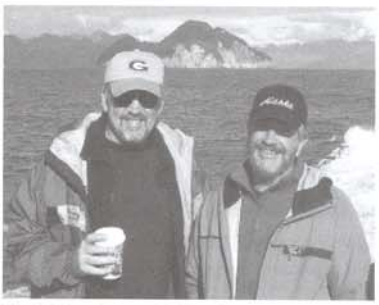
Long-Term Projections of Backcountry Recreation Use

BY KEN CORDELL and J. M. BOWKER*

Management of wilderness and other backcountry lands can be more sure-footed if some notion of what the future will hold is revealed. An important part of that future is recreational use of these lands. Some have argued that per capita nature-based recreation use has been declining and may continue doing so in the future (Pergams and Zaradic 2008). Harris (2012) reported that whereas total hunting and fishing participation numbers declined between 1996 and 2006, wildlife watching was on the rise. Findings from the 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation showed some recent rebounds since 2006, with number of hunters increasing by 9%, anglers increasing by 11%, and wildlife watchers increasing 2% (U.S. Fish and Wildlife Service 2012). Walls et al. (2009) used data from 1979 through 2008 to show that although total visits remained relatively stable, visits per capita on public lands have declined for about 15 years, except for national wildlife refuges. Using national household survey data from 1999 to 2009, Cordell (2012) found upward trends in participation for a number of nature-based activities, such as viewing/photographing natural scenery, hiking, and visiting backcountry areas. Bowker et al. (2006) used household recreation participation, socioeconomic, land-use, and agency-visitation count data to model and project declining per capita participation rates and per capita days of visitation to wilderness and primitive areas, while projecting increasing overall visitation. Similarly, Poudyal et al. (2008) and Poudyal et al. (2012) forecasted declines in hunting and fishing license sales per capita in the southeastern United States.

To address differing interpretations of observable trends and futures, we developed national projections through 2060 of participation for 17 nature-based activities. A detailed description of the data, methods, and resultant projections has been published (Bowker et al. 2012) as part of the Forest Service's Renewable Resources Planning Act 2010 Assessment of forest and rangelands (USDA Forest Service 2012).



J. M. Bowker and Ken Cordell. Photo by Babs McDonald.

We present projections for four of those 17 activities – those occurring mainly in wilderness or other backcountry. The backcountry activities featured are challenge activities, horseback riding on trails, hiking, and visiting primitive areas (see Figure 1). Limited results for other activities that sometimes occur in wilderness or backcountry are also presented. These other activities include viewing/photographing nature, floating (nonmotorized boating), hunting, and fishing. We present current (recent) and projected percentages of population participating in activities, total number participating, average days per participant, and total days for all participants per year. The main focus of the projections presented here is on their averages by activity across climate change scenarios that were forecasted. An "activity day" of participation is any amount of time on a single day by one person. A person can participate in more than one activity on a single day, so there may be "double" counting when days are added across activities. Hence, when considered across activities, the "days" metric is an index of participation and projected growth.

Methods and Data

Cicchetti (1973) pioneered population-level models to forecast recreation participation. Our research used Cicchetti's approach, combined with modern statistical techniques and improved data, to project participation in nature-based recreation activities (Bowker et al. 2012).

First, a logistic model was used to estimate the probability of participation in an activity. Results were combined

*Senior authorship is not assigned.

Figure 1 – Hikers preparing to hike through Gorges State Park to Rainbow Falls and other falls on Horsepasture River in the Nantahala National Forest, North Carolina. Photograph by Ken Cordell.

with 2008 population-weighted baseline sample means for the explanatory variables to estimate an initial participation rate for each activity. These were recalculated at 10-year intervals out to 2060 using projected changes in the external variables. Indices were then created for the participation rates by which the National Survey on Recreation and the Environment (NSRE) 2005–2009 average population-weighted participation frequencies (2008 baselines) were scaled. The resulting indexed participation rates were combined with forecasts of population growth to yield values for total adult participants across activities.

Next, a hurdle model, combining the probability of participation and number of days of use for those participating, was used to estimate indices of activity days. Hurdle model estimates were combined with 2008 NSRE baseline participant and days estimates, projected external variables, and forecast population changes to yield values of projected days of participation by activity.

