ASSOCIATION of FISH & WILDLIFE AGENCIES

The North American Conservation Education Strategy:

Indicators and Data Sources for Assessing the State of Outdoor Recreation Participation, Environmental Literacy and Civic Participation and Stewardship in America

A white paper of the Association of Fish & Wildlife Agencies' North American Conservation Education Strategy

Funded by a Multistate Conservation Grant of the Sport Fish and Wildlife Restoration Program

November 2010

SPORT FISH & WILDLIFE RESTORATION

Produced by:

Responsive Management

Conservation Education = Conservation

INTRODUCTION

With the nation's wild lands and ecosystems continually being threatened by urbanization, deforestation, and habitat fragmentation, the need for an assessment of conservation and environmental education standards has never been greater. The obligation for Americans to regard the natural world with an urgency to conserve its resources is as pressing as ever, and the value of comprehension and retention in America's science classrooms remains utterly essential, especially given a string of recent events with national implications (the oil spill in the Gulf; deadly floods in Tennessee and Arkansas; record winter blizzards in the northeast; and the continuing threat of climate change). These occurrences and others like them demonstrate that our knowledge and awareness of the earth's systems and natural processes amount to a certain moral and educational imperative, and that the time to act is now. Standards in conservation and environmental education, particularly those that facilitate comprehension on a national level, will help to foster both a responsible, informed citizenry and an active, engaged youth population.

Further, there exists a clear and growing need for a nationwide emphasis on and encouragement of participation in nature-based outdoor activities. The multitude of sedentary and indoor leisure activities that compete today for people's time and interest—video games, computers, home theaters, and the array of electronic and digital hobbies that figure so prominently into the cultural and economic portrait of 21st Century America—help to explain why national grant funding opportunities and state allocations for anti-obesity programs have recently outmatched funding for anti-smoking initiatives (consider that although one in five Americans smokes, one in three is obese).[1] It is clear that Americans of all ages, but particularly the generation now in its early years of formal education, stand to benefit considerably from a greater willingness to engage in outdoor activities and a more sophisticated appreciation of the natural world.

To this end, and in support of its longtime goals of promoting participation in outdoor activities, highlighting the value of conservation and environmental literacy, and encouraging stewardship and active civic involvement, the Association of Fish and Wildlife Agencies (AFWA) in 2005 convened to develop the North American Conservation Education Strategy. The Conservation Education Strategy proceeds from a set of objectives designed to advance AFWA's Strategic Plan and communicate the importance of the North American Model of Fish and Wildlife Conservation (which especially emphasizes recognition that funding for fish and wildlife management largely depends on hunting and fishing license sales). In a broader sense, the Conservation Education Strategy is intended to increase knowledge and awareness of wildlife and the environment and reinforce the connection between Americans and the outdoors, in part by promoting involvement in outdoor activities and imparting on the public the value of the nation's fish and wildlife resources.

Following the inception of the North American Conservation Education Strategy, AFWA developed, in part through a survey of state fish and wildlife agencies, a list of Core Concepts to give direction to the overall effort and to reflect essential areas of conservation and environmental education to communicate to the public. From the overall list of Core Concepts, AFWA identified eleven "Top Core Concepts" that represent an abbreviated but essential

[1] Wilson, Duff. "Tobacco Funds Shrink as Obesity Fight Intensifies," *The New York Times* 27 July 2010, http://www.nytimes.com/2010/07/28/health/policy/28obesity.html?_r=1.

selection of the Education Strategy's most critical principles and messages. AFWA's Top Core Concepts include the following:

1. In North America fish and wildlife are public trust resources managed by governmental agencies.
2. Since most wildlife live on private lands, private landowners play an important role in sustaining and improving habitat.
3. Sustainable natural resources depend on the support of an informed and responsible citizenry.
4. The health and well-being of fish, wildlife, and humans depend on the quality of their environment.
5. Loss and degradation of habitat are the greatest problems facing fish and wildlife; therefore, enhancing and protecting habitat is critical to managing and conserving them.
6. Conserving biodiversity is important.
7. Fish and wildlife can be conserved and restored through science-based management which considers the needs of humans as well as those of fish and wildlife.
8. Everyone impacts fish and wildlife and their habitats, and, as human populations grow, impacts on natural resources increase.
9. Regulated hunting, fishing, and trapping are important tools for managing some wildlife populations and habitats.
10. Within the U.S., state fish and wildlife management is funded primarily through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting, and fishing equipment and motor boat fuels.
11. Wildlife-based activities, such as hunting, fishing, viewing, and photography, provide people with millions of days of outdoor recreation each year and generate billions of dollars for the economy.

AFWA's next task was to establish a series of benchmarks to assess the relationship between concepts of learning in public education and three primary components of the Conservation Education Strategy (outdoor participation, conservation literacy, and civic participation and stewardship). The benchmarks address expectations related to the Core Concepts for 4^{th}, 8^{th}, and 12^{th} grade lesson plans and general curricula. Benchmark content is specific to each grade level and identifies concepts including the various benefits and impacts of outdoor recreational pursuits (outdoor participation), the identification of ecological systems and the ways in which living and nonliving things interact (conservation literacy), and understanding of fish and wildlife laws and engagement in natural resource-related issues (civic participation and stewardship).

AFWA believes that an immersion in outdoor natural resource-based activities and an educational structure fostering environmental literacy are both important means of more fully communicating the Top Core Concepts to adults and youth. Accordingly, this paper outlines and briefly explains the available resources for baseline data pertaining to the aforementioned components of AFWA's North American Conservation Education Strategy. The review here is intended to provide proven methods of tracking Americans' participation in outdoor wildlife and natural resource-based recreational activities, and to inventory some of the resources that help to indicate levels of environmental and conservation literacy and stewardship and civic participation among Americans.

OUTDOOR RECREATION PARTICIPATION

Although the majority of recent survey data suggests that hunting and fishing license sales and participation rates are generally declining, overall participation in nature-based recreation, particularly wildlife viewing, may not reflect as dire a situation. The U.S. Fish and Wildlife Service's trend data for the period from 1996 to 2006 suggests that the number of Americans who viewed or photographed wildlife during this period increased to the extent that the new wildlife viewers more than made up for the loss in hunters and anglers during the same time, creating an overall gain of about 1.5 million people to wildlife-associated recreation.[2] Participation in many other types of outdoor and nature-based activities, such as bow hunting, appears to be increasing as well, as indicated by some of the major data sources outlined in this section. In fact, between 2000 and 2007, the total number of Americans participating in one or more outdoor recreational activities rose by 4.4 percent.[3] It is also possible that, given the economic climate in recent years, participation in outdoor recreation and nature-based activities (e.g., trips to state and national parks, hiking and camping trips) serves as an affordable substitute for more elaborate or expensive vacations.

This apparent growth in general outdoor recreational participation is tempered by the fact that, as mentioned, increasingly fewer Americans appear to be purchasing hunting and fishing licenses, despite the funds and efforts spent each year by educators and fish and wildlife professionals attempting to reverse the trend. Nevertheless, federal assistance data reported by individual states and compiled by the U.S. Fish and Wildlife Service reflects relatively steady declines in license sales for the two activities (although both the National Shooting Sports Foundation's Hunting License Sales Index and the Recreational Boating and Fishing Foundation and American Sportfishing Association's Fishing License Sales Index showed increases for 2009 hunting and fishing license sales in several states).[4] Hunting and fishing license sales trend data has been interpreted by some as more evidence of an overall downward trend in nature-based recreation; a 2008 paper by Oliver R.W. Pergams and Patricia A. Zaradic argues that electronic entertainment ("videophilia") may be to blame for widespread declining interest in outdoor recreation, including hunting and fishing.[5] Others, however, point out that license sales do not reflect the entire picture of Americans' participation in outdoor activities. H. Ken Cordell, a project leader and scientist for the U.S. Forest Service, notes that findings from the *National Survey on Recreation and the Environment* suggest that many nature-based recreational activities were in fact still growing during the first part of the decade, and that the number of wildlife viewers and photographers in particular continues to increase rather substantially.[6] Cordell further points out that license sales miss the large numbers of hunters and anglers who participate in these activities on their own properties or other private lands, thus bypassing the need to

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[2] U.S. Fish and Wildlife Service/U.S. Census Bureau. 2006. *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*.

[3] U.S. Forest Service. 2008. *National Survey on Recreation and the Environment.*

[4] Ratcliff, Bob. "Hunting, Fishing License Sales Rise in 12-State Index," *Harker Heights Evening Star*, 8 May 2010, http://hheveningstar.com/index.php?option=com_content&view=article&id=336:hunting-fishing-license-sales-rise-in-12-state-index&catid=36:sports&Itemid=54.

[5] Pergams, Oliver R.W. and Zaradic, Patricia A., "Evidence for a fundamental and pervasive shift away from nature-based recreation," *Proceedings of the National Academy of Sciences* 105 (2008): 2295-2300.

[6] Cordell, H. Ken, Bentz, Carter J., and Green, Gary T. "Nature-Based Outdoor Recreation Trends and Wilderness," *International Journal of Wilderness* 14 (2008): 7-13.

purchase a license (this tendency was especially prominent in a 2009 study conducted by Responsive Management regarding lapsed hunters' license purchasing behaviors, in which nearly half the sample of "lapsed" hunters had hunted on private land in the year prior to the survey).[7] In any case, there is debate over the exact extent of the decline in hunting and fishing, the extent to which this decline may apply to other wildlife-associated recreation, and whether these trends will continue, even out, or reverse in the future.

This section presents some of the most authoritative sources for measuring and tracking historical trends on Americans' participation in nature-related recreational activities. Two of these sources include long-established studies that have been managed for decades by the U.S. Fish and Wildlife Service and the U.S. Forest Service. In addition, a considerable amount of data is available from surveys commissioned or conducted by commercial and nonprofit organizations, including educational, sportsmen, conservation, and outdoor recreation groups. In examining a group of participation surveys from various sources, there are some expected methodological differences worth taking into consideration. For example, hunting participation data is alternately reported by species and weapon type, and the criteria for "participation" itself is defined differently among some of the surveys (i.e., a requirement of one day of participation versus multiple days). It bears mention that, as a result of these differences in methodology and sampling, the sources described here often provide conflicting data regarding the exact participation rates of hunters, anglers, and other wildlife-associated recreationists in a given year. However, in its totality, the selection of data sources amounts to a fairly comprehensive view of overall outdoor recreation participation in America (that is, the high and low ends of participation rates described in the various surveys amount to an estimation close to the reality of actual participation among Americans).

The two surveys managed by federal agencies offer consistent methodologies and the benefit of several decades of trend data. For this reason, they are the top recommendations for indicators of nature-based recreation participation rates. The *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* (commonly referred to as the *National Survey*) has been conducted every 5 years since 1955 by the U.S. Fish and Wildlife Service and the U.S. Census Bureau. Both state and national *National Survey* data dating back to 1991 can be accessed at the U.S. Census Bureau website.

The *National Survey* determines numbers of participants based on participation rates in a random sample of likely anglers, hunters, and wildlife viewers. This sample is developed from an initial phase of data collection conducted the prior year, during which U.S. households are screened to determine who had fished, hunted, and viewed wildlife. The *National Survey* asks about participation in fishing, hunting, and wildlife viewing in the year prior to the survey (note that the respondent may or may not have purchased a fishing or hunting license). Because it looks only at a single year, participation rates reported by the *National Survey* do not include those who may consider themselves to be anglers, hunters, or wildlife viewers but who did not fish, hunt, or view wildlife in the year before the survey. Therefore, the methodology employed by the U.S. Fish and Wildlife Service has two caveats: the survey may miss those recreationists who periodically do not participate in fishing, hunting, or wildlife viewing during certain years,

[7] Responsive Management/Virginia Department of Game and Inland Fisheries. 2009. *Lapsed Hunters' License Purchasing Behaviors and Their Opinions on Messages Encouraging Them to Purchase Hunting Licenses.*

and the survey may include those who may have participated only once but who otherwise do not consider themselves to be anglers, hunters, or wildlife viewers.[8]

The three tables that follow show fishing, hunting, and wildlife viewing participation rates from the most recent *National Survey* conducted in 2006 (the next survey will be conducted in 2011). Columns on the right-hand side of each table display the change in participation for the period from 2001 to 2006.

