of days in the Pacific Coast Region.

Observing Nature

Nature observation participation includes those who participate in birding (viewing and/or photographing) and those who participate in nature viewing in general, which consists of gathering mushrooms and berries or viewing and/or photographing birds, other wildlife, natural scenery, and so on. These activities can be undertaken casually in one's backyard or on a trip encompassing great distances. In 2008, about one-third of the population participated in birding in all of the RPA regions (table 12-4). In the absence of climate change, projections show an increased participation rate. Climate change has a small effect on those projections for the South, Rocky Mountain, and Pacific Coast Regions. The most notable change occurs in the North Region, where an increase in the participation rate without climate change turns into a decline with the addition of

Table 12-2. Developed site projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.825	1	0	1	(4)	(4)	(3)
RPA South Region	0.799	2	1	1	(0)	(2)	(1)
RPA Rocky Mountain Region	0.815	2	1	1	2	0	1
RPA Pacific Coast Region	0.812	2	0	1	2	0	1
Nation	0.819	3	1	1	1	(0)	0
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	12	(3)	(3)	(3)	(10)	(9)	(5)
RPA South Region	11	0	0	0	3	3	1
RPA Rocky Mountain Region	13	(1)	(2)	(1)	(5)	(5)	(3)
RPA Pacific Coast Region	13	13	5	6	11	4	4
Nation	12	(2)	(2)	(1)	(3)	(3)	(2)

RPA = Resources Planning Act.

Table 12-3. Interpretive site projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.686	9	5	6	9	5	6
RPA South Region	0.639	9	7	6	7	4	5
RPA Rocky Mountain Region	0.713	10	8	7	9	7	6
RPA Pacific Coast Region	0.696	5	2	3	5	2	2
Nation	0.669	9	5	6	8	4	5
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	8	7	2	3	13	8	5
RPA South Region	7	12	9	7	11	8	6
RPA Rocky Mountain Region	9	5	3	3	5	2	2
RPA Pacific Coast Region	9	25	14	15	21	11	11
Nation	8	8	3	4	11	6	6

RPA = Resources Planning Act.

warmer and drier spring seasons. Nationwide, birders in 2008 participated about 98 days annually, with a range of 80 to 107 days across the regions. In contrast with the mostly positive projections for birder participation rates, the days of birding per person are projected to decline across all regions except the Rocky Mountain Region. The large decline in the South Region is correlated with an increase in the rate of population growth and to a strong negative relationship with increasing income through 2060. The negative effects of population growth are related to increasing population density and the increasing proportion of Hispanic residents in the overall population. Lower birding days per participant for Hispanic groups have a stronger negative effect over time as their share of the population grows. The addition of climate change induces an overall decline in days per participant with varying degrees by region. The negative impact of year-round warming in the South Region reduces the days of birding by at least 10 percent per person in comparison with models excluding climate effects.

The national participation rate in 2008 for nature viewing was more than 80 percent, with comparable rates among the regions (table 12-5). All the projection estimates reveal relatively small changes in the participation rate over time. Participation is already high, so little room exists for significant growth. The intensity of nature viewing is greatest in the North Region in 2008, exceeding the annual days per participation in the Rocky Mountain and Pacific Coast Regions by nearly 20 days (table 12-5). The projection of participation days shows a moderate decline of between 6 and 14 percent across all scenarios and areas. The inclusion of climate variables induces a small additional decline for most regions.

Backcountry Activities

Backcountry activities, typically requiring travel to a dispersed setting, include challenge activities, horseback riding on trails, day hiking, and primitive area use. Challenge activities such as mountain climbing, rock climbing, and caving require physical endurance and specialized training and equipment. These special requirements lower the national participation rate to about 10 percent (table 12-6). The activity is most popular in the Rocky Mountain Region, where the terrain and sites

Table 12-4. Birding projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.382	8	6	6	(4)	(6)	1
RPA South Region	0.342	10	8	8	12	10	9
RPA Rocky Mountain Region	0.331	6	6	6	6	6	5
RPA Pacific Coast Region	0.343	2	1	2	4	3	2
Nation	0.346	8	4	4	2	(1)	1
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	100	(3)	(3)	(2)	(4)	(3)	(3)
RPA South Region	107	(19)	(17)	(13)	(29)	(28)	(20)
RPA Rocky Mountain Region	80	6	4	8	1	(0)	5
RPA Pacific Coast Region	86	(7)	(8)	(6)	(9)	(11)	(7)
Nation	98	(4)	(6)	(2)	(5)	(6)	(3)

RPA = Resources Planning Act.

Table 12-5. Nature viewing projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.815	4	2	2	(0)	(2)	(1)
RPA South Region	0.791	3	0	1	1	(2)	(1)
RPA Rocky Mountain Region	0.829	4	1	2	4	1	2
RPA Pacific Coast Region	0.817	2	(1)	0	1	(2)	(1)
Nation	0.805	3	1	1	3	0	1
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	176	(8)	(8)	(7)	(9)	(8)	(7)
RPA South Region	173	(10)	(12)	(8)	(12)	(13)	(9)
RPA Rocky Mountain Region	157	(9)	(11)	(6)	(10)	(11)	(7)
RPA Pacific Coast Region	157	(11)	(13)	(9)	(13)	(14)	(11)
Nation	170	(11)	(9)	(8)	(13)	(10)	(9)

RPA = Resources Planning Act.

afford many opportunities year round. Without accounting for climate change, the Rocky Mountain Region and the South Region show similar growth in the participation rate, whereas the North and Pacific Coast Regions are likely to experience declines. These declines are correlated with a decrease in per capita opportunities, whereas increases in the South and Rocky Mountain Regions are supported by income growth. The inclusion of climate variables has little effect on projections for most regions and scenarios, except for the South Region, where climate effects result in declines in participation rate growth from 7 to 13 percent. The challenge activities support a relatively low annual number of days per participant. The projections are relatively static for the Nation and for the North and Pacific Coast Regions, regardless of whether climate variables are included. The 6- to 8-percent decline in days per participant shown for the Rocky Mountain Region is correlated with increased population growth that reduces the per capita availability of resource opportunities for challenge activities. The South Region, where warmer temperatures in the fall contribute to increased per participant days, was the only region to show increases in annual days per participant, ranging from 7 to 15 percent with no climate change and up to 16 to 38 percent with climate change. Income growth was a key driver of the increase.