Recreation participation, socioeconomic, and supply variables for the models and projections were obtained from the NSRE database (Cordell 2012). Other supply and land-use change data were obtained from Cordell et al. (2012) and Wear (2011). Historical as well as projected climate data were from Joyce et al. (in press).

Projections for Backcountry Activities

Challenge activities, often associated with young and affluent adults, include caving, mountain climbing, and rock climbing. About 11% of adults (25 million of those 16 or older) currently engage in these challenge activities, a rate forecast to increase by 15–20%, depending on which climate change assumptions are used. Averaged across climate change scenarios, the projected number of challenge activity participants is projected to grow by more than 80%, to about 43 million by 2060 (see Figure 2). Days per participant is projected to remain almost unchanged at just under five days per year per participant, but coupled with population growth, total annual challenge activity days is projected to grow from 121 million in 2008 to around 210 million days by 2060.

Riding horseback on trails was an activity pursued by around 7% of American adults (17 million) in 2008. This percentage is forecast to increase to between 8 and 9.4% by 2060 (depending on climate change assumptions). With population growth

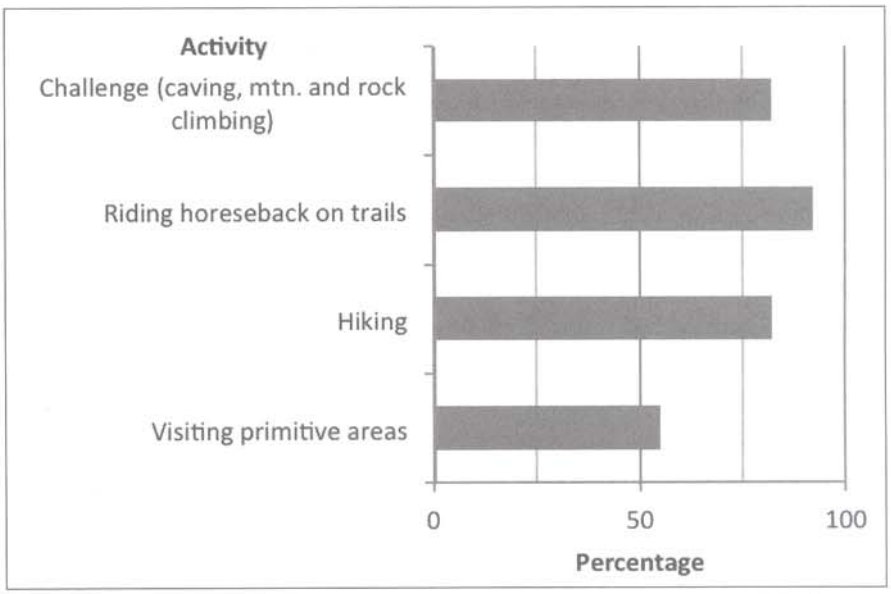


Figure 2 – Projected percentage increase in number of people 16 or older participating in backcountry activities by 2060.

included, projected annual number of participants rises by more than 90% (see Figure 2) to just over 32 million. The projections show an average decrease in number of horse trail days per participant annually by about 9%, down about 1.5 days per year. With this drop, projected population growth to 2060 leads to increases in total days of horseback riding on trails of between 40 and 92%, depending on climate assumptions. If climate is incorporated, the absolute increase in trail riding days averages 166 million days by 2060, which reflects the growth-dampening effect of projected days per year greater than 35°C .

Hiking is the single most popular backcountry activity in the United States. About a third of American adults, or about 79 million, hiked in 2008. The percentage of Americans hiking is expected to increase by 4–10% by 2060. Hiking is popular among Hispanics, thus rapid growth in numbers in this segment of the population – plus substantial population growth overall – pretty well assures that hiking participation will rise in the future. Over all scenarios, and considering climate change, the number of adults hiking should rise by more than 60% (see Figure 2) – from 79 million currently to around 129 million by 2060. Annual days of hiking per participant are virtually identical across scenarios, increasing about 6% when averaged across climate change assumptions, or about 1.5 days per year by 2060. Thus, the rate of growth of total annual days of hiking will slightly exceed that of population growth, going from about 1.8 billion in 2008 to more than 3.2 billion by 2060.