Table 1—*National Survey* trend data for participation in fishing, 1996-2006

	1996 Total participants age 16 and older (thousands)	2001 Total participants age 16 and older (thousands)	2006 Total participants age 16 and older (thousands)	Percent change from 2001-2006
Anglers, total	**35,246**	**34,071**	**29,952**	**-12**
All freshwater	29,734	28,439	25,431	-11
Freshwater, except Great Lakes	28,921	27,913	25,035	-10
Great Lakes	2,039	1,847	1,420	-23
Saltwater	9,438	9,051	7,717	-15
	Total days (thousands)	**Total days (thousands)**	**Total days (thousands)**	
Days, total	**625,893**	**557,394**	**516,781**	**-7**
All freshwater	515,115	466,984	433,337	-7
Freshwater, except Great Lakes	485,474	443,247	419,942	-5*
Great Lakes	20,095	23,138	18,016	-22*
Saltwater	103,034	90,838	85,663	-6*

Source: U.S. Fish and Wildlife Service/U.S. Census Bureau, 2006
* Not statistically significant at the 95% confidence interval.

[8] Duda, M.D., Jones, M.F., Criscione, A. *The Sportsman's Voice*. State College, PA: Venture. (in press)

Table 2—*National Survey* trend data for participation in hunting, 1996-2006

	1996 Total participants age 16 and older (thousands)	2001 Total participants age 16 and older (thousands)	2006 Total participants age 16 and older (thousands)	Percent change from 2001-2006
Hunters, total	**13,975**	**13,034**	**12,510**	**-4***
Big game	11,288	10,911	10,682	-2*
Small game	6,945	5,434	4,797	-12
Migratory bird	3,073	2,956	2,293	-22
Other animal	1,521	1,047	1,128	8*
	Total days (thousands)	**Total days (thousands)**	**Total days (thousands)**	
Days, total	**256,676**	**228,368**	**219,925**	**-4***
Big game	153,784	153,191	164,061	7*
Small game	75,117	60,142	52,395	-13*
Migratory bird	26,501	29,310	19,770	-33
Other animal	24,522	19,207	15,205	-21*

Source: U.S. Fish and Wildlife Service/U.S. Census Bureau, 2006

* Not statistically significant at the 95% confidence interval.

Table 3—*National Survey* trend data for participation in wildlife viewing, 1996-2006

	1996 Total participants age 16 and older (thousands)	2001 Total participants age 16 and older (thousands)	2006 Total participants age 16 and older (thousands)	Percent change from 2001-2006
Wildlife viewers, total	**62,868**	**66,105**	**71,132**	**8**
Around the home	60,751	62,928	67,756	8
Observers	44,063	42,111	44,467	6
Photographers	16,021	13,937	18,763	35
Feeders	54,122	53,988	55,512	3*
Visitors of public parks or areas	11,011	10,981	13,271	21
Maintainers of plantings or natural areas	13,401	13,072	14,508	11
Away from home	23,652	21,823	22,977	5*
Observers	22,878	20,080	21,546	7*
Photographers	12,038	9,427	11,708	24
Feeders	9,976	7,077	7,084	(Z)*
	Total days (thousands)	**Total days (thousands)**	**Total days (thousands)**	
Days, away from home	**313,790**	**372,006**	**352,070**	**-5***
Observing	278,683	295,345	291,027	-1*
Photographing	79,342	76,324	103,872	36*
Feeding	89,606	103,307	77,329	-25*

Source: U.S. Fish and Wildlife Service/U.S. Census Bureau, 2006
* Not statistically significant at the 95% confidence interval.
(Z) Less than 0.5 percent.

The second major data source on participation in outdoor recreational activities is the *National Survey on Recreation and the Environment* (NSRE), managed by the U.S. Forest Service with assistance from the University of Georgia and the University of Tennessee. This survey provides participation data for a number of activities not covered in the *National Survey*, although it also measures participation in fishing, hunting, and wildlife viewing as well.

The NSRE determines participation rates through a national telephone survey of U.S. residents age 16 and older that asks about participation in the year prior to the survey (the respondent need only have participated in an activity once to be counted as a participant). As such, the same considerations that apply to the *National Survey* should be kept in mind here: the data will miss recreationists who did not participate in an activity/sport in the year before the survey but who otherwise consider themselves to be participants, and it will include respondents who do not

consider themselves to be participants but who, nonetheless, took part in the given activity once in the previous year.[9]

The tables that follow reflect trend data from the NSRE, some of it produced from the most recent round of data collection in 2008.[10] Additional percentages from previous rounds of data collection have been added to the tables to show historical trends in participation from people 16 and older; the percent change for the time period from 1999-2001 to 2005-2009 is shown in the right-hand column.

Table 4—NSRE trends in participation in natural resource-based outdoor activities in 1994-95, 1999-2001, and 2005-2009 (for activities with greater than 50 million participants in 2005-2009)

[Note that the table below has been edited to show only those activities relevant to AFWA.]

Activity	1994-1995 Total participants age 16 and older (millions)	1999-2001 Total participants age 16 and older (millions)	2005-2009 Total participants age 16 and older (millions)	2005-2009 Percent of population age 16 and older	Percent change 1999-2001 to 2005-2009
Viewing natural scenery		127.1	147.5	62.7	16.1
Visiting outdoor nature center/zoo	110.9	121.0	130.8	55.6	8.2
Viewing wildflowers/trees		93.8	119.3	50.7	27.3
Viewing wildlife besides birds and fish	62.8	94.2	116.6	49.5	23.8
Visiting historic sites/monuments	91.6	96.1	99.5	42.3	3.5
Visiting a beach	128.8	84.4	99.1	42.1	17.4
Swimming in lakes, ponds, etc.	87.4	85.5	95.1	40.4	11.1
Viewing or photographing birds	54.3	68.5	82.0	34.9	19.8
Day hiking	53.5	69.1	77.8	33.1	12.6
Visiting a wilderness area		67.2	75.5	32.1	12.3
Visiting a farm or agricultural setting		58.6	73.8	31.4	26.1
Viewing salt/freshwater fish	27.6	52.3	62.9	26.7	20.3

[9] Duda, M.D., et al.

[10] Cordell, Ken H. Forthcoming. "Outdoor Recreation Trends and Futures." U.S. Forest Service General Technical Report--Draft, Southern Forest Experiment Station, Asheville, NC.

Table 4 (continued)—NSRE trends in participation in natural resource-based outdoor activities in 1994-95, 1999-2001, and 2005-2009 (for activities with greater than 50 million participants in 2005-2009)

[Note that the table below has been edited to show only those activities relevant to AFWA.]

Activity	1994-1995 Total participants age 16 and older (millions)	1999-2001 Total participants age 16 and older (millions)	2005-2009 Total participants age 16 and older (millions)	2005-2009 Percent of population age 16 and older	Percent change 1999-2001 to 2005-2009
Camping (developed)	46.5	55.3	55.9	23.8	1.0
Warmwater fishing	49.3	47.6	54.4	23.1	14.3
Motorboating	59.5	50.7	54.4	23.1	7.3
Visiting waterside besides beach		53.2	53.4	22.7	0.5

Source: NSRE 1994-1995 (n=17,217), NSRE 1999-2001 (n=52,607), and NSRE 2005-2009 (n=24,073). Notes: 1994-1995 participants based on 201.26 million people age 16+ (Woods & Poole Economics). 1999-2001 participants based on 214.02 million people age 16+ (2000 Census). 2005-2009 participants based on 235.30 million people age 16+ (2008 Census estimate). Missing data indicates that participation was not collected for the activity during that time period.

Table 5—NSRE trends in participation in natural resource-based outdoor activities in 1994-95, 1999-2001, and 2005-2009 (for activities with between 25 and 49 million participants in 2005-2009)

[Note that the table below has been edited to show only those activities relevant to AFWA.]

Activity	1994-1995 Total participants age 16 and older (millions)	1999-2001 Total participants age 16 and older (millions)	2005-2009 Total participants age 16 and older (millions)	2005-2009 Percent of population age 16 and older	Percent change 1999-2001 to 2005-2009
Visiting archaeological sites	36.1	44.0	48.2	20.5	9.7
Boat tours or excursions		40.8	45.7	19.4	12.1
Camping (primitive)	31.4	33.1	33.3	14.2	0.6
Coldwater fishing	25.1	28.4	30.0	12.8	5.7

Source: NSRE 1994-1995 (n=17,217), NSRE 1999-2001 (n=52,607), and NSRE 2005-2009 (n=24,073). Notes: 1994-1995 participants based on 201.26 million people age 16+ (Woods & Poole Economics). 1999-2001 participants based on 214.02 million people age 16+ (2000 Census). 2005-2009 participants based on 235.30 million people age 16+ (2008 Census estimate). Missing data indicates that participation was not collected for the activity during that time period.

Table 6—NSRE trends in participation in natural-resource based outdoor activities in 1994-95, 1999-2001, and 2005-2009 (for activities with between 15 and 25 million participants in 2005-2009)

[Note that the table below has been edited to show only those activities relevant to AFWA.]

Activity	1994-1995 Total participants age 16 and older (millions)	1999-2001 Total participants age 16 and older (millions)	2005-2009 Total participants age 16 and older (millions)	2005-2009 Percent of population age 16 and older	Percent change 1999-2001 to 2005-2009
Saltwater fishing	22.9	21.4	24.9	10.6	16.5
Backpacking on trails	17.0	21.5	22.9	9.7	6.4
Canoeing	17.9	19.3	22.0	9.3	14.1
Using personal watercraft	12.0	19.1	20.6	8.8	8.0
Waterskiing	22.7	16.0	19.5	8.3	22.3
Rafting	19.3	19.1	18.5	7.9	-3.2
Big game hunting	19.0	17.8	16.3	6.9	-8.7
Small game hunting	17.3	14.8	15.9	6.8	7.3

Source for above tables: NSRE 1994-1995 (n=17,217), NSRE 1999-2001 (n=52,607), and NSRE 2005-2009 (n=24,073). Notes: 1994-1995 participants based on 201.26 million people age 16+ (Woods & Poole Economics). 1999-2001 participants based on 214.02 million people age 16+ (2000 Census). 2005-2009 participants based on 235.30 million people age 16+ (2008 Census estimate). Missing data indicates that participation was not collected for the activity during that time period.

Table 7—NSRE trends in participation in natural resource-based outdoor activities in 1994-95, 1999-2001, and 2005-2009 (for activities with fewer than 15 million participants in 2005-2009)

Activity	1994-1995 Total participants age 16 and older (millions)	1999-2001 Total participants age 16 and older (millions)	2005-2009 Total participants age 16 and older (millions)	2005-2009 Percent of population age 16 and older	Percent change 1999-2001 To 2005-2009
Snorkeling	16.2	13.6	14.5	6.2	6.9
Kayaking	3.4	7.0	13.3	5.7	91.2
Mountain climbing	9.0	13.2	12.4	5.3	-5.9
Snowboarding	6.1	9.1	11.7	5.0	28.5
Caving	9.5	8.8	10.1	4.3	14.9
Sailing	12.1	10.4	10.0	4.3	-3.8
Anadromous fishing	11.0	8.6	9.7	4.1	13.2
Rock climbing	7.5	9.0	9.7	4.1	7.7
Ice skating	14.2	13.6	9.5	4.0	-29.9

Table 7 (continued)—NSRE trends in participation in natural resource-based outdoor activities in 1994-95, 1999-2001, and 2005-2009 (for activities with fewer than 15 million participants in 2005-2009)

Activity	1994-1995 Total participants age 16 and older (millions)	1999-2001 Total participants age 16 and older (millions)	2005-2009 Total participants age 16 and older (millions)	2005-2009 Percent of population age 16 and older	Percent change 1999-2001 To 2005-2009
Snowmobiling	9.6	11.3	9.3	4.0	-17.7
Rowing	10.7	8.6	9.3	4.0	8.2
Orienteering	4.8	3.7	6.0	2.6	63.3
Cross country skiing	8.8	7.8	5.0	2.1	-35.2
Migratory bird hunting	5.7	4.9	4.6	2.0	-6.0
Ice fishing	4.8	5.7	4.6	2.0	-19.2
Surfing	2.9	3.2	4.3	1.8	34.2
Scuba diving		3.8	3.5	1.5	-10.1
Snowshoeing		4.5	3.4	1.4	-25.0
Windsurfing	2.8	1.5	1.3	0.6	-14.9

Source: NSRE 1994-1995 (n=17,217), NSRE 1999-2001 (n=52,607), and NSRE 2005-2009 (n=24,073). Notes: Snorkeling in 1994-1995 included scuba diving. 1994-1995 participants based on 201.26 million people age 16+ (Woods & Poole Economics). 1999-2001 participants based on 214.02 million people age 16+ (2000 Census). 2005-2009 participants based on 235.30 million people age 16+ (2008 Census estimate). Missing data indicates that participation was not collected for the activity during that time period.