The participation rate for horseback riding on trails ranged between 6 and 9 percent (table 12-7). The projected participation rates show large variability across RPA regions and RPA scenarios. Across RPA scenarios, RPA A1B, with higher income growth and moderate population growth, had the most positive impact, but moderate growth in income and high population growth contribute to more negative effects for RPA A2. Per capita participation is also negatively correlated with increasing proportions of minority residents, especially Hispanic groups, who historically have had low participation rates. The large decline in the Rocky Mountain Region also appears to be influenced by increasing population density, especially in RPA A2. Adding climate effects stimulates a significant increase in horseback riding participation for the North Region and substantial decline in the Rocky Mountain Region. These changes appear as a result of warmer and drier summer

Table 12-6. Challenge activities projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.095	(4)	(9)	(9)	(10)	(10)	(10)
RPA South Region	0.086	18	11	9	5	(2)	2
RPA Rocky Mountain Region	0.177	14	8	8	18	7	11
RPA Pacific Coast Region	0.135	(6)	(7)	(10)	(3)	(7)	(7)
Nation	0.107	18	7	7	18	6	7
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	4	(1)	(1)	(0)	(2)	(0)	0
RPA South Region	4	15	7	7	38	28	16
RPA Rocky Mountain Region	9	(7)	(8)	(6)	(6)	(8)	(6)
RPA Pacific Coast Region	4	(2)	(2)	(2)	0	0	0
Nation	5	(1)	(2)	(1)	1	0	0

RPA = Resources Planning Act.

Table 12-7. Horseback riding projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.059	16	3	4	42	22	19
RPA South Region	0.071	8	(9)	(5)	7	(11)	(5)
RPA Rocky Mountain Region	0.093	(3)	(16)	(10)	(13)	(24)	(17)
RPA Pacific Coast Region	0.072	17	2	4	14	(2)	4
Nation	0.070	19	1	3	27	9	8
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	13	3	3	3	(4)	(4)	(1)
RPA South Region	18	26	(1)	9	(36)	(53)	(32)
RPA Rocky Mountain Region	35	10	(11)	(6)	11	(13)	(5)
RPA Pacific Coast Region	8	56	19	23	56	16	27
Nation	16	3	3	3	(11)	(10)	(7)

RPA = Resources Planning Act.

seasons, which have a positive correlation for the North Region and a negative correlation for the Rocky Mountain Region. The popularity of horseback riding on trails in the Rocky Mountain Region is reflected in the high level of days of annual participation—more than double any other region. The positive effects of income growth in all regions, except the North, contribute to the high level of projected days for RPA A1B. For other RPA scenarios, a stronger income effect in the Pacific Coast Region is sufficient to offset the negative effects of education level, race/ethnicity, and population growth affecting projections for the South and Rocky Mountain Regions. The effects of climate were fairly profound in the South Region, where horseback riding days per participant drop by more than 50 percent on average across the three RPA scenarios. Population density and, more importantly, extreme maximum temperatures are the driving factors.

Nationwide, approximately 1 out of 3 adults participated in day hiking during 2008 (table 12-8). There is considerable variation in 2008 participation rates across regions, as the Rocky Mountain Region participation rate is almost double the South Region rate. The results without climate change show participation rate increases across all regions except for the Pacific Coast Region under RPA A2. The growth is dampened by climate effects in the North and South Regions. The North Region shifts from gradual increases to a small downturn in the projected participation rate as warmer and drier conditions are projected. The average annual days people hike vary little across regions from the national average of almost 23 days. National day hiking intensity appears unaffected by both the RPA scenarios and climate change. Although climate seems to induce marginal decreases in hiking days per participant in the North and South Regions, those declines appear to be offset by positive effects in the Rocky Mountain and Pacific Coast Regions.

Approximately 38 percent of adults backpacked, camped in primitive settings, or visited wilderness in 2008 (table 12-9). By 2060, overall adult participation rates are expected to decline somewhat across all regions and RPA scenarios, with the exception of RPA A1B in the Rocky Mountain Region. Projection models with climate effects increase the rate of decline in most regions, especially in the North and Rocky

Table 12-8. Day hiking projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.327	7	5	6	(2)	(5)	(1)
RPA South Region	0.252	16	13	12	7	6	7
RPA Rocky Mountain Region	0.461	12	7	8	13	6	9
RPA Pacific Coast Region	0.447	2	(1)	1	(1)	(3)	(2)
Nation	0.333	10	8	7	6	3	5
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	22	(5)	(1)	(1)	(7)	(1)	(1)
RPA South Region	23	(4)	(5)	(3)	(5)	(6)	(3)
RPA Rocky Mountain Region	20	(5)	(7)	(4)	0	(1)	1
RPA Pacific Coast Region	26	3	(4)	(1)	6	(3)	2
Nation	23	6	6	6	6	6	7

RPA = Resources Planning Act.