Visiting primitive areas consists of activities such as backpacking, primitive camping, and visiting a wilderness or other primitive area. This composite of backcountry activities accounted for more than 90 million participants in 2008, about 38% of all adults. The percentage of the adult population participating in this category is expected to decline by nearly two percentage points by 2060. Increased population density, declining wilderness acres per capita, and declining forest/rangeland per capita appear to be influencing this decline. However, because of population growth, overall numbers participating in these activities is expected to increase by about 50% (see Figure 2) to more than 135 million by 2060. Annually, average days visiting primitive areas are projected to decline by about one-half day per participant by 2060. Hence, total annual days of primitive area visitation will increase at a rate slightly less than population growth, but increase nonetheless from more than 1.2 billion in 2008 to almost 1.8 billion by 2060.

Projections for Other Activities Sometimes Occurring in Backcountry

Other activities for which we provide projections include viewing/photographing nature, floating (nonmotorized boating), hunting and fishing. These activities mostly do not occur in backcountry. For example, viewing/photographing/studying nature often takes place in backyards. In addition, fishing often occurs in farm ponds or in hydroelectric reservoirs.

Viewing/photographing/studying nature is very popular among Americans. This composite includes activities such as birding, wildlife watching, photography of wild flowers, fish watching, gathering natural materials (e.g., pine cones), or any number of related nature appreciation activities. The number of adults participating in birding is projected to rise from 82 to nearly 130 million by 2060. Total days are projected to rise from more than 8 billion to more than 12 billion. *Floating* is nonmotorized boating (such as canoeing, kayaking, rafting, tubing, etc.). In recent years, the percentage participating in floating has been around 17%, or about 40 million participants, annually. Projections indicate growth to about 53 million participants by 2060. Total days are projected to grow from 262 to 345 million by 2060.

Nature-based outdoor recreation activities will remain a key part of the social and economic fabric of the United States.

Hunting and fishing have remained popular with about 28 million annual adult hunters and 73 million annual adult anglers in recent years. However, on a per capita basis, these pursuits have shown some decline from past decades (Cordell 2012; Walls et al. 2009; Harris 2012). The annual adult *hunting* participation rate – nearly 12% in 2008 – is projected to decline between 24 and 35% across scenarios, with climate included. However, with population growth, the number of hunters should increase from 28 to 32 million by 2060. Total days of hunting, however, are projected to drop by 8 million by then. *Fishing* of any type is showing a similar future trend. The percentage of adults participating in fishing is expected to drop during the next five decades. However, with population increasing, the number participating is projected to increase from 73 to 103 million. Fishing days per participant are forecast to decline by about a day per annum, but total days are projected to increase by almost 400 million by 2060.

Observations and Discussion

Presented above are U.S. participation projections for four backcountry outdoor activities and four other activities that sometimes occur in backcountry. As illustrated in Figure 2, growth is projected, but rates will vary across activities. Figure 3 shows the combined projected growth trend for a broad range of nature-based outdoor recreation, including backcountry activities (Bowker et al. 2012). This is important context because it indicates a general condition of rising demand pressures for access to increasingly scarce land, water, and other resources. If our projections are showing anything near what the future has in store, then the recreation use pressures across the spectrum of public and private land, water, and other resources and across the spectrum of nature-based activities of interest to people will intensify.

Future per capita supply – To examine this very important point, related research has been completed to look at per capita supply of lands and other resources in a future where increasing population is assured. The resources examined included federal and state park land, water, nonfederal forest, nonfederal range and pasture, ocean and Great Lakes coast, mountains, area with snow cover, specially designated federal lands, and private recreation businesses (Cordell et al. 2013). Looking at just two of the resources examined, we see that there is likely to be only about two-thirds of the current 2.1 acres (0.85 ha) of federal and state park lands per capita by 2060. The western regions will continue to far outpace the eastern regions by 2060 in acres per capita. At the same time, however, these regions will experience the largest declines in per capita acres because their populations are growing very rapidly.