Table 8—NSRE mean and total *days* for natural resource-based activities summing to more than 100 million participation days in 1999-2001 and 2005-2009

Activity	1999-2001		2005-2009			
	Mean annual days	Total annual days (millions)	Mean annual days	Total annual days (millions)	Percent change in total days 1999-2001 to 2005-2009	Change in total days (millions) 1999-2001 to 2005-2009
Viewing wildflowers/trees	61.2	5,739.9	86.8	10,361.3	80.5	+ 4,621.4
Viewing natural scenery	56.2	7,141.5	77.7	11,471.3	60.6	+ 4,329.8
Walking for pleasure	103.2	18,109.3	105.3	20,869.4	15.2	+ 2,760.1
Viewing or photographing birds	87.8	6,009.3	98.8	8,103.9	34.9	+ 2,094.6
Visiting farm or agricultural setting	29.9	1,750.4	48.5	3,584.1	104.8	+ 1,833.7
Viewing wildlife besides birds and fish	38.8	3,652.3	46.9	5,462.0	49.5	+ 1,809.7
Outdoor pool swimming	23.2	1,971.1	25.7	2,560.8	29.9	+ 589.7
Driving off-road	23.8	857.3	29.9	1,416.9	65.3	+ 559.6
Gathering of family/friends	7.4	1,162.1	8.9	1,559.1	34.2	+ 397.0
Sightseeing	19.7	2,148.0	20.3	2,454.4	14.3	+ 306.4
Visiting a beach	13.8	1,166.7	14.7	1,454.6	24.7	+ 287.9
Visiting waterside besides beach	15.5	823.7	19.7	1,051.4	27.6	+ 227.7
Visiting outdoor nature center/zoo	6.9	838.2	8.0	1,042.3	24.3	+ 204.1
Visiting a wilderness area	14.2	957.8	15.0	1,133.3	18.3	+ 175.5
Swimming in lakes, ponds, etc.	14.4	1,230.8	14.6	1,383.8	12.4	+ 153.0
Gathering mushrooms/berries	13.6	816.8	12.5	941.8	15.3	+ 125.0

Source: NSRE 1994-1995 (n=17,217), NSRE 1999-2001 (n=52,607), and NSRE 2005-2009 (n=24,073). Notes: Snorkeling in 1994-1995 included scuba diving. 1994-1995 participants based on 201.26 million people age 16+ (Woods & Poole Economics). 1999-2001 participants based on 214.02 million people age 16+ (2000 Census). 2005-2009 participants based on 235.30 million people age 16+ (2008 Census estimate). Missing data indicates that participation was not collected for the activity during that time period.

Table 9—NSRE mean and total days for natural resource-based activities summing to between 20 and 100 million participation days in 1999-2001 and 2005-2009

Activity	1999-2001		2005-2009			
	Mean annual days	Total annual days (millions)	Mean annual days	Total annual days (millions)	Percent change in total days 1999-2001 to 2005-2009	Change in total days (millions) 1999-2001 to 2005-2009
Warmwater fishing	17.6	838.0	17.1	930.2	11.0	+ 92.2
Camping at primitive site	8.1	266.9	10.1	336.0	25.9	+ 69.1
Motorboating	13.4	679.3	13.7	743.9	9.5	+ 64.6
Camping at developed sites	8.7	483.3	9.8	545.2	12.8	+ 61.9
Backpacking on trails	10.4	223.4	12.3	282.6	26.5	+ 59.2
Visiting historic sites/monuments	6.8	655.4	7.2	712.9	8.8	+ 57.5
Visiting archaeological sites	4.6	204.0	5.1	243.9	19.6	+ 39.9
Kayaking	7.9	54.7	6.3	83.8	53.2	+ 29.1
Snowboarding	8.0	73.0	8.5	99.7	36.6	+ 26.7
Rock climbing	5.9	52.8	7.8	75.5	43.0	+ 22.7

Source: NSRE 1994-1995 (n=17,217), NSRE 1999-2001 (n=52,607), and NSRE 2005-2009 (n=24,073). 1994-1995 participants based on 201.26 million people age 16+ (Woods & Poole Economics). 1999-2001 participants based on 214.02 million people age 16+ (2000 Census). 2005-2009 participants based on 235.30 million people age 16+ (2008 Census estimate).

Table 10—NSRE mean and total days for natural resource-based activities summing to less than 20 million participation days in 1999-2001 and 2005-2009

Activity	1999-2001		2005-2009			
	Mean annual days	Total annual days (millions)	Mean annual days	Total annual days (millions)	Percent change in total days 1999-2001 to 2005-2009	Change in total days (millions) 1999-2001 to 2005-2009
Using personal watercraft	9.3	176.7	9.3	191.5	8.4	+ 14.8
Anadromous fishing	9.0	77.1	9.4	91.7	18.9	+ 14.6
Waterskiing	9.3	149.0	8.2	160.9	8.0	+ 11.9
Rafting	4.5	86.2	5.2	96.5	11.9	+ 10.3

Table 10 (continued)—NSRE mean and total days for natural resource-based activities summing to less than 20 million participation days in 1999-2001 and 2005-2009

Activity	1999-2001		2005-2009			
	Mean annual days	Total annual days (millions)	Mean annual days	Total annual days (millions)	Percent change in total days 1999-2001 to 2005-2009	Change in total days (millions) 1999-2001 to 2005-2009
Mountain climbing	6.5	85.3	7.5	92.5	8.4	+ 7.2
Surfing	25.9	82.6	20.5	87.9	6.4	+ 5.3
Rowing	7.4	63.3	7.2	66.7	5.4	+ 3.4
Caving	2.3	20.6	2.2	22.5	9.2	+ 1.9
Small game hunting	16.0	237.5	14.7	233.5	-1.7	-4.0
Windsurfing	9.3	14.3	5.4	7.0	-51.0	-7.3
Sailing	7.5	78.2	6.9	69.7	-10.9	-8.5
Migratory bird hunting	13.1	64.8	12.1	56.2	-13.3	-8.6
Snorkeling	7.3	99.4	6.1	88.5	-11.0	-10.9
Coldwater fishing	13.8	393.0	12.7	380.7	-3.1	-12.3
Saltwater fishing	12.5	268.0	10.2	255.1	-4.8	-12.9
Scuba diving	9.6	36.9	6.9	23.8	-35.5	-13.1
Canoeing	7.0	135.3	5.5	121.4	-10.3	-13.9
Big game hunting	14.7	262.1	15.3	248.2	-5.3	-13.9
Snowshoeing	7.6	34.2	5.9	19.7	-42.4	-14.5
Cross country skiing	7.8	60.8	6.7	33.8	-44.4	-27.0
Snowmobiling	10.5	118.8	8.2	75.8	-36.2	-43.0
Downhill skiing	8.0	139.8	6.3	95.6	-31.6	-44.2
Horseback riding on trails	24.5	387.6	19.3	312.9	-19.3	-74.7
Driving for pleasure	25.5	2,750.8	22.7	2,653.3	-3.5	-97.5
Picnicking	8.1	954.2	6.8	816.2	-14.5	-138.0
Bicycling on mountain/hybrid bike	29.3	1,289.8	22.3	950.1	-26.3	-339.7
Day hiking	35.6	2,458.9	27.2	2,116.3	-13.9	-342.6

Source: NSRE 1999-2001 (n=52,607), and NSRE 2005-2009 (n=24,073). Notes: 1994-1995 participants based on 201.26 million people age 16+ (Woods & Poole Economics). 1999-2001 participants based on 214.02 million people age 16+ (2000 Census). 2005-2009 participants based on 235.30 million people age 16+ (2008 Census estimate). Missing data indicates that either participation or annual days were not collected during that time period.

In addition to the two major surveys managed by federal agencies, the National Sporting Goods Association (NSGA) and the Sporting Goods Manufacturers Association (SGMA) each produce market research reports from surveys measuring levels of participation in recreational activities and sports, including outdoor nature-based activities. Both of these organizations charge fees for the complete participation reports assembled from the survey data, although the NSGA makes available on its website a selection of basic participation data for several of the last few years in which the survey was conducted (the SGMA does not offer any of its survey data free of charge).

The NSGA survey employs a panel sampling methodology, which identifies individuals who meet certain criteria (for example, general purchase and household size) and then invites them to participate in a survey. Those who turn down or ignore the invitation are discarded from the sample while those who accept are kept in a database and later contacted when they are needed to complete a survey. It should be noted that the reported response rates for this type of research are high because of this self-selection process (i.e., nonrespondents who turn down or do not respond to the invitation are not included in the response rate calculation). The age group considered in the NSGA data is age 7 and older. Unlike the surveys managed by the U.S. Fish and Wildlife Service and the U.S. Forest Service, the NSGA survey criteria dictate that the respondent must have participated more than once in the previous year for most activities. As such, a few considerations apply: the NSGA data leaves out those who did not participate in an activity in the year prior to the survey but who otherwise consider themselves to be participants of the sport or activity (despite having missed a year of participation), as well as those who consider themselves to be regular participants but who only participated once in the year prior to the survey.[11]

The SGMA purchases its data from American Sports Data, Inc., which also uses a panel sampling methodology. The age group considered in the SGMA data is age 6 and older, although the SGMA survey also uses a less restrictive criteria in determining whether a respondent is a participant in an activity or sport. Like the *National Survey* and NSRE, the SGMA defines participants as anyone who participated in the activity/sport at least once in the year prior to the survey. The same considerations for the *National Survey* and NSRE apply here: the survey misses recreationists who did not participate in an activity/sport in the year before the survey but who otherwise consider themselves to be participants, and it includes respondents who do not consider themselves to be participants but who, nonetheless, took part in the given activity once in the previous year.

Table 11 on the following page displays NSGA participation data for every other year since 1999. Note that missing data indicate that participation was not measured during that time period.

[11] Duda, M.D., et al.

Table 11—NSGA trend data for participation in recreational activities, 1999-2009

[Note that the table below has been edited to show only those activities relevant to AFWA.]