Table 12-9. Primitive area projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.367	(2)	(5)	(4)	(23)	(25)	(14)
RPA South Region	0.353	(3)	(7)	(6)	(4)	(8)	(6)
RPA Rocky Mountain Region	0.541	1	(4)	(2)	(8)	(13)	(9)
RPA Pacific Coast Region	0.460	(4)	(11)	(7)	(3)	(9)	(7)
Nation	0.383	(1)	(5)	(5)	(3)	(8)	(6)
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	11	(10)	(11)	(10)	(21)	(20)	(18)
RPA South Region	15	1	1	0	(8)	(8)	(4)
RPA Rocky Mountain Region	14	(15)	(16)	(14)	(14)	(16)	(13)
RPA Pacific Coast Region	14	17	5	8	12	2	3
Nation	13	(1)	(1)	(1)	(4)	(4)	(3)

RPA = Resources Planning Act.

Mountain Regions. Projected drier conditions in the summer and fall strengthen falling per capita primitive area participation. Although the South Region reported the lowest primitive area participation rate in 2008, it conversely had the highest annual days of participation. The North and Rocky Mountain Regions show relatively large reductions in projected days with and without climate effects. The projections vary little across scenarios within regions, except for the Pacific Coast Region, where the high income RPA A1B scenario is considerably higher. The Pacific Coast Region was also the only region showing positive growth in 2060 in days per participant, although climate change had a dampening effect on growth. Drier seasonal conditions resulted in further declines in annual days of participation in both the North and South Regions.

Motorized Activities

The motorized activities category incorporates off-road driving, motorized water use, and motorized snow use. The participation rate for motorized off-road driving varies across regions, from 18 percent in the North Region to 27 percent in the Rocky Mountain Region (table 12-10). A downturn in the proportion of adults who participate is likely by 2060 across most RPA regions and scenarios. The South Region shows the sharpest declines, particularly in RPA A2. The RPA A2 declines are correlated with projected high concentrations of population and reduced land access per person. The projected growth in the Hispanic population could contribute to reductions across the country, because their participation rates for motorized activities are relatively low, particularly in the South and Pacific Coast Regions. The downturn for off-road driving in 2060 is also reflected in the annual days per participant. Although participation in all scenarios and regions is projected to decline, the effects of climate change accentuate the decline in the South Region by an additional 16 to 24 percent; an expected increase in the number of days with excessive heat contributes to the decline.

Motorized water activities consist of motorboating, waterskiing, or the use of personal watercraft. In 2008, the participation rate was approximately 26 percent, with little variation across regions (table 12-11). Increases in participation rates in all

Table 12-10. Motorized off-road projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.176	(1)	(9)	(7)	(8)	(16)	(10)
RPA South Region	0.213	(12)	(25)	(17)	(14)	(27)	(18)
RPA Rocky Mountain Region	0.271	4	(13)	(6)	5	(13)	(6)
RPA Pacific Coast Region	0.224	(1)	(21)	(11)	0	(20)	(9)
Nation	0.204	(0)	(18)	(8)	(0)	(18)	(8)
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	16	(11)	(11)	(11)	(13)	(11)	(11)
RPA South Region	33	(2)	(3)	(2)	(24)	(27)	(18)
RPA Rocky Mountain Region	17	(8)	(11)	(6)	(10)	(12)	(7)
RPA Pacific Coast Region	13	(10)	(13)	(7)	(10)	(11)	(8)
Nation	22	(7)	(7)	(6)	(4)	(4)	(5)

RPA = Resources Planning Act.

Table 12-11. Motorized water projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.268	14	(2)	3	35	15	16
RPA South Region	0.270	10	(5)	(3)	13	(3)	(2)
RPA Rocky Mountain Region	0.259	15	0	1	2	(11)	(9)
RPA Pacific Coast Region	0.256	21	(0)	4	20	(1)	3
Nation	0.263	15	(2)	1	10	(7)	(3)
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	15	7	(1)	0	9	(1)	1
RPA South Region	18	(1)	(9)	(6)	(1)	(9)	(7)
RPA Rocky Mountain Region	13	9	(1)	1	8	(1)	0
RPA Pacific Coast Region	12	16	(2)	2	15	(2)	1
Nation	15	4	(6)	(2)	2	(8)	(4)

RPA = Resources Planning Act.

regions are highest under the RPA A1B scenario, likely related to its high income growth. Higher population growth, resulting in increasing population density and a decline in water area per capita, and lower economic growth contribute to reductions in projected participation rates for most RPA A2 scenarios. Climate change has a strong positive effect on participation rates in the North Region and, by contrast, a strong negative influence in the Rocky Mountain Region, both resulting from an increase in warmer and drier summer conditions. Days per participant are highest in the South Region, yet the South is the only region projected to experience a decrease across all scenarios by 2060, with and without climate change. The income effect from RPA A1B is associated with the largest relative increase in days per participant for all regions, with the largest increases concentrated in the Pacific Coast Region. Overall, the climate variables minimally affect annual participant days.

The last motorized activity, motorized snow or snowmobiling, reported one of the lower participation rates at the national level, at about 4 percent (table 12-12). Because climate is not favorable for this activity in the South Region, no projections were estimated. Future participation rates for snowmobiling activities face larger declines than most other outdoor recreation activities, especially when considering climate change. Only the RPA A1B scenario for the Pacific Coast Region reflects a positive change in the participation rate under any scenario. The snowmobiling participation rate is negatively correlated with level of education, median age, and the Hispanic proportion of the population. All these factors are anticipated to increase over time as the population grows, leading to diminishing participation rates in snowmobiling. Warmer and drier climate conditions in the North Region contribute to participation rate declines exceeding 60 percent by 2060. The negative trend in projected snowmobile participation rates continues for days per participant across all regions and scenarios. Population growth is the primary negative driver nationwide and in the Rocky Mountain and Pacific Coast Regions in particular. The impact of climate variables on regional projections is limited. Yet, the national estimates suggest considerable effects from warmer and drier conditions as snowmobilers recreate fewer days per year.