With regard to designated federal lands, often considered prime places for backcountry recreation activities, projected per capita area shows a similar general pattern of decline. The designated lands examined include the National Wilderness Preservation System, National Park System, and National Recreation Areas. Per capita acres of specially designated federal land in the 50 states are projected at about 0.35 acre (0.13 ha), down from the current 0.52 acre (0.21 ha). Excluding Alaska, per capita acres of specially designated land in the Intermountain subregion of the West will drop to almost half the current 1.6 acres (0.65 ha) per person to almost 0.8 acre (0.32 ha) by 2060. Figure 4 maps the county pattern of proportions of per capita acres of designated federal lands anticipated in 2060 relative to 2008. Most counties are projected to have fewer acres per capita by 2060, especially those in the West.

The influence of climate change – Participant numbers and days of participation were projected for scenarios both with and without associated climate change. Overall, projections for 14 of 17 activities indicate fewer *participants* in the future when climate change is considered. The general effect of climate change on projections of *total days* is similar. Overall, 14 of 17 activities showed declines in total days of participation when climate change is considered. Activities that could show an increase in total days under projected climate changes include interpretive site use, challenge sports, and off-road driving.

The influence of other factors – The variables making up the forecasting models resulting from this research showed that demographic variables in part determine participation in backcountry recreation. For example, males are more apt to participate in backcountry activities, in hunting, in fishing, and in floating than are females. Females are more likely to participate in the viewing activities and in horseback riding. Ethnicity is also important. Minorities, including African Americans, Hispanics, and Asians, were

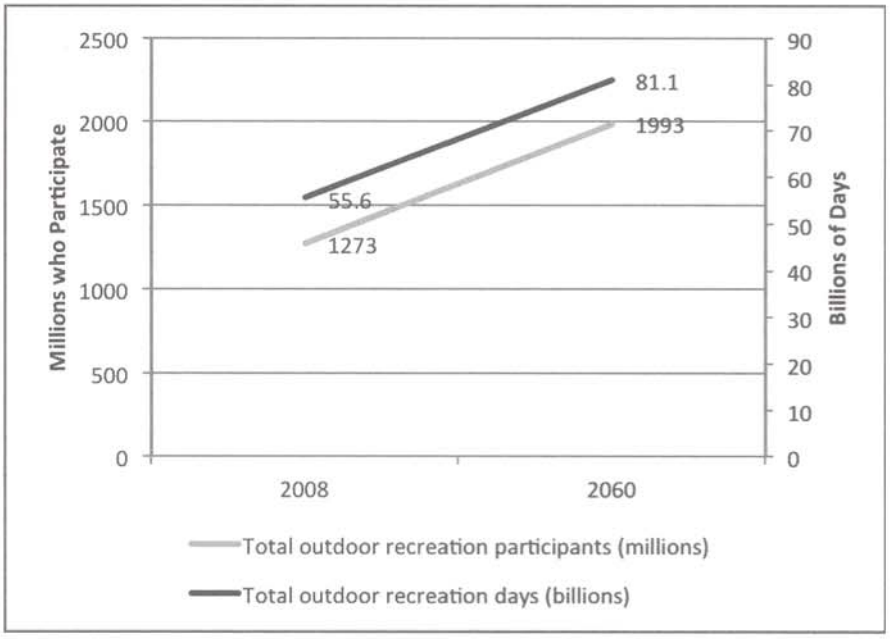


Figure 3 – Projected growth indices of nature-based outdoor recreation activity participation from 2008 to 2060. Number of participants and days are summed across the full 17 nature-based activities and do not account for potential double counting, thus they represent a growth index.

less likely than whites to participate in backcountry activities. One notable exception is hiking, where Hispanics were more likely to participate than either whites or other minority ethnicities. Another exception is that American Indians were more likely than whites to participate in hiking or horseback riding on trails.

With regard to other factors, the greater the education level, the greater the likelihood of participation in backcountry and viewing activities. However, for fishing and hunting, more education lowered the probability of participation. Income was positively associated with participation and days of use across all activities, although for birding, hiking, and hunting, the effect was small. Because place of residence in large part determines local per capita land and water availability, it is an important factor in determining participation. Hence, declines in wilderness lands and so forth induced projections of declines in spatially extensive activities, such as horseback riding on trails.