Activity	1999 Total participants age 7 and older (millions)	2001 Total participants age 7 and older (millions)	2003 Total participants age 7 and older (millions)	2005 Total participants age 7 and older (millions)	2007 Total participants age 7 and older (millions)	2009 Total participants age 7 and older (millions)
Archery (target)	4.9	4.7	3.9	6.8	6.6	7.1
Backpack/wilderness camping	15.3	14.5	15.1	13.3	13.0	12.3
Boating, motor/power	24.4	23.9	24.2	27.5	31.9	24.0
Camping (vacation/overnight)	50.1	48.7	53.4	46.0	47.5	50.9
Fishing	46.7	44.4	42.7	41.6	41.0	32.9
Hiking	28.1	26.1	26.7	29.8	28.6	34.0
Hunting with firearms	20.4	16.8	17.7	19.6	19.5	18.8
Hunting with bow and arrow	5.8	4.7	5.0	6.6	5.7	6.2
Kayaking					5.9	4.9
Mountain/rock climbing					4.6	
Muzzleloading	3.3	3.2	3.4	4.1	3.6	3.8
Scuba diving (open water)	2.3	2.1			2.4	
Skiing (alpine)	7.4	7.7	6.8	6.9	6.4	7.0
Skiing (cross country)	2.2	2.3	1.9	1.9	1.7	1.7
Snowboarding	3.3	5.3	6.3	6.0	5.1	6.2
Snowmobiling	3.4	4.6				
Target shooting (net)	17.7	17.3	17.9	19.9	20.9	19.8
Target shooting – airgun	3.5	2.9	3.8	6.7	6.6	5.2
Water skiing	6.6	5.8	5.5	6.7	5.3	5.2

Source: *Ten-Year History of Sports Participation*, National Sporting Goods Association, 7 August 2010, http://www.nsga.org/i4a/pages/index.cfm?pageid=3479

Table 12 on the following page displays SGMA data for participation in outdoor recreation activities for the period from 2007 to 2009.

Table 12—SGMA trend data for participation in outdoor recreational activities, 2007-2009

[Note that the table below has been edited to show only those activities relevant to AFWA.]

Activity	2007 Total participants age 6 and older (thousands)	2008 Total participants age 6 and older (thousands)	2009 Total participants age 6 and older (thousands)	Percent change 2008-2009
Outdoor sports				
Backpacking overnight – more than ¼ mile from vehicle/home	6,637	7,867	7,647	-2.8
Birdwatching – more than ¼ mile from home/vehicle	13,476	14,399	13,294	-7.7
Camping (recreational vehicle)	16,168	16,517	17,436	5.6
Camping – within ¼ mile of vehicle/home	31,375	33,686	34,338	1.9
Climbing (sport/indoor/boulder)	4,514	4,769	4,313	-9.6
Climbing (traditional/ice/mountaineering)	2,062	2,288	1,835	-19.8
Fishing (fly)	5,756	5,941	5,568	-6.3
Fishing (freshwater/other)	43,859	40,331	40,961	1.6
Fishing (saltwater)	14,437	13,804	12,303	-10.9
Hiking (day)	29,965	32,511	32,572	0.2
Hunting (bow)	3,818	3,722	4,226	13.5
Hunting (handgun)	2,595	2,873	2,276	-20.8
Hunting (rifle)	10,635	10,344	11,114	7.4
Hunting (shotgun)	8,545	8,731	8,490	-2.8
Shooting (sport clays)	4,115	4,282	4,182	-2.3
Shooting (trap/skeet)	3,376	3,669	3,368	-8.2
Target shooting (handgun)	11,736	13,365	12,473	-6.7
Target shooting (rifle)	12,436	13,102	12,730	-2.8
Wildlife viewing – more than ¼ mile from home/vehicle	22,974	24,113	21,291	-11.7
Winter sports				
Skiing (alpine/downhill)	10,362	10,346	10,919	5.5

Table 12 (continued)— SGMA trend data for participation in outdoor recreational activities, 2007-2009

[Note that the table below has been edited to show only those activities relevant to AFWA.]

Activity	2007 Total participants age 6 and older (thousands)	2008 Total participants age 6 and older (thousands)	2009 Total participants age 6 and older (thousands)	Percent change 2008-2009
Skiing (cross-country)	3,530	3,848	4,157	8.0
Skiing (freestyle)	2,817	2,711	2,950	8.8
Snowboarding	6,841	7,159	7,421	3.7
Snowshoeing	2,400	2,922	3,431	17.4
Telemarking (downhill)	1,173	1,435	1,482	3.3
Water sports				
Boardsailing/windsurfing	1,118	1,307	1,128	-13.7
Canoeing	9,797	9,935	10,058	1.0
Jet skiing	8,055	7,815	7,724	-1.2
Kayaking (recreational)	5,070	6,240	6,212	-0.4
Kayaking (sea/touring)	1,485	1,780	1,771	-0.5
Kayaking (white water)	1,207	1,242	1,369	10.2
Rafting	4,340	4,651	4,318	-7.2
Sailing	3,786	4,226	4,342	2.7
Scuba diving	2,965	3,216	2,723	-15.3
Snorkeling	9,294	10,296	9,358	-9.1
Surfing	2,206	2,607	2,403	-7.8
Wakeboarding	3,521	3,544	3,577	0.9
Water skiing	5,918	5,593	4,862	-13.1

Source: *2010 SGMA Sports & Fitness Participation Top Line Report*

The Outdoor Foundation, a nonprofit entity supported by the Outdoor Industry Association, offers reports of Americans' participation in outdoor recreational activities for several years of the past decade. The Foundation sponsors research on both individual sport participation as well as overall outdoor recreation participation rates, using a panel sampling methodology similar to the NSGA and SGMA (the Outdoor Industry Foundation purchases samples from the U.S. Online Panel compiled by Synovate). The age group considered in the Outdoor Industry Foundation data is 6 and older, and the Foundation defines participants as anyone who participated in the activity at least once in the year prior to the survey.

Table 13 below reflects participation data from the most recent round of data collection for 2009; the percent change for the time period from 2008 to 2009 is shown in the right-hand column.

Table 13—Outdoor Recreation Foundation trend data for participation in outdoor recreation activities, 2007-2009

[Note that the table below has been edited to show only those activities relevant to AFWA.]

Activity	2007 Total participants age 6 and older (thousands)	2008 Total participants age 6 and older (thousands)	2009 Total participants age 6 and older (thousands)	Percent change 2008-2009
Outdoor activities				
Backpacking overnight – more than ¼ mile from vehicle/home	6,637	7,867	7,647	-2.8
Birdwatching – more than ¼ mile from vehicle/home	13,476	14,399	13,294	-7.7
Camping (RV)	16,168	16,517	17,436	5.6
Camping – within ¼ mile of vehicle/home	31,375	33,686	34,338	1.9
Canoeing	9,797	9,935	10,058	1.2
Climbing (sport/indoor/boulder)	4,514	4,769	4,313	-9.6
Climbing (traditional/ice/mountaineering)	2,062	2,288	1,835	-19.8
Hiking (day)	29,965	32,511	32,572	0.2
Kayaking (recreational)	5,070	6,240	6,212	-0.4
Kayaking (sea/touring)	1,485	1,780	1,771	-0.5
Kayaking (white water)	1,207	1,242	1,369	10.2
Rafting	4,340	4,651	4,318	-7.2

Table 13 (continued)—Outdoor Recreation Foundation trend data for participation in outdoor recreation activities, 2007-2009

[Note that the table below has been edited to show only those activities relevant to AFWA.]

Activity	2007 Total participants age 6 and older (thousands)	2008 Total participants age 6 and older (thousands)	2009 Total participants age 6 and older (thousands)	Percent change 2008-2009
Trail running	4,216	4,857	4,883	-0.5
Wildlife viewing – more than ¼ mile from home/vehicle	22,974	24,113	21,291	-11.7
Fishing				
Fishing (fly)	5,756	5,941	5,568	-6.3
Fishing (freshwater)	43,859	40,331	40,961	1.6
Fishing (saltwater)	14,437	13,804	12,303	-10.9
Winter sports				
Skiing (alpine/downhill)	10,362	10,346	10,919	5.5
Skiing (cross-country)	3,530	3,848	4,157	8.0
Snowboarding	6,841	7,159	7,421	3.7
Snowshoeing	2,400	2,922	3,431	17.4
Telemarking (downhill)	1,173	1,435	1,482	3.3
Hunting				
Hunting (bow)	3,818	3,722	4,226	13.5
Hunting (handgun)	2,595	2,873	2,276	-20.8
Hunting (rifle)	10,635	10,344	11,114	7.4
Hunting (shotgun)	8,545	8,731	8,490	-2.8
Water sports				
Boardsailing/windsurfing	1,118	1,307	1,128	-13.7
Sailing	3,786	4,226	4,342	2.7
Scuba diving	2,965	3,216	2,723	-15.3
Snorkeling	9,294	10,296	9,358	-9.1
Surfing	2,206	2,607	2,403	-7.8
Wakeboarding	3,521	3,544	3,577	0.9

Source: Outdoor Recreation Foundation 2010 Top Line Report, 7 August 2010, http://www.outdoorfoundation.org/pdf/ResearchParticipation2010Topline.pdf

Finally, the Children and Nature Network (C&NN), an organization supporting initiatives and efforts to encourage youth involvement in nature-based activities, presents several reports of research outlining the physical and psychological benefits of engaging in outdoor recreational activities. Much of the C&NN research contains correlations to AFWA's Top Core Concepts, including a 2009 study examining attitudes of the American public on the relationship between direct experiences in nature and healthy childhood development, as well as 2008 survey report detailing an inventory and assessment of nationwide, state, and local campaigns focusing on childhood exposure to nature.[12]

ENVIRONMENTAL AND CONSERVATION LITERACY

While the major surveys measuring participation in outdoor recreation provide consistent trend data for the last decade or so, the tools available for measuring environmental and conservation literacy among Americans, a second component of AFWA's Conservation Education Strategy, are somewhat more limited. One reason for this is the apparent lack of national survey research providing up-to-date trend data on environmental knowledge and related concepts—although some studies are available, much of the data are either outdated or offer only an inconsistent, snapshot view of the state of environmental literacy. At the same time, educational indicators such as national and international standardized tests, databanks of scores, test questions, and suggested curriculum standards are certainly capable of suggesting American students' exposure to and retention of some of the content from AFWA's Top Core Concepts. Other data sources and indicators include federal and state fish and wildlife learning programs (some offered in formal K-12 education), which vary considerably in terms of content, standards, and expectations. Finally, the No Child Left Behind Act appears close to being reworked through a major policy overhaul on the federal level, while other pending legislation calling for standards and benchmarks in environmental education (particularly the proposed No Child Left Inside language) may positively affect the future availability of additional tools for measuring conservation literacy.

Survey Research

The U.S. Forest Service's *National Survey on Recreation and the Environment* has, in past rounds of data collection, administered several modules of questions designed to measure basic knowledge and opinions on federal land and wildlife management and other issues related to the work of the Forest Service. A number of these questions are highly relevant to the Top Core Concepts, including specific questions addressing attitudes and beliefs about forest and natural resource management and values related to management and environmental policy (see Appendices A and B for a list of questions from past NSRE surveys pertinent to the Top Core Concepts). Unfortunately, national survey data for these questions are not available to reflect results from the current decade, although there are plans for the next round of NSRE surveys to include questions on conservation and environmental attitudes and beliefs.[13] As such, it seems important to keep this resource in mind as an upcoming indicator for national comprehension of some of AFWA's Top Core Concepts.

[12] Children and Nature Network, Research, Resources & Publications, http://www.childrenandnature.org/research/, 5 August 2010.
[13] K. Cordell, personal communication, 9 August 2010.

The NSRE survey questions may be the best example of a nationwide measurement of attitudes and knowledge levels concerning some of the issues listed in AFWA's Top Core Concepts. However, other survey research conducted at the regional and state levels has employed similar questionnaire content. For example, a 2004 Responsive Management study conducted for the Northeast Conservation Information and Education Association (NCIEA) and its member agencies examined respondents' knowledge of state fish and wildlife agencies and agency credibility, their attitudes toward various natural resource management issues, values related to outdoor recreation and the environment, and their participation in outdoor recreational activities (all areas with strong correlations to AFWA's Core Concepts). The survey was conducted in states in the northeast region of the United States, with both regional and state results reported.

Other parts of the country have been similarly assessed: in surveying residents of the southeastern region of the United States in 2005, Responsive Management used a questionnaire similar to the NCIEA survey, while a Colorado State University study from the same year measured wildlife value orientation types among residents of the western region of the country.[14] (Questions from the NCIEA study are listed in Appendix C; regional and state reports of survey results, including a literature review, can be accessed via the Responsive Management website, www.responsivemanagement.com, under the tab for wildlife reports.) Numerous other past studies conducted by Responsive Management have also employed questions designed to gauge opinions on the importance of conservation, priorities for fish and wildlife management, and other areas indicative of environmental and conservation literacy. A survey questionnaire incorporating elements from the NCIEA study as well as other assessment research could easily be reproduced to measure opinions on a nationwide scale and implemented over time to provide an analysis of trends—it simply appears that no such effort has yet been undertaken (except on regional and statewide levels).