Consumptive Activities

Consumptive activities traditionally include all types of hunting and fishing. Participation rates for legal hunting ranged from 7 percent in the Pacific Coast Region to 16 percent in the Rocky Mountain Region (table 12-13). Hunting is projected to experience participation rate declines of 18 percent or more across all regions and scenarios, declining more than 40 percent in some regions under the high population growth expected with RPA A2. The factors contributing most to this decline are a reduction in the per capita access to opportunities, increases in population density, non-White ethnicity, and education. Warmer and drier conditions associated with climate change appear to exacerbate declines nationwide and for all regions. Annual hunting days per participant are also projected to decline in all future scenarios, except in the South Region, in which case a decrease in days with extremely low temperatures leads to a small percentage increase in 2060 participant days. Higher annual temperatures in the North Region result in further decreases by an additional 8 percent more than estimates without climate effects.

Fishing includes anadromous, coldwater, warmwater, and saltwater fishing. Nationwide, fishing is more than twice as popular as hunting, but the intensity of use is similar across both fishing and hunting (table 12-14). Projected fishing participation rates in 2060 show decreases across all regions when climate effects are not included. The largest declines among scenarios are attributed to the higher population growth for RPA A2. This population growth negatively affects the participation rate through increased population density in general and decreased per capita availability of fishing venues. Projected decreases of 12 to 20 percent are reported for the South Region. Climate

Table 12-12. Motorized snow projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.071	(12)	(21)	(17)	(69)	(73)	(60)
RPA South Region[a]	—	—	—	—	—	—	—
RPA Rocky Mountain Region	0.060	(28)	(37)	(32)	(33)	(43)	(35)
RPA Pacific Coast Region	0.034	4	(21)	(8)	(2)	(23)	(15)
Nation	0.040	(13)	(23)	(21)	(51)	(57)	(49)
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	8	(14)	(8)	(13)	(12)	(9)	(14)
RPA South Region[a]	—	—	—	—	—	—	—
RPA Rocky Mountain Region	5	(15)	(18)	(11)	(14)	(19)	(11)
RPA Pacific Coast Region	9	(16)	(22)	(10)	(18)	(23)	(12)
Nation	7	(3)	(4)	(2)	(20)	(20)	(13)

RPA = Resources Planning Act.

[a] Winter activity models were not estimated for the South Region.

Table 12-13. Hunting projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.117	(19)	(28)	(18)	(38)	(45)	(27)
RPA South Region	0.137	(26)	(41)	(29)	(27)	(42)	(30)
RPA Rocky Mountain Region	0.162	(26)	(39)	(28)	(37)	(47)	(36)
RPA Pacific Coast Region	0.067	(32)	(41)	(29)	(25)	(33)	(27)
Nation	0.119	(22)	(31)	(23)	(25)	(34)	(25)
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	19	(10)	(10)	(9)	(18)	(18)	(18)
RPA South Region	22	(1)	(1)	0	3	2	7
RPA Rocky Mountain Region	14	(5)	(10)	(8)	(6)	(11)	(9)
RPA Pacific Coast Region	20	(19)	(21)	(17)	(21)	(22)	(20)
Nation	19	(12)	(12)	(12)	(13)	(13)	(12)

RPA = Resources Planning Act.

Table 12-14. Fishing projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.296	(3)	(10)	(8)	17	6	5
RPA South Region	0.357	(12)	(20)	(15)	(17)	(24)	(18)
RPA Rocky Mountain Region	0.337	(4)	(13)	(8)	(21)	(27)	(21)
RPA Pacific Coast Region	0.264	(3)	(13)	(8)	(2)	(12)	(8)
Nation	0.309	(3)	(10)	(9)	(10)	(16)	(13)
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	18	(5)	(5)	(5)	12	9	7
RPA South Region	21	(2)	(3)	(1)	(16)	(18)	(9)
RPA Rocky Mountain Region	14	(8)	(9)	(7)	(9)	(9)	(8)
RPA Pacific Coast Region	18	(8)	(9)	(7)	(8)	(9)	(8)
Nation	18	(5)	(7)	(4)	(6)	(7)	(4)

RPA = Resources Planning Act.

effects from higher summer and annual temperatures result in further decreases in the participation rate for the South and Rocky Mountain Regions. Warmer and drier summers in the North Region reverse the direction of change for projected participation rates and days per participant from a predicted decline to an increase in 2060. Climate changes most affected days per participant in the North and South Regions, albeit in different directions. The North Region has an increase in annual days per participant, but the South Region has the largest reduction in participant days across all scenarios because of climate effects from an increase in the number of days with high temperatures.

Nonmotorized Winter Activities

Downhill skiing and snowboarding, which comprise the aggregate activity of developed skiing, had adult participation rates between 10 and 14 percent (table 12-15). Projected participation rates show increases nationwide and for the three RPA regions across all scenarios. The growth in participation rate is highest under RPA A1B because of the higher levels of income. Although climate change has mixed effects across regions and scenarios, those effects, in general, are small. Developed skiing participant days show positive growth in the Rocky Mountain and Pacific Coast Regions. The income effect remains strong for those regions due to projected income growth. The North Region experiences the only significant projected downturn in days per participant. An insignificant contribution from income growth and an increase in the minority population negatively affects the rates of change. Climate variables are a major factor only in the 2060 projections for the North Region because winters with higher maximum temperatures reduce the available opportunities for developed skiing.

Undeveloped skiing includes cross-country skiing and snowshoeing. Participants engaged in undeveloped skiing about the same number of days annually as developed skiers, but the percentage of the population that participated was lower (table 12-16). Undeveloped skiing is another winter activity that shows many projected declines, although they are of a smaller magnitude than for motorized snow activities. The Pacific Coast Region shows the largest declines, influenced by an

Table 12-15. Developed skiing projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.116	32	6	8	29	7	8
RPA South Region[a]	—	—	—	—	—	—	—
RPA Rocky Mountain Region	0.131	40	13	14	42	12	15
RPA Pacific Coast Region	0.140	32	6	8	35	9	9
Nation	0.101	45	11	13	42	7	12
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	7	(16)	(15)	(16)	(32)	(32)	(22)
RPA South Region[a]	—	—	—	—	—	—	—
RPA Rocky Mountain Region	8	18	7	8	17	4	8
RPA Pacific Coast Region	9	19	5	6	19	5	6
Nation	7	10	1	2	9	(0)	1

RPA = Resources Planning Act.