Population change is perhaps the most influential factor in projections. Depending on which futures scenario one selects, population is projected to rise in the United States from just over 300 million to nearly 500 million by 2060. If people continue to be interested in nature-based and backcountry recreation – and we believe that will be the case – in less than 50 years there will be between 100 and 200 million more Americans, which will surely translate into greater nature-based recreation demand.

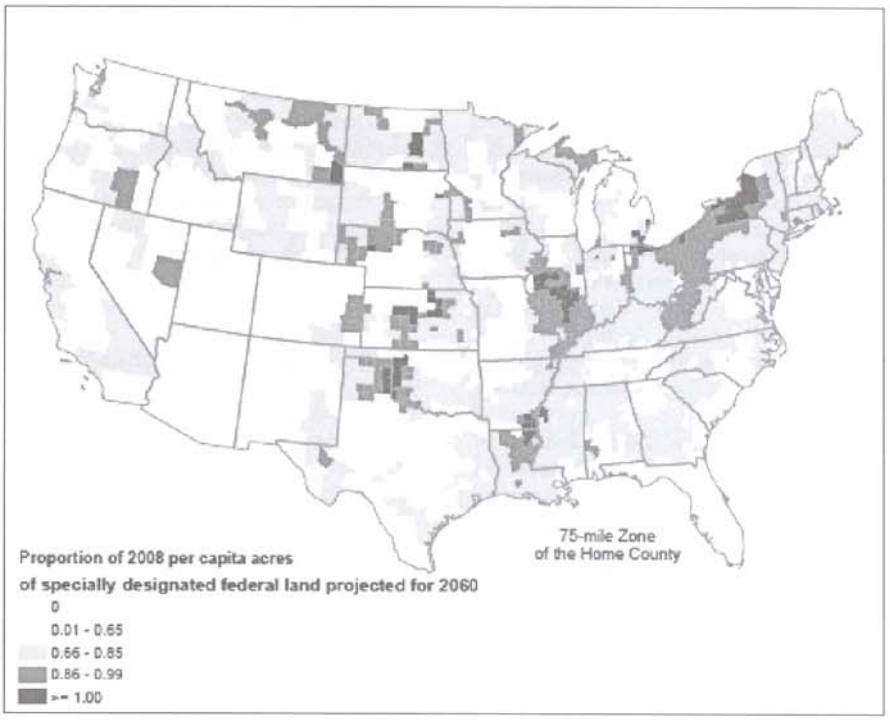


Figure 4 – Proportion of 2008 per capita acres of specially designated federal land projected for 2060, within the 75-mile distance zone of county centers. Sources: USDA Forest Service (2008), USDI National Park Service (2008), Wilderness Institute (2009).

Implications

Under nearly all of the considered future population, demographic, land-use, and climate conditions, total recreation participant numbers and days are expected to grow. Thus, nature-based outdoor recreation activities will remain a key part of the social and economic fabric of the United States. Assuming the public land base remains more or less stable, increasing population and participation will result in decreasing per capita recreation opportunities across most of the country. Although many other factors are involved, recreation resources, both natural and human-made, likely will become somewhat less "available" as more people compete to use them. In the case of privately owned land, this increased competition for recreational resources could mean rising access prices due to increased demand relative to supply. On public lands, where access fees cannot be adjusted easily to market or quasi-market conditions, increased congestion and possible declines in the quality of the backcountry recreation experience are likely to present important challenges to management.

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KEN CORDELL is a pioneering research scientist with the USDA Forest Service, Southern Research Station, 320 Green Street, Athens, GA 30602-2044, USA; email: kcordell@fs.fed.us.

J. M. BOWKER is a research social scientist with the USDA Forest Service, Southern Research Station, 320 Green Street, Athens, GA 30602-2044, USA; email: mbowker@fs.fed.us.

Continued from SOCIAL HALF, page 10

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VANCE G. MARTIN is president of The WILD Foundation; email: vance@wild.org.

JULIE ANTON RANDALL is vice president of government relations for The WILD Foundation; email: julie@wild.org.