Environmental and conservation literacy has been evaluated periodically by other research organizations as well, although relevance and correlation to AFWA's Top Core Concepts varies by study. For example, major research firms such as the Pew Research Center, the Gallup Organization, and Zogby International have conducted numerous surveys of the general public examining concern over various environmental issues, although many of these studies are implemented within the context of specific events or larger issues (the oil spill in the Gulf, energy policy, global warming, etc.). In other words, in examining the results of such surveys, one would need to infer the relevance of the study findings to AFWA's Top Core Concepts. For example, a Gallup trends study examining recycling behaviors among Americans is somewhat related to AFWA's third Core Concept concerning the sustainability of natural resources, whereas many of Gallup's other available poll results have little to do with hunting, fishing, or wildlife management.[15] Most polls conducted by major firms such as Gallup and the Pew Research Center that bear any relevance to AFWA's needs have been archived under the "environment" topic category on the organizations' websites.[16] [17] It should be noted, however,

[14] Teel, T.L., Dayer, A.A., Manfredo, M.J., and Bright, A.D. 2005. *Regional results from the research project entitled, "Wildlife Values in the West."* Project Report No. 58 submitted to the Western Association of Fish and Widllife Agencies by the Human Dimensions in Natural Resources Unit, Colorado State University, CO.
[15] Morales, Lymari. "Green Behaviors Common in U.S., But Not Increasing," the Gallup Organization, 9 April 2010, http://www.gallup.com/poll/127292/Green-Behaviors-Common-Not-Increasing.aspx.
[16] Gallup archive of polls and studies concerning the environment, http://www.gallup.com/poll/1615/Environment.aspx, 7 October 2010.

that such studies are conducted sporadically at best, or else are implemented during election cycles to evaluate the relative priority of basic environmental issues. Apart from the aforementioned surveys conducted by the U.S. Forest Service and Responsive Management, there appears to be relatively little current survey research conducted by major polling firms that measures or tracks opinions and knowledge related to AFWA's Top Core Concepts.

One indicator of conservation and environmental literacy among Americans, albeit slightly dated, comes from the survey research conducted by Roper Public Affairs and the National Environmental Education & Training Foundation (NEETF). The most recent compendium of this research was produced in 2005 by NEETF former President Kevin Coyle, and summarizes ten years of data concerning environmental literacy in America; the report, *Environmental Literacy in America*, can be accessed via the website of the National Environmental Education Foundation.[18] The Foundation also lists on its website several other reports and studies focusing on environmental literacy issues, although none of the available research applies to the latter part of the decade after 2005.

Environmental Literacy in America is an excellent resource for baseline data concerning youth and adult attitudes toward the environment and their knowledge of conservation and environmental issues. The report provides substantial discussion on research-based indications of how much Americans know about the environment; the influence of environmental myths on basic beliefs and attitudes; general actions and attitudes related to the environment; media strategies for enhancing adult environmental learning; the differences between environmental information and environmental education; the effects of environmental education on youth; and strategies for improving environmental education and literacy. As mentioned, the one drawback with the Roper/NEETF research is that there is nothing beyond 2005 to follow up the research conducted during the first part of the decade.

The NEETF also makes available on its website an annual report containing information on its new initiatives and innovations in environmental literacy information dissemination; the most recent report available was produced for NEETF fiscal year 2008.

Educational Tools

There are a number of different educational tools available for approximating the state of environmental and conservation literacy, although many require some interpretation and inference in order to make the connection between the tool and AFWA's Core Concepts. One of the most direct ways to assess environmental and conservation literacy among youth is to examine environmental literacy plans themselves, which are presently developed on a state-by-state basis and therefore tend to differ in content, depth, and scope. In general, most environmental literacy plan content is directed by state departments of education and other teaching professionals, although substantial input is often supplied by state fish and wildlife agencies. In fact, a survey commissioned by AFWA to examine fish and wildlife agency involvement in conservation education found that, in addition to consulting on environmental

[17] Pew Research Center archive of survey questions and polls concerning the environment, http://people-press.org/questions/ [must specify topic in searchable list], 7 October 2010.
[18] Kevin Coyle. *Environmental Literacy in America*, the National Environmental Education & Training Foundation, Washington, D.C., 2005 http://www.neefusa.org/pdf/ELR2005.pdf.

literacy plan content, a number of agencies either provide or help to facilitate grants for schools, teacher training, information on native plant and wildlife species, sample lesson plans, and training on the use of public lands for school activities or field trips.[19]

As a way to aid in the development of individual literacy plans (as well as to provide direction to more general initiatives, lessons, and programs), the North American Association for Environmental Education has made available a database of learning resources through its website.[20] Such resources include lesson plans, unit content, projects, workshop materials, teaching aids, interpretive activities (e.g., field trip plans), and curriculum guides, all related to environmental education. The database includes material from all of North America and is searchable by keyword. For example, checking all of the options for resource types (units, events, service learning, audio/visual, lesson plan/activity, etc.) and executing a search for materials using the keyword "habitat" returns the following: "Hop into Action," a lesson plan produced by the Amphibian Crossing organization; "Treasures in the Sea: Our Bahamian Marine Resources," a resource book on marine biodiversity produced by the Center for Biodiversity and Conservation, American Museum of Natural History; several "Project WILD" resources; and the "Earth Awareness Researchers for Tomorrow's Habitat" program, produced by the Kansas State University Research and Extension Office.

The North American Association for Environmental Education database is vast, linking to numerous resources and items with correlations to AFWA's Top Core Concepts. It should be noted, however, that although many of the educational resources and activities contain material that addresses or is related to the Core Concepts, they do not, in and of themselves, necessarily constitute data sources or indicators of actual retention and understanding.

Another major educational resource for estimating the state of environmental and conservation literacy includes trends in scores from standardized tests, especially those that measure knowledge of certain types of content relevant to AFWA's interests. Although many national-level tests stop short of evaluating aptitude in subjects beyond mathematics and English (reading, writing, composition, etc.), a few resources are available for measuring retention of earth science and biology material (i.e., subjects that demonstrate a relationship with AFWA's Core Concepts). However, it bears repeating that educational standards and classroom content vary rather significantly by state, and that most states have separate approaches to standardized tests (see the heading later in this section on pending legislation and future indicators for a discussion on emerging national standards in public education).

Educational assessments developed by the California Department of Education, for example, rely in part on Standardized Testing and Reporting (STAR), a statewide database of test questions and assessment tools organized by grade and subject. In this case, assessment of concepts related to scientific investigation and experimentation, earth science, life science, and physical

[19] D.J. Case and Associates. *Conservation Education in Fish and Wildlife Agencies*, prepared for the Association of Fish and Wildlife Agencies, March 2010.
[20] North American Association for Environmental Education, NAAEE Resources, http://naaee.org/cgi-bin/risee/noram/programs?id, 6 August 2010.

science initially begin at the fifth grade level, whereas test questions on evolution and ecology are included in standardized tests typically administered to high school students.[21]

On the other hand, the Colorado Department of Education's "units of student assessment" system somewhat resembles the California STAR assessment mechanism, although the content detail is different in each.[22] For example, science assessment begins in the eighth grade in Colorado. As another example, Virginia uses the Standards Of Learning to guide the direction and content of its science standards and curriculum framework, which are available on the Virginia Department of Education's website.[23] Elsewhere, state departments of education employ entirely separate approaches to evaluation and testing of science curriculum material. A national resource available to all states is the Performance Assessment Links in Science, an interactive resource bank of science assessment tasks, questions, and test material. The resource bank is continually updated and indexed through National Science Education Standards.[24]

Overall, the majority of state standardized tests show correlations to AFWA's Core Concepts, although the exact degree to which a correlation exists and the depth of evaluation on Core Concept material is usually different in each case. For this reason, AFWA may wish to enlist the services of a professional educator or educational consultant to analyze the wealth of material available from state departments of education to determine individual relationships between curriculum content and Core Concept material.

In a more general sense, the National Center for Education Statistics (NCES) offers a wealth of resources for comparing test scores and academic assessment records from among the different states. The Center's website also provides a searchable inventory of publications, questionnaire item banks, survey reports divided by educational category (early childhood, elementary/ secondary, postsecondary, etc.), and various other assessment tools.[25] One particularly useful resource from the NCES is the Nation's Report Card for Science, a presentation of results from the National Assessment of Educational Progress (NAEP) for science. This assessment was conducted through a standardized test of grade-specific science material administered to fourth, eighth, and twelfth-grade students in 44 participating states and Department of Defense schools.[26] The assessment measures understanding in three major fields of science: Earth, physical, and life, with the latter category containing material with the most relevance to AFWA's Core Concepts. This section of the assessment tests students' understanding of change and evolution (i.e., the diversity of life on Earth and changes in diversity over time) as well as organisms and ecology (i.e., interdependence of life, including populations, communities, and ecosystems).[27]

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[21] Standardized Testing and Reporting (STAR) Sample Questions, http://starsamplequestions.org/starRTQ/search.jsp, 6 August 2010.
[22] Colorado Department of Education Units of Student Assessment, http://www.cde.state.co.us/cdeassess/co_law.html, 5 August 2010.
[23] Virginia Department of Education Standards and SOL-Based Resources for Science, http://www.doe.virginia.gov/testing/sol/standards_docs/index.shtml, 8 August 2010.
[24] Performance Assessment Links in Science, http://pals.sri.com/, 4 August 2010.
[25] National Center for Education Statistics, http://nces.ed.gov/, 7 August 2010.
[26] NCES National Report Card for Science 2005, http://nces.ed.gov/nationsreportcard/science/, 6 August 2010.
[27] Major concepts covered by the NAEP science assessment, http://nces.ed.gov/nationsreportcard/science/lifescience.asp, 4 October 2010.

The NCES also provides a database of released NAEP exam questions searchable by subject area, grade level, type of question, and difficulty.[28] Results from the most recent National Assessment of Educational Progress conducted in 2009 are set to be made available at the end of 2010.

Finally, the NCES offers reports of results from the Trends in International Mathematics and Science Study (TIMSS), a large-scale mathematics and science achievement assessment comparing scores from fourth and eighth grade students in the United States with data from students in other countries. TIMSS data have been collected in 1995, 1999, 2003, and 2007 in more than 60 countries.[29]

Media Tools

An additional indicator of public awareness and understanding of environmental and conservation issues to consider is media exposure. Although exposure is not a direct measure of public knowledge, it may be useful as a convenient and cost-effective proxy for measuring public awareness based on the assumption that being exposed to media coverage of environmental issues fosters awareness of those issues and the general notion that the environment is an important social issue. Therefore, media content analysis may provide useful data to support or bolster other national measures related to public awareness of environmental issues.

Media sources offer easy access to national data to measure exposure. A media content analysis could be conducted somewhat inexpensively either independently or in partnership with a university or college on an annual or other periodic basis to measure media exposure. Items to examine in the media content analysis would include circulation, readership/viewership, the size/length of environmental issue covered, and placement/level/importance given to the environmental issue covered in major national media sources that include television news, radio news, online news sources, and newspapers that reach national audiences. Additional items to measure, which may also be used to inform an assessment of public knowledge levels, may include identification of issues covered and those covered most frequently, nature of issue presentation (i.e., positive, negative, or neutral), and key words.

Content analysis is an indirect but potentially useful tool that uses media exposure to serve as a proxy for measuring public awareness. The results would not be a substitute for surveys or other assessments of actual awareness and knowledge levels, but may provide an efficient and periodic examination of predominant sources of information the national public may use to acquire their awareness and knowledge of environmental issues.