[a] Winter activity models were not estimated for the South Region.

Table 12-16. Undeveloped skiing projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.048	2	(8)	(4)	(36)	(48)	(29)
RPA South Region[a]	—	—	—	—	—	—	—
RPA Rocky Mountain Region	0.045	6	(12)	(2)	(4)	(15)	(9)
RPA Pacific Coast Region	0.035	(27)	(29)	(22)	(20)	(21)	(21)
Nation	0.033	6	(8)	(6)	(39)	(47)	(36)
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	7	3	2	4	(9)	(10)	(4)
RPA South Region[a]	—	—	—	—	—	—	—
RPA Rocky Mountain Region	7	(3)	(5)	(2)	(13)	(13)	(10)
RPA Pacific Coast Region	7	(4)	(7)	(2)	(10)	(10)	(10)
Nation	7	2	2	2	(5)	(5)	(2)

RPA = Resources Planning Act.

[a] Winter activity models were not estimated for the South Region.

increasing minority population, especially the Hispanic population. The North Region has the largest decline when climate effects are considered; the participation rate declines almost 50 percent under RPA A2. As with developed skiing, higher maximum winter temperatures drive those declines. By contrast, climate change ameliorates declines in the Pacific Coast Region in response to increasing precipitation. The projected days per participant vary across regions—slightly positive for the North Region and negative for the Rocky Mountain and Pacific Coast Regions. When factoring in climate change, all the projections for days per participant show declines for undeveloped skiing across all scenarios.

Nonmotorized Water Activities

Swimming and floating activities are included in a composite group of activities referred to as nonmotorized water activities. Swimming is a popular activity spanning all ages and comprises a variety of outdoor water activities accessible in pools, lakes, streams, and the ocean (table 12-17). Roughly 61 percent of adults participated in swimming nationwide in 2008, with significant regional variation. Moderate growth is anticipated for the participation rate under historical climate conditions. Swimming responds positively to rising education and income associated with RPA A1B. The outlook for positive growth holds when climate variables are included for all areas except the North Region, where the overall growth rate falls below zero for the RPA A2 and RPA B2 models. An unexpected negative correlation exists between warmer summer temperatures in the North Region and participation. The popularity of swimming in the Pacific Coast Region is also reflected by annual participation days, approaching 30. The projections of days per participant are quite variable across regions and scenarios. The highest growth occurs in the Pacific Coast Region with and without climate effects. Swimming days per person are highest under RPA scenario A1B due to a positive correlation with income and a negative correlation with a population that is aging and includes more minority residents. The North Region slips from positive growth rates without

climate effects to moderate declines in response to more very warm days, declining water area per person, and an increase in population age. The South Region showed a similar decline due to climate effects.

The floating activities of canoeing, kayaking, and whitewater rafting are not nearly as popular as swimming. Except for RPA A1B, all the regional projections reflect moderate declines in participation rates by 2060 (table 12-18). Increasing population density, age, and the proportion of minorities all contribute to a reduction in the floating participation rate. The greatest declines result from a decrease in the floating opportunities per capita in the Rocky Mountain Region. Warmer and drier summer temperatures in the North Region and warmer summer temperatures in the South Region further reduce participation rates relative to the historical climate scenarios. Projections of days per participant are relatively flat across regions except for the Rocky Mountain Region, where moderate declines are projected. The inclusion of climate effects, however, creates notable shifts in projected 2060 days per participant for the North and South Regions. The RPA A1B and A2 scenarios for the North Region drop 20 percent after the inclusion of climate. The South Region benefits from climate change and actually shows increasing participant days across all scenarios. In both cases, warmer and drier spring conditions contribute to the change in participant floating days.

Summary

The number of Americans participating in outdoor recreation will continue to grow during the next five decades. The greatest growth in adult participation rates will come in developed skiing, challenge activities, day hiking, swimming, horseback riding on trails, and visiting interpretive sites. Activities with low or declining rates include hunting, snowmobiling, motorized off-roading, fishing, and floating. The largest increases in participants will be for already popular activities easily undertaken by most at a wide array of venues, including visiting developed and interpretive sites, nature viewing, swimming, and day hiking.

Table 12-17. Swimming projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.633	12	6	6	0	(6)	(4)
RPA South Region	0.590	11	6	5	7	1	2
RPA Rocky Mountain Region	0.522	8	3	2	13	8	6
RPA Pacific Coast Region	0.661	8	5	4	7	4	4
Nation	0.609	11	6	5	11	6	5
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	22	7	1	1	(5)	(12)	(5)
RPA South Region	24	2	(4)	(2)	(3)	(10)	(7)
RPA Rocky Mountain Region	20	1	(5)	(3)	2	(5)	(3)
RPA Pacific Coast Region	30	13	4	4	12	3	4
Nation	24	4	(1)	(1)	2	(4)	(3)

RPA = Resources Planning Act.

Table 12-18. Floating projected participation and use by RPA region, the Nation, scenario, and climate future, 2008 to 2060.

Nation or RPA region	2008	RPA scenario			RPA scenario		
		A1B	A2	B2	A1B	A2	B2
	per capita participation	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	0.187	6	(5)	(4)	(16)	(23)	(18)
RPA South Region	0.154	5	(5)	(4)	(6)	(13)	(12)
RPA Rocky Mountain Region	0.160	(5)	(15)	(12)	(5)	(15)	(13)
RPA Pacific Coast Region	0.165	2	(13)	(8)	1	(14)	(10)
Nation	0.169	3	(11)	(7)	(10)	(22)	(15)
	days per participant	Percentage increase (decrease) from 2008 initial value					
		without climate change			*with climate change*		
RPA North Region	7	(0)	(0)	0	(20)	(20)	(8)
RPA South Region	7	(2)	(3)	(2)	6	6	2
RPA Rocky Mountain Region	5	(8)	(10)	(6)	(11)	(11)	(8)
RPA Pacific Coast Region	6	(1)	(2)	(1)	(2)	(2)	(1)
Nation	7	(0)	(0)	0	(1)	(0)	(0)

RPA = Resources Planning Act.

Outdoor recreation participation growth will vary across regions. Growth, in general, is less in the North Region because population growth is lowest there. The fastest growing activities will be developed skiing, day hiking, and horseback riding on trails. For the South Region, the growth in participation will increase the most in hiking, birding, visiting developed sites, and motorboating. The Rocky Mountain Region has some of the highest growth rates for participants because the region has the highest projected population growth rate. Activities with the highest participant growth rates in this region are developed skiing, challenge activities, day hiking, and birding. In the Pacific Coast Region, the activities with the highest participant growth include developed skiing, motorboating, horseback riding on trails, and swimming.

Participation projections for total participants incorporating climate change reveal significant positive and negative effects on recreation participation growth for some activities (table 12-19). In general, where projected climate changes have an effect, the impact is more likely to affect participation adversely rather than enhance it. For many activities, however, climate has negligible impacts. The activities affected most positively

Table 12-19. Percentage change in recreation participants across all activities and scenarios by RPA region and the Nation, 2008 to 2060.[a]

Outdoor recreation activity group	Nation or RPA region	2008 total participants[b]	2060 average change in total participants[c]	2060 average change in total participants[d, e]
			without climate change	with climate change
		millions	*percentage change increase (decrease) from 2008*	
Developed site usage				
Visiting developed sites	RPA North Region	81	36	30
	RPA South Region	63	73	69
	RPA Rocky Mountain Region	17	94	94
	RPA Pacific Coast Region	31	68	67
	Nation	194	60	58
Visiting interpretative sites	RPA North Region	67	44	44
	RPA South Region	51	83	80
	RPA Rocky Mountain Region	15	108	107
	RPA Pacific Coast Region	26	72	71
	Nation	158	68	66
Observing nature				
Birding	RPA North Region	37	44	31
	RPA South Region	27	86	88
	RPA Rocky Mountain Region	7	104	103
	RPA Pacific Coast Region	13	69	71
	Nation	82	65	58
Nature viewing	RPA North Region	80	39	33
	RPA South Region	63	72	70
	RPA Rocky Mountain Region	18	97	96
	RPA Pacific Coast Region	31	66	65
	Nation	190	60	59
Backcountry activities				
Challenge activities	RPA North Region	9	25	22
	RPA South Region	7	92	74
	RPA Rocky Mountain Region	4	112	115
	RPA Pacific Coast Region	5	54	57
	Nation	25	74	73
Horseback riding on trails	RPA North Region	6	45	73
	RPA South Region	6	67	65
	RPA Rocky Mountain Region	2	73	57
	RPA Pacific Coast Region	3	78	75
	Nation	16	69	80
Day hiking	RPA North Region	33	43	31
	RPA South Region	20	94	82
	RPA Rocky Mountain Region	10	110	110
	RPA Pacific Coast Region	17	67	63
	Nation	79	70	64
Primitive area use	RPA North Region	36	30	6
	RPA South Region	28	61	60
	RPA Rocky Mountain Region	12	89	73
	RPA Pacific Coast Region	18	53	55
	Nation	91	52	48

Table 12-19. Percentage change in recreation participants across all activities and scenarios by RPA region and the Nation, 2008 to 2060.[a] (continued)

Outdoor recreation activity group	Nation or RPA region	2008 total participants[b]	2060 average change in total participants[c]	2060 average change in total participants[d, e]
			without climate change	with climate change
		millions	*percentage change increase (decrease) from 2008*	
Motorized activities				
Motorized off-roading	RPA North Region	17	28	19
	RPA South Region	17	40	37
	RPA Rocky Mountain Region	6	83	83
	RPA Pacific Coast Region	9	47	49
	Nation	48	43	43
Motorized water activities	RPA North Region	26	41	64
	RPA South Region	21	72	75
	RPA Rocky Mountain Region	5	103	81
	RPA Pacific Coast Region	10	80	78
	Nation	62	64	57
Motorized snow activities	RPA North Region	7	12	(57)
	RPA South Region[f]	1	—	—
	RPA Rocky Mountain Region	1	30	21
	RPA Pacific Coast Region	1	52	44
	Nation	9	28	(26)
Consumptive activities				
Hunting	RPA North Region	11	5	(15)
	RPA South Region	11	15	14
	RPA Rocky Mountain Region	3	32	15
	RPA Pacific Coast Region	3	9	19
	Nation	28	17	13
Fishing	RPA North Region	29	26	48
	RPA South Region	28	44	37
	RPA Rocky Mountain Region	7	76	48
	RPA Pacific Coast Region	10	52	54
	Nation	73	46	37
Nonmotorized winter activities				
Developed skiing	RPA North Region	12	56	55
	RPA South Region[f]	4	—	—
	RPA Rocky Mountain Region	3	135	136
	RPA Pacific Coast Region	5	91	96
	Nation	24	93	89
Undeveloped skiing	RPA North Region	5	30	(17)
	RPA South Region[f]	1	—	—
	RPA Rocky Mountain Region	1	86	74
	RPA Pacific Coast Region	1	22	32
	Nation	8	53	(7)
Nonmotorized water activities				
Swimming	RPA North Region	62	46	30
	RPA South Region	47	83	76
	RPA Rocky Mountain Region	11	100	110
	RPA Pacific Coast Region	25	75	74
	Nation	144	69	69
Floating	RPA North Region	18	33	9
	RPA South Region	12	69	52
	RPA Rocky Mountain Region	3	71	71
	RPA Pacific Coast Region	6	55	53
	Nation	40	49	32

RPA = Resources Planning Act.