Similarly, an analysis of subscription and circulation rates for magazines and publications such as *Nature*, *National Geographic*, and *Discover* (which contain content supportive of AFWA's Core Concepts as well as other material focusing on wildlife management, biodiversity, climate change, etc.) could perhaps serve as a proxy measurement of general audience levels of interest in environmental and conservation issues. Again, such an examination would hardly substitute

[28] NAEP Questions Tool, http://nces.ed.gov/nationsreportcard/itmrlsx/search.aspx?subject=science, 4 October 2010.
[29] Trends in International Mathematics and Science Study, http://nces.ed.gov/timss/, 9 August 2010.

for reliable survey research, but could provide additional supplemental insights and context into an investigation of environmental and conservation literacy.

Pending Legislation and Future Indicators

Two different political and legislative developments on the horizon may end up figuring prominently into the availability of ongoing trend data related to the mandates of AFWA's Conservation Education Strategy. First, the No Child Left Inside Coalition, a consortium of 1,825 state natural resource and outdoor recreation agencies and national nonprofit organizations, has spearheaded advocacy efforts calling for the introduction of new national standards in environmental and conservation education in formal K-12 curricula.[30] Among its efforts to advance the proposed legislation, the Coalition is actively seeking signatures on a petition advocating the insertion of environmental education language and standards into school lesson plans. An early version of the legislation, written to help state departments of education enhance and expand programs and funding for environmental education, as well as implement academic content standards, achievement standards, and curriculum frameworks in environmental education across the nation, was passed by the U.S. House of Representatives in 2008.[31] If the No Child Left Inside legislation is able to garner enough support in future sessions of Congress, national standards in environmental education and outdoor participation could create new opportunities for evaluating student achievement in areas and subjects directly related to many of AFWA's stated goals.

The other major development concerns political movement toward more general standards-based education reform on the national level, especially through changes to the current No Child Left Behind Act. As part of the proposed reform, the U.S. Department of Education's Race to the Top Fund provides financial support for states whose education departments adopt uniform standards and assessments that build data systems measuring student growth and success and inform teachers and principals about how they can improve instruction.[32] At present, 27 states have adopted national standards developed by governors and state school administrators across the nation.[33] The No Child Left Inside Coalition notes that the U.S. Department of Education has, for the first time, included environmental literacy under its "Well Rounded Education" annual budget initiative.[34] Thus, if the continued adoption of national educational standards coincides with the introduction of No Child Left Inside legislation, AFWA may be afforded an accessible and timely opportunity to gauge students' success in areas related to the Top Core Concepts, including standards established for physical education, earth science, biology, and other subjects related to conservation/environmental literacy.

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[30] No Child Left Inside Coalition Members, http://www.cbf.org/Page.aspx?pid=956, 7 August 2010.
[31] No Child Left Inside Act, http://edlabor.house.gov/no-child-left-inside-act/index.shtml, 7 August 2010.
[32] U.S. Department of Education Race to the Top Fund website, http://www2.ed.gov/programs/racetothetop/index.html, 27 July 2010; 5 August 2010.
[33] Tamar Lewin. "Many States Adopt National Standards for Their Schools," The New York Times, 21 July 2010, http://www.nytimes.com/2010/07/21/education/21standards.html?_r=1&scp=1&sq=education%20standards&st=cs.
[34] U.S. Department of Education press release, http://press.abc-directory.com/press/5729, 3 Feb. 2010; 5 August 2010.

CIVIC PARTICIPATION AND STEWARDSHIP

The third and final component of AFWA's Conservation Education Strategy outlined in this document concerns assessment of civic participation and involvement in stewardship activities among American youth and adults. Similar to indicators of environmental literacy, the tools available for measuring civic participation and stewardship are rather varied. A reading of survey and statistical data on volunteer numbers and their proportions in various types of volunteering (a proxy for civic participation and stewardship) represents the most direct look at Americans' propensity toward stewardship and their involvement in civic activities and community service projects.

Findings from a 2009 U.S. Department of Labor/Bureau of Labor Statistics study reveal that about 63.4 million Americans (nearly 27 percent of the population) volunteered either through or for an organization at least once in 2009, and that both the number of volunteers and the volunteer rate itself increased since 2008.[35] (Note that the 2010 Census and the American Community Survey were also considered as potential sources indicating levels of volunteer activity, although these were found to be insufficient data sources.)

Apart from this data, the table shown on the following two pages summarizes the distribution of volunteers in 2009 by organization type (revealing a breakdown of volunteer activity among different areas).

[35] "Volunteering in the United States"—2009, 26 January 2010 news release, http://www.bls.gov/news.release/pdf/volun.pdf, 9 August 2010.

Table 14—Distribution of volunteers by type of main organization, September 2009

		Percent of volunteers by type of organization				
Characteristics in September 2009	**Total volunteers (thousands)**	**Civic, political, professional, international**	**Educational or youth service**	**Environ-mental or animal care**	**Hospital or other health**	**Public safety**
Both sexes	63,361	5.5	26.1	2.2	8.5	1.2
Men	26,655	6.7	24.2	2.1	6.7	2.0
Women	36,706	4.6	27.5	2.3	9.7	0.6
Total, 16 years or over	63,361	5.5	26.1	2.2	8.5	1.2
16 to 24 years	8,290	4.2	30.1	2.6	9.9	1.9
16 to 19 years	4,429	4.0	33.5	2.4	8.1	0.8
20 to 24 years	3,861	4.3	26.1	2.9	11.8	3.2
25 years or over	55,071	5.6	25.5	2.1	8.2	1.1
25 to 34 years	9,511	4.9	32.0	2.1	8.6	1.2
35 to 44 years	12,835	4.0	40.2	2.0	6.5	1.1
45 to 54 years	13,703	5.4	27.4	2.3	7.8	0.9
55 to 64 years	9,894	7.1	14.3	2.5	9.1	1.2
65 years or over	9,129	7.5	7.5	1.9	10.1	1.0

Table 14 (continued)—Distribution of volunteers by type of main organization, September 2009

		Type of volunteer organization				
Characteristics in September 2009	**Total volunteers (thousands)**	**Religious**	**Social or community service**	**Sport, hobby, cultural, or arts**	**Other**	**Not determined**
Both sexes	63,361	34.0	13.9	3.4	3.4	1.9
Men	26,655	33.7	14.9	4.0	3.6	2.1
Women	36,706	34.2	13.2	2.9	3.2	1.7
Total, 16 years or over	63,361	34.0	13.9	3.4	3.4	1.9
16 to 24 years	8,290	28.6	15.0	2.8	2.7	2.3
16 to 19 years	4,429	29.7	14.2	2.4	2.3	2.5
20 to 24 years	3,861	27.4	16.0	3.2	3.1	2.0
25 years or over	55,071	34.8	13.8	3.5	3.5	1.8
25 to 34 years	9,511	27.5	14.2	3.3	3.7	2.4
35 to 44 years	12,835	27.7	10.6	3.4	2.8	1.8
45 to 54 years	13,703	35.9	12.6	3.3	3.2	1.3
55 to 64 years	9,894	40.4	15.3	3.9	4.4	1.9
65 years or over	9,129	44.8	18.0	3.6	3.7	2.0

Source: Bureau of Labor Statistics, Volunteering in the United States, 27 Jan. 2010, http://www.bls.gov/news.release/volun.t04.htm, 10 Aug. 2010.

Although it seems obvious that the "environmental or animal care" category in the above table would reflect the type of volunteer work and subject matter most closely related to AFWA's Core Concepts, it should be noted that many of the other volunteer categories could potentially involve natural resource stewardship activities as well (for example, volunteers grouped in the "social or community service" category may have participated in cleanup initiatives as part of their involvement). For this reason, the table above should be regarded as a rough indicator of national volunteer activity related to AFWA's goals.

Other statistical data related to volunteerism and stewardship comes from a series of surveys conducted by Roper Starch Worldwide for the American Recreation Coalition between 1994 and 2003. Despite the fact that these surveys are now somewhat dated, they are important to acknowledge as a source of useful data assessing attitudes toward environmental issues and willingness to engage in volunteer activities. For example, the 2003 Roper survey found that, although about a fifth of Americans expressed interest in volunteering on public lands, only about a quarter of those interested said they had actually taken part in such volunteer activities.

Overall, the study found that under 6 percent of American adults had actually volunteered on public lands.[36]

Other survey research conducted on the regional and state levels has examined attitudes toward stewardship and civic involvement as well, occasionally as part of broader overall evaluations of youth programs or other initiatives offered through fish and wildlife agencies or nonprofit conservation organizations. A recent example of such research includes a 2010 nationwide evaluation of recruitment and retention programs conducted by Responsive Management. In addition to measuring opinions on overall program structure and pre- and post-program participation in key activities such as hunting, fishing, and shooting, the researchers also collected data on attitudes toward the environment and participation in stewardship activities by including a set of ten questions on surveys administered to both adult and youth recruitment and retention program participants. This set of questions (shown in Appendix D) directly addresses many of AFWA's conservation education benchmarks and Top Core Concepts related to engagement, stewardship, and awareness of the natural world. In fact, the questions were written to investigate the potential for hands-on, field-based components of the recruitment and retention programs to encourage stewardship and interaction with ecosystems and the outdoors.

Similar to assessments of outdoor recreation participation, it seems that with an adequate sample size and an appropriate survey instrument including content to measure participation in and attitudes toward environmental stewardship, the national state of civic participation and stewardship could be measured with some confidence. Survey data remains the most reliable method of examining such activities and attitudes, particularly since survey questions can be implemented consistently over time at regular intervals to demonstrate trends on the national level.

One additional resource providing some important data on volunteerism and civic involvement comes from the Corporation for National & Community Service, which has produced several national reports looking at trends in volunteerism; most substantial among these may be *Volunteer Growth in America: A Review of Trends Since 1974*, which tracks volunteer rates over a thirty-year period.[37] Further, two websites are highly useful in understanding the variety of different volunteer and civic involvement opportunities available nationwide: Volunteer.gov/gov, which lists opportunities relating to natural and cultural resources across the country; and Handsonnetwork.org, a volunteer network describing various resources, programs, and events.

There are a multitude of programs offered through state and federal conservation and natural resource agencies and organizations that encourage stewardship and civic involvement, and many of these are implemented by or rely on input from fish and wildlife professionals. Such

[36] Roper Starch Worldwide. 2004. *Outdoor Recreation in America 2003: Recreation's Benefits to Society Challenged by Trends*, conducted for the Recreation Roundtable. http://www.funoutdoors.com/files/ROPER%20REPORT%202004_0.pdf , 10 August 2010.
[37] Corporation for National and Community Service. 2006. *Volunteer Growth in America: A Review of Trends Since 1974.* http://www.nationalservice.gov/about/role_impact/performance_research.asp#VOLGROWTH , 10 August 2010.

programs may be influential in nurturing feelings of connectivity to nature that lead to civic involvement and an inclination towards stewardship.

Programs offered on the federal level—including those directed at youths, adults, families, or other types of audiences—have the benefit of being available to residents across the country (except when such programs depend extensively on individual state chapters, whose resources may vary). Thus, a review of participation data for such programs could yield two important indicators of stewardship and civic involvement: first, participation data would supply a baseline estimation of the general popularity and reach of such programs; second, programs with evaluation components could presumably provide data on participants' ability to achieve program milestones and requirements related to stewardship activities.

Some of the programs offered through federal agencies and national organizations include the National Park Service's Junior Ranger Program and the National Wildlife Federation's Ranger Rick Program. These are just two examples of informal initiatives that provide hands-on introductions to conservation and environmental topics (i.e., material related to the Top Core Concepts) through program activities and structured lessons. Another example is the Boy Scouts of America, which offers a merit badge fulfillment for fish and wildlife management; the requirements for earning the badge involve demonstrated understanding of concepts closely related to some of the principles outlined in AFWA's Top Core Concepts. Similar course content is offered through activities and programs within the Girl Scouts and 4-H organizations.