[a] Activities are composites derived from the National Survey on Recreation and the Environment (NSRE). Participant estimates are the product of the average weighted activity participation frequency for NSRE data from 2005 to 2009 and the adult (> 16) population in the United States during 2008 (235.4 million).

[b] Because initial values for 2008 differ across RPA scenarios, an average is used for a starting value.

[c] Average percentage change in total participation across RPA scenarios A1B, A2, and B2, without climate considerations.

[d] Average percentage change in total participation across RPA scenarios A1B, A2, and B2 and across climate models.

[e] Percentage differences between without and with climate considerations exceeding 10 percent are highlighted: > 10-percent decrease > 10-percent increase

[f] Projection models were not estimated for winter activities in the South Region.

are horseback riding on trails, motorboating, and fishing in the North Region. The activities affected most negatively include snowmobiling in the North and Pacific Coast Regions, hunting in the North and Rocky Mountain Regions, undeveloped skiing in the North and Rocky Mountain Regions, and floating in the North and South Regions. Participation in activities such as developed skiing, motorized off-roading, nature viewing, visiting developed and interpretive sites, birding, and challenge activities appear largely unaffected by climate changes.

Annual days per participant appear somewhat more negatively influenced by expected future climate changes than do participation rates. This negative influence is also reflected in total participation days (table 12-20). Incorporating climate effects generally leads to lower increases in total participation days, particularly in the North Region. Exceptions include horseback riding on trails, motorized water activities, and fishing in the North Region and day hiking in the Rocky Mountain Region. In a number of cases, climate effects lead to projected decreases in total days for some activities versus their levels in 2008. The most notable cases are motorized snow activities, hunting, undeveloped skiing, and primitive area use in the North Region.

Table 12-20. Percentage change in recreation days across all activities and scenarios by RPA region and the Nation, 2008 to 2060.[a]

Outdoor recreation activity group	Nation or RPA region	2008 total days[b]	2060 average change in total participants[c]	2060 average change in total participants[d, e]
			without climate change	with climate change
		millions	*percentage change increase (decrease) from 2008*	
Developed site usage				
Visiting developed sites	RPA North Region	948	32	19
	RPA South Region	676	73	73
	RPA Rocky Mountain Region	234	92	86
	RPA Pacific Coast Region	389	82	78
	Nation	2,246	58	53
Visiting interpretative sites	RPA North Region	519	50	57
	RPA South Region	368	100	96
	RPA Rocky Mountain Region	134	116	113
	RPA Pacific Coast Region	228	103	95
	Nation	1,249	76	79
Observing nature				
Birding	RPA North Region	3,714	40	27
	RPA South Region	2,876	55	38
	RPA Rocky Mountain Region	555	116	107
	RPA Pacific Coast Region	1,110	57	56
	Nation	8,255	59	51
Nature viewing	RPA North Region	13,993	28	23
	RPA South Region	10,855	55	50
	RPA Rocky Mountain Region	2,762	79	78
	RPA Pacific Coast Region	4,851	48	44
	Nation	32,461	45	42
Backcountry activities				
Challenge activities	RPA North Region	38	24	21
	RPA South Region	26	110	122
	RPA Rocky Mountain Region	34	97	101
	RPA Pacific Coast Region	23	51	57
	Nation	120	71	74
Horseback riding on trails	RPA North Region	73	49	67
	RPA South Region	99	87	(2)
	RPA Rocky Mountain Region	69	69	54
	RPA Pacific Coast Region	22	138	133
	Nation	263	74	63
Day hiking	RPA North Region	727	39	28
	RPA South Region	465	86	73
	RPA Rocky Mountain Region	202	98	110
	RPA Pacific Coast Region	440	65	65
	Nation	1,834	80	75
Primitive area use	RPA North Region	417	16	(14)
	RPA South Region	414	62	50
	RPA Rocky Mountain Region	163	60	48
	RPA Pacific Coast Region	245	68	65
	Nation	1,239	50	42

Table 12-20. Percentage change in recreation days across all activities and scenarios by RPA region and the Nation, 2008 to 2060.[a] (continued)

Outdoor recreation activity group	Nation or RPA region	2008 total days[b]	2060 average change in total participants[c]	2060 average change in total participants[d, e]
			without climate change	with climate change
		millions	*percentage change increase (decrease) from 2008*	
Motorized activities				
Motorized off-roading	RPA North Region	284	14	6
	RPA South Region	564	37	5
	RPA Rocky Mountain Region	97	68	65
	RPA Pacific Coast Region	107	32	35
	Nation	1,053	34	37
Motorized water activities	RPA North Region	381	44	69
	RPA South Region	386	63	65
	RPA Rocky Mountain Region	72	109	86
	RPA Pacific Coast Region	119	90	88
	Nation	958	62	52
Motorized snow activities	RPA North Region	55	(1)	(62)
	RPA South Region[f]	4	—	—
	RPA Rocky Mountain Region	6	11	3
	RPA Pacific Coast Region	12	27	17
	Nation	69	24	(39)
Consumptive activities				
Hunting	RPA North Region	211	(5)	(30)
	RPA South Region	231	14	18
	RPA Rocky Mountain Region	47	22	5
	RPA Pacific Coast Region	49	(12)	(6)
	Nation	538	3	(2)
Fishing	RPA North Region	518	19	62
	RPA South Region	575	41	17
	RPA Rocky Mountain Region	97	62	35
	RPA Pacific Coast Region	178	40	41
	Nation	1,369	38	29
Nonmotorized winter activities				
Developed skiing	RPA North Region	82	32	10
	RPA South Region[f]	23	—	—
	RPA Rocky Mountain Region	23	162	161
	RPA Pacific Coast Region	47	112	116
	Nation	171	103	96
Undeveloped skiing	RPA North Region	32	34	(23)
	RPA South Region[f]	3	—	—
	RPA Rocky Mountain Region	7	80	53
	RPA Pacific Coast Region	10	17	19
	Nation	51	56	(11)
Nonmotorized water activities				
Swimming	RPA North Region	1,383	51	21
	RPA South Region	1,118	81	64
	RPA Rocky Mountain Region	223	95	105
	RPA Pacific Coast Region	752	88	86
	Nation	3,476	70	66
Floating	RPA North Region	125	33	(8)
	RPA South Region	80	65	60
	RPA Rocky Mountain Region	17	57	54
	RPA Pacific Coast Region	40	53	50
	Nation	262	49	32

RPA = Resources Planning Act.

[a] Activities are composites derived from the National Survey on Recreation and the Environment (NSRE). Participant estimates are the product of the average weighted activity participation frequency for NSRE data from 2005 to 2009 and the adult (> 16) population in the United States during 2008 (235.4 million).

[b] Because initial values for 2008 differ across RPA scenarios, an average is used for a starting value.

[c] Average percentage change in total participation across RPA scenarios A1B, A2, and B2, without climate considerations.

[d] Average percentage change in total participation across RPA scenarios A1B, A2, and B2 and across climate models.

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[f] Projection models were not estimated for winter activities in the South Region.

Overall growth in the number of recreation participants and total days of recreation is projected because the rate of growth of the population is expected to exceed the rate at which per capita participation declines. For most activities, however, population density is somewhat negatively correlated with participation. With projected increases in urbanization, population density will increase in many areas where people live. Unless recreation behavior changes, the increases in population density will be accompanied by decreases in participation rates for some activities, especially those most affected by crowding or access limits. With an assumed static public land base, and a declining private land base as a result of land use change and access limitations, some venues will likely see more crowding and, in many cases, a decreased quality of experience.

The magnitude and direction of outdoor recreation participation will change as the proportion of minority groups in the population grows, age levels increase, urbanization becomes more widespread, and economic conditions change. Non-Hispanic White visitors, particularly males, continue to dominate participation in most outdoor recreation activities. Some exceptions occur because American Indian populations have similar or higher participation rates for many backcountry activities in most regions, and Hispanic visitors are more likely than White visitors to participate in day hiking in the North, South, and Rocky Mountain Regions. For most activities and across most regions, African-American populations are the least likely to participate. Males are more likely to participate in most activity groups, except in visiting developed sites and nature viewing. Age is negatively correlated with most activities requiring stamina. Place of residence, as represented by population density, is also correlated negatively with participation in most activities across regions, especially with space-intensive activities like motorized off-roading, hunting, horseback riding on trails, and other backcountry use. Income is positively correlated with a number of activities across regions, including motorboating, horseback riding, downhill skiing, undeveloped skiing, hunting, fishing, and challenge activities. Higher education levels often have a negative effect on participation in activities like hunting, fishing, and motor sports. Thus, with income, age, education levels, urbanization, and the proportion of minority groups, especially Hispanic, rising in the population, participation rates can be expected to continue changing.

Future Work

The recreation trends and recreation projections parts of the 2010 RPA and this RPA Update drew primarily on data from the NSRE. The NSRE ended in 2010; thus, a significant need exists to identify and develop datasets for the 2020 RPA Assessment. We are exploring several datasets for the potential to do further work: the Forest Service NVUM project, the National Woodland Owner Survey (a periodic survey on nonindustrial private forest landowners), the Department of the Interior's Fishing Hunting and Wildlife-Associated Recreation survey, and the surveys conducted by the Outdoor Industry Association. We will be using the NVUM data for more detailed analyses of recreation on national forests.

A major limitation of previous RPA recreation projections is that they provide limited information regarding changes in recreation participation and drivers of these changes at smaller scales (climate patterns, regional economic differences, cultural change), which could be more relevant to resource managers. Moreover, the climate variables for projection modeling at the national and regional levels are strictly based on the participant's origin rather than destination. Thus, further analysis is needed that explores destination-based climate variables and levels of recreation participation and consumption.

Conclusions

The American public will continue to enjoy the benefits of outdoor recreation. The number of Americans participating in outdoor recreation will continue to grow during the next five decades. Differences in recreation opportunities and future resident populations will require recreation management strategies that respond to changing regional patterns. The fastest growing recreation activities vary across regions, influenced by a variety of socioeconomic factors and the availability of recreation opportunities. In addition, national, regional, and subregional levels of participation in certain activities may change by large amounts in response to climate change. Participation projections incorporating climate change reveal significant positive and negative effects on recreation participation growth for some activities.

Population growth results in increasing numbers of outdoor recreation participants. At the same time, projected increases in urbanization will increase population density in areas where most people live. For most activities, population density is negatively correlated with participation. Unless recreation behavior changes, the increased density will be accompanied by decreases in participation rates for some activities, especially those most affected by crowding or access constraints.

Managers of the Nation's recreation opportunities will be challenged to anticipate and adjust to the changing preferences and needs of the evolving population. Projected changes in the proportion of minorities and average age will affect patterns of participation and preferred activities. Increased and refocused recreation investments may be needed to address evolving recreation preferences and demand.

The national forests provide opportunities to large numbers of the American public. Most visitors have been satisfied with their recreation experiences on national forests to date. In the future, managers' responses to changes in activity preferences and climate change will affect both recreationists' activity choices and available recreation settings.