On the state level, there are numerous programs offered through individual fish and wildlife agencies and natural resource organizations that address major aspects of conservation and environmental education related to AFWA's Top Core Concepts, very often through nature-based activities involving elements of stewardship and hands-on participation. These include recruitment and retention programs, family programs, youth camps, programs centered around specific activities or designed to teach certain skills (hunting clinics, youth shooting programs, etc.), and school-based "outdoor classroom" programs that range in level of involvement, from major components of formal K-12 science/physical education curricula to comparatively minor programs taking the form of either club or after-school initiatives. Every state natural resource agency across the country offers some variety of these types of programs—a few examples include the South Carolina Department of Natural Resources' SC Reel Kids Program, a school-based effort focusing on fishing that includes habitat improvement projects; several fishing education events and programs offered by the Wisconsin Department of Natural Resources, several of which include lessons in hatcheries management; and the Arizona Game and Fish Department's Focus Wild Arizona Program. The latter example represents a particularly comprehensive initiative, with materials and lesson plans provided by the Department to both public and home-school classrooms. Such programs often include or encourage an evaluation component (i.e., surveys conducted with participants, instructors, teachers, or parents), the results of which could provide some useful perspective on introductions to civic involvement and stewardship.

Finally, grant projects from some of the major conservation and sportsmen's organizations provide a meaningful indicator of the state of large-scale stewardship initiatives and projects. Organizations such as the National Wildlife Federation and the National Wild Turkey Federation

are, in any given month, involved in a number of efforts closely related to active stewardship and civic involvement. For example, the website of the National Wild Turkey Federation reveals current state grant projects in areas including water protection, wetlands conservation, habitat restoration, soil enhancement, and a U.S. Forest Service initiative promoting youth involvement in natural resource stewardship.

CONCLUSIONS AND RECOMMENDATIONS

Overview

The review of data sources and indicators suggests that AFWA has two major options for evaluating Core Concept understanding and retention among Americans. The first option relies on the variety of existing surrogate data sources inventoried here, which include national, state, and regional surveys, educational and media tools, standardized test scores reflective of student achievement in science subjects, and evaluations of national and state fish and wildlife programs. The second option calls for the development and implementation of an entirely new comprehensive survey instrument written specifically to measure Core Concept understanding and retention among youths and adults and administered on an annual or biennial basis. This latter option represents the recommended course of action—a new survey constructed to evaluate key components of AFWA's Conservation Education Strategy is the most direct route to accurate, statistically valid and scientifically defensible data regarding Core Concept knowledge levels. By contrast, consulting the wide array of existing resources, tools, and indicators (some of which are only partially related to the objectives of the Core Concepts) will yield an expansive, if comparatively less certain, view of Core Concept understanding.

The aforementioned two options apply only to AFWA's goals concerning future measurements of environmental and conservation literacy components of the Core Concepts. The state of natural resource-based outdoor recreation participation among Americans can easily be assessed through two existing data sources, the U.S. Fish and Wildlife Service's *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* and the U.S. Forest Service's *National Survey on Recreation and the Environment*. As these two sources provide highly reliable options for tracking trends and examining participation data at regular intervals, there appears to be no particular need for a new survey to collect outdoor recreation participation data.

The use of the federal surveys is discussed in greater detail below, and specific aspects related to the major options for evaluating Core Concept understanding and retention follow.

Use of Federal Outdoor Recreation Participation Data

The *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* (National Survey) and the *National Survey on Recreation and the Environment* (NSRE) are highly valid sources of data concerning outdoor recreational participation due to their consistent methodologies and ongoing preservation of trend data. In fact, the two national surveys are comprehensive enough data sources that consideration of the other data sources mentioned in this review, particularly those produced through outdoor industry market research, should be entirely secondary to the federal studies. As outlined in the earlier section of the paper, both the *National Survey* and the *National Survey on Recreation and the Environment* capture significant participation data on the

natural resource-based activities relevant to AFWA: the U.S. Fish and Wildlife Service study is arguably the standard for participation rates on hunting, fishing, and wildlife viewing, and the U.S. Forest Service survey provides data on the remainder of relevant activities (shooting, archery, hiking, camping, etc.), while also providing a secondary glimpse of hunting, fishing, and wildlife viewing participation trends.

These surveys are the top recommendations for monitoring participation trends in wildlife and natural resource-based activities; other data sources (included in the review for the sake of comprehensiveness) may be treated best as sources of supplementary but not necessarily primary data, lest they obfuscate or contradict the overall picture offered by the U.S. Fish and Wildlife Service and U.S. Forest Service research. AFWA should continually bear in mind the limitations inherent in some of the other sources as well, such as the panel sampling methodologies, the inconsistent availability of up-to-date results or intervals between data collection, the differing categorizations of certain activities (e.g., the National Sporting Goods Association measures "hunting with firearms" and "hunting with bow and arrow" as opposed to "big game hunting" and "small game hunting"), and the fact that industry market research reports often must be purchased instead of accessed freely. These are among the major reasons why the two national surveys are recommended over the other sources.

The matrix on the following page (Table 15) provides a visual display of correlations between major data sources/indicators and the eleven Core Concepts. The matrix is presented with the understanding that the primary recommendation is for the development of a new national survey conducted at regular intervals to measure adult and youth understanding and retention of Core Concept material. As such, one of the key points illustrated by the matrix is that a number of gaps exist in the resources that apply to or specifically address the Core Concepts. Note that the matrix does not include every indicator or data source mentioned in this paper, but instead the major sources and indicators bearing clear correlations to the Core Concepts.

Table 15—Correlation of Data Sources and Indicators to AFWA's Top Core Concepts

Data Source / Indicator	Core Concept 1	Core Concept 2	Core Concept 3	Core Concept 4	Core Concept 5	Core Concept 6	Core Concept 7	Core Concept 8	Core Concept 9	Core Concept 10	Core Concept 11
National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (contains relevant survey content)											●
National Survey on Recreation and the Environment (contains relevant survey content)			●	●				●			●
1999 Responsive Management survey conducted for USFWS regarding knowledge of fish and wildlife management funding (contains relevant survey content)										●	
2004 Responsive Management survey conducted for NCIEA (contains relevant survey content)	●				●		●		●		
2010 Responsive Management evaluation on recruitment and retention programs (contains relevant survey content)								●			
National/state natural resource/ conservation education programs (e.g., Ranger Rick, SC Reel Kids, Focus Wild Arizona)		●									
National/state recruitment and retention programs incorporating use of private land (e.g., ADCNR Youth Dove Hunt Program)		●									
National Assessment of Educational Progress (NAEP) nationwide assessment of fourth, eighth, and twelfth-graders						●	●				
Environmental Literacy in America, from the 1997-2001 Roper Public Affairs / National Environmental Education & Training Foundation (contains relevant survey content)				●		●					
State-specific educational curriculum standards (vary by state, subject, concept depth of focus, etc.)			●								
2005 Colorado State University typology categorizing wildlife value orientation types									●		

Table 15 (continued)—Numbering of AFWA's Top Core Concepts

1	In North America fish and wildlife are public trust resources managed by governmental agencies.
2	Since most wildlife live on private lands, private landowners play an important role in sustaining and improving habitat.
3	Sustainable natural resources depend on the support of an informed and responsible citizenry.
4	The health and well-being of fish, wildlife, and humans depend on the quality of their environment.
5	Loss and degradation of habitat are the greatest problems facing fish and wildlife; therefore, enhancing and protecting habitat is critical to managing and conserving them.
6	Conserving biodiversity is important.
7	Fish and wildlife can be conserved and restored through science-based management which considers the needs of humans as well as those of fish and wildlife.
8	Everyone impacts fish and wildlife and their habitats, and, as human populations grow, impacts on natural resources increase.
9	Regulated hunting, fishing, and trapping are important tools for managing some wildlife populations and habitats.
10	Within the U.S., state fish and wildlife management is funded primarily through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting, and fishing equipment and motor boat fuels.
11	Wildlife-based activities, such as hunting, fishing, viewing, and photography, provide people with millions of days of outdoor recreation each year and generate billions of dollars for the economy.

Use and Limitations of Existing Data Sources Addressing the Core Concepts

As this paper demonstrates, there is a diffuse selection of resources that provide information on or assessments related to the Core Concepts. These include educational tools, such as the resources made available by the National Environmental Education & Training Foundation, which account for an important source of baseline information on national literacy rates and attitudes regarding conservation and the environment. Similarly, the educational databases and assessment tools provided by various state departments of education and educational organizations (California's Standardized Testing and Reporting, the Children and Nature Network, the National Center for Education Statistics, etc.) are valuable means of assessing the national educational focus on concepts relevant to AFWA's North American Educational Strategy. Mainstream media content analysis may also prove useful in developing a deeper sense of Americans' exposure to environmental and conservation issues. Finally, Americans' involvement in stewardship activities and civic participation is reflected in volunteer data from the Bureau of Labor Statistics, additional survey research, assessments of formal and informal

fish and wildlife and nature programs directed at children and families, and government and organizational grant projects involving natural resource stewardship activities.

At the same time, however, a review of these tools demonstrates that they can only be considered *indicators*. Despite the fact that many of them have a correlation to AFWA's Top Core Concepts, none of them represents an exact fit in terms of a conclusive measurement tool for Core Concept understanding. Indeed, at their best, these indicators represent merely an adequate substitute for a survey instrument tailored specifically to AFWA's needs (i.e., a questionnaire to evaluate knowledge, understanding, and retention of Top Core Concept material). Although many of the indicators and resources mentioned here are suitable proxy estimations of Core Concept comprehension, it is necessary to infer their worth as evaluative tools.

Further, beyond the fact that most of the indicators and data sources have rather indirect relationships with AFWA's Core Concepts, there are two major issues that render some of them little more than "snapshot" pictures of the state of Core Concept literacy: they are outdated, or their availability is unpredictable and/or inconsistent. The usefulness of even those studies that address elements of the Top Core Concepts fairly closely is tempered by the fact that they were conducted or implemented several years ago, and thus do not necessarily provide up-to-date information (and, further, cannot be counted on as ongoing sources of trend data).

For example, the Forest Service has not incorporated into its most recent rounds of NSRE data collection the battery of questions measuring attitudes and beliefs about forest management and opinions about the environment (as previously mentioned, the Forest Service intends to continue collecting this data in future rounds of the survey). Two highly pertinent Responsive Management surveys conducted for the Northeast Conservation Information and Education Association and the Southeastern Association of Fish and Wildlife Agencies and measuring opinions on fish and wildlife management issues, awareness of fish and wildlife agency functions, and values associated with conservation and preservation, are now several years old. *Outdoor Recreation in America*, a series of trend surveys conducted by Roper Starch Worldwide for the Recreation Roundtable and measuring, among other things, outdoor recreation participation and volunteerism in the outdoors, does not extend past 2003. Finally, *Environmental Literacy in America*, a relevant compendium of research summarizing ten years of data produced by Roper Public Affairs and the National Environmental Education & Training Foundation, offers nothing past 2005. Thus, the need for a new ongoing trends survey becomes increasingly evident.

Development of a New Survey to Measure Core Concept Understanding and Retention

In their totality, many of the resources discussed in this paper are capable of providing approximations and rough estimates, but each has its limitations (e.g., outdated data, a single discrete set of findings as opposed to long-term trends, a partial or tenuous correlation to Core Concept material, being only regional or statewide in scope). It is therefore recommended that the data sources and tools inventoried here be considered a viable option for evaluating Core Concept understanding only in the absence of a comprehensive survey created specifically to provide conclusive data regarding Americans' understanding of the issues addressed in AFWA's Core Concepts. AFWA's needs would be best served through an established nationwide survey conducted with statistically valid, geographically representative samples of American youths and

adults and measuring attitudes, beliefs, participation rates (such as in stewardship activities), and knowledge levels associated with the Top Core Concepts. It is recommended that such a survey be administered annually or biennially through a uniform data collection methodology to provide for the tracking of long-term trends in responses to questions. The data collection process would provide opportunities to continually analyze trends on the national and regional levels. Further, AFWA could encourage fish and wildlife agencies across the country to conduct the survey themselves in order to provide trend data on the statewide level. This recommendation represents the most effective way for AFWA to truly evaluate national comprehension of the Top Core Concepts. The next section provides examples of past survey questions that have applications to Core Concept measurements; many of these could serve as models for content in the recommended survey instrument.

Summary of Survey Research Data Source Relevance to Core Concepts

Following is an overview of available resources that address or provide indicators relevant to each of the Top Core Concepts, which are listed individually. Considering the broadly worded nature of most of AFWA's Top Core Concepts, note that the discussions below provide brief summaries of applicable resources, but are not intended as exhaustive lists. This is due in part to the challenging nature of conclusively identifying every tool or resource that addresses, communicates, reinforces, measures, or otherwise provides information on such sweeping topics as "biodiversity," "habitat," "sustainability," etc. Instead, this list illustrates how available survey research can provide insight into Core Concept understanding through questionnaire responses revealing attitudes and opinions relevant to the Concepts themselves. Rather than gauging exact knowledge and understanding (except in instances where survey respondents are asked to name the agency responsible for managing fish and wildlife in their state, or similar such questions), these examples of survey content instead demonstrate levels of interest or personal priority with regard to some of the major values and issues addressed in the Core Concepts (e.g., when a respondent indicates how important he or she considers biodiversity or the preservation of habitat).

1. In North America fish and wildlife are public trust resources managed by governmental agencies.

The following survey questions from the 2004 Responsive Management study concerning the credibility of fish and wildlife agencies directly address the first Core Concept by assessing the respondent's knowledge of the agency responsible for managing fish and wildlife resources (see Appendix C for a complete listing of questions that appeared in the survey):

- Which government agency would you say is most responsible for managing and protecting fish and wildlife in [*respondent's state*]?
- The [*name of state agency*] is responsible for managing and protecting fish and wildlife in [*respondent's state*]. Before this survey, would you say you knew a great deal, a moderate amount, a little, or nothing about the [*name of state agency*]?

The questions both reinforce the concept of fish and wildlife as public resources and evaluate the respondent's understanding of the governmental agency tasked with their management.

These questions could serve as a model for similar questions included in a comprehensive trends survey written to evaluate understanding of AFWA's Core Concepts.

2. Since most wildlife live on private lands, private landowners play an important role in sustaining and improving habitat.

Few entities or organizations comprehend the degree to which wildlife conservation depends on private land and landowners better than fish and wildlife agencies. It follows that most information addressing this concept tends to come from the agencies themselves through various offerings (school programs, websites, public outreach events, etc.). Further, many hunting and fishing recruitment and retention programs, particularly those involving youth mentoring initiatives, communicate this concept in a hands-on, experiential manner by inviting participants onto the private properties of landowners who volunteer the use of their lands for program events. A youth dove hunt program sponsored by the Alabama Department of Conservation and Natural Resources, for instance, makes ample use of privately owned dove hunt lands, and instructors and hunt coordinators provide considerable information during program events regarding the importance of sustaining habitat on private lands. Otherwise, there appear to be few major national resources that specifically address the role of private landowners in habitat sustainability. Such a lack of emphasis on this concept again illustrates the need for a comprehensive survey to assess understanding of this Core Concept.

3. Sustainable natural resources depend on the support of an informed and responsible citizenry.

The following series of questions has appeared in past iterations of the Forest Service's *National Survey on Recreation and the Environment*, and seems to represent the one of the more direct large-scale measurements of support for efforts to improve sustainability. Respondents are instructed to indicate varying degrees of agreement or disagreement with several statements addressing the concept of sustainability (without using the specific term):

- Human skill and resources will ensure that we do not make the earth unliveable.
- Humans are severely abusing the environment.
- Humans have the right to modify the natural environment to suit their needs.
- Humans were meant to rule over nature.
- Humans will eventually learn enough about how nature works to be able to control it.
- If things continue on their present course, we will soon experience a major ecological catastrophe.
- The balance of nature is delicate and easily upset.
- The so-called "environmental crisis" has been greatly exaggerated.
- We are approaching the limit to the number of people this earth can support.
- When humans interfere with nature, it often produces disastrous consequences.

Sustainability is also addressed in numerous standardized tests administered to students, although the different contexts in which the principle is presented, along with the degree of conceptual depth and focus, vary considerably by source.

4. The health and well-being of fish, wildlife, and humans depend on the quality of their environment.

Surveys administered by Roper Public Affairs and the National Environmental Education & Training Foundation (NEETF) from 1997 to 2001 collected data on numerous topics related to respondents' knowledge of and opinions on the health of the environment, including the most common reasons for animal and plant extinction and the most common causes of stream, river, and ocean pollution. The full results of the Roper / NEETF surveys are presented in *Environmental Literacy in America*, mentioned previously in this paper and accessible via the NEETF website.

Further, the importance of the environment in terms of the well-being of fish, wildlife, and human beings has also been addressed in the NSRE, such as through the following questions (see Appendix B for the full list of questions from the NSRE):

Please tell me which one of these 5 issues most concerns you.

1 Reducing the public debt
2 Reducing crime
3 Saving social security
4 Protecting and improving the natural environment
5 Reforming the health system
6 Don't know
7 Refused

Which one next most concerns you?

1 Reducing the public debt
2 Reducing crime
3 Saving social security
4 Protecting and improving the natural environment
5 Reforming the health system
6 Don't know
7 Refused

We are faced with many problems in this country, none of which can be solved easily or inexpensively. With this in mind, do you think we're spending too much, too little or about the right amount of money on protecting and improving the environment?

1 Too much
2 Too little
3 About the right amount
4 Don't know
5 Refused

There are differing opinions about how far we've gone in this country with environmental protection laws and regulations. At present, do you think our environmental protection laws and regulations have gone too far, not far enough, or have struck about the right balance?

1 Too far
2 Not far enough
3 About the right balance
4 Don't know
5 Refused

5. Loss and degradation of habitat are the greatest problems facing fish and wildlife; therefore, enhancing and protecting habitat is critical to managing and conserving them.

Perceptions of the importance of habitat protection, conservation, and preservation have been measured in numerous studies, and this document provides several examples of the types of questions commonly used to assess this Core Concept. The following list represents one of the best examples of a series of questions evaluating the importance of habitat enhancement and protection; these questions appeared in the 2004 Responsive Management survey (see Appendix C for the full list).

- How important is it to you that fish and wildlife resources and habitat are properly managed and conserved?
- How important is it to you personally to participate in efforts to conserve fish and wildlife resources and habitat in your area?
- How important is it to you to think about how YOUR activities might affect fish and wildlife and their habitat?
- How important is it to you that fish and wildlife resources are being properly managed and conserved?
- How important is it to you that fish and wildlife resources and habitat are conserved for future generations?
- How important is to you that fish and wildlife are protected even if it means the use and development of land is restricted?
- How important is it to you that fish and wildlife are protected from the impacts of land development even if it means less housing development and housing becomes more expensive?

6. Conserving biodiversity is important.

The National Assessment of Educational Progress (NAEP), identified previously in the paper as a major nationwide assessment of fourth, eighth, and twelfth-graders, included in its 2005 life science assessment questions regarding the diversity of life on Earth and the interdependence of various organisms. This appears to be the closest a major nationwide assessment has come to addressing this Core Concept, although surveys conducted by Responsive Management as well as the Forest Service have included questions indirectly addressing perceptions of the importance of biodiversity (see previous examples).

Further, the Roper Public Affairs / National Environmental Education & Training Foundation surveys from 1997 to 2001 (also mentioned under Core Concept 4) tested the ability of respondents to define or describe biodiversity. The importance of biodiversity appears to be one more example of an area to be measured in the recommended new survey of Core Concept understanding.

7. Fish and wildlife can be conserved and restored through science-based management which considers the needs of humans as well as those of fish and wildlife.

As mentioned under the previous Core Concept, the balance and sharing of resources is communicated in some of the NAEP science questions, and also is shown in some of the survey data produced by Responsive Management through questions designed to gauge respondents' priorities regarding the balance of interests between fish, wildlife, natural resources, and human beings. Similar types of questions have appeared in the NSRE. Below, some of the best examples from the 2004 Responsive Management study are listed.

- If it came down to a choice between preserving wildlife habitat or providing land for new homes, we should always side with providing new homes for the residents of our state. Do you agree or disagree with this statement?
- The use and development of land should be restricted to protect fish and wildlife. Do you agree or disagree with this statement?
- Landowners should be allowed to develop their land regardless of its impact on wildlife. Do you agree or disagree with this statement?

8. Everyone impacts fish and wildlife and their habitats, and, as human populations grow, impacts on natural resources increase.

This Core Concept addressing how both personal actions as well as overall population growth can have effects on fish and wildlife populations has been fairly directly measured through questions included in some of the aforementioned mentioned Responsive Management studies. Below, example questions from a 2010 evaluation of hunting, fishing, and shooting recruitment and retention programs are included to provide an example of assessing the importance of this Core Concept among both adult and youth respondents (see Appendices D and E for a complete list of relevant questions from the evaluation).

- How important is it to you to think about how YOUR activities might affect fish and wildlife and their habitat? [adult survey wording]
- How important is it to you to think about how YOUR activities and the things you do might help or harm fish, wild animals, and the areas where they live? [youth survey wording]

The series of questions from the NSRE listed under Core Concept 3 is also fairly relevant to Core Concept 8.

9. Regulated hunting, fishing, and trapping are important tools for managing some wildlife populations and habitats.

There is considerable survey research to demonstrate Americans' understanding of this concept, particularly the ability for survey respondents to reconcile the fact that killing certain species is actually a method of aiding the overall population. The following question has been included in many Responsive Management surveys (including the 2004 study) and, after questions measuring basic support for or opposition to legal, regulated hunting, fishing, and trapping (i.e., "Do you support or oppose legal, regulated hunting?"), represents the next logical step in how to determine Americans' comprehension of the principle that these practices constitute wildlife management tools.

- Hunting and fishing are part of the scientific management of healthy fish and wildlife populations. Do you agree or disagree with this statement?

One further resource providing insight into the ability of Americans to consider regulated hunting, fishing, and trapping as wildlife management tools is the Colorado State University study cited previously in the paper, in which the authors provided a typology for categorizing wildlife value orientation types among residents of the western region of the country.[38]

10. Within the U.S., state fish and wildlife management is funded primarily through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting, and fishing equipment and motor boat fuels.

A study conducted by Responsive Management in 1999 for the U.S. Fish and Wildlife Service is highly relevant to this Core Concept and included a series of questions measuring knowledge of fish and wildlife management funding.[39] Pertinent examples from the survey include the following:

- Where do you think funds for wildlife management in your state come from? (open-ended question with multiple responses allowed)
- Where do you think funds for fisheries management in your state come from? (open-ended question with multiple responses allowed)
- Where do you think funding to enhance hunting opportunities comes from in your state? (open-ended question with multiple responses allowed)
- Where do you think funding to enhance recreational fishing opportunities comes from in your state? (open-ended question with multiple responses allowed)
- Additional questions provided respondents with the names of the Federal Aid in Sport Fish and Wildlife Restoration Programs, including Federal Aid in Wildlife Restoration, Federal Aid in Sport Fish Restoration, Pittman-Robertson, Dingell-Johnson and Wallop-Breaux. Respondents were asked if they had ever heard of each program and whether they supported or opposed each program.

[38] Teel, T.L., et al.

[39] Responsive Management/U.S. Fish and Wildlife Service. 1999. *Hunters', Anglers', and Boaters' Awareness of and Attitudes Toward the Federal Aid in Sport Fish and Wildlife Restoration Programs.*

- A question informed respondents, "In recent years, some people have felt that a portion of money collected from excise taxes on shooting and hunting equipment should be used for purposes other than programs that benefit hunting, shooting, and wildlife management, such as crime prevention, maintaining highways, and reducing the national debt." Respondents were then asked if they would support or oppose using these excise taxes for other purposes.
- A question informed respondents, "In recent years, some people have felt that a portion of money collected from excise taxes on sport fishing equipment and motor boat fuel should be used for purposes other than programs that benefit fishing, boating, and fisheries management, such as crime prevention, maintaining highways, and reducing the national debt." Respondents were then asked if they would support or oppose using these excise taxes for other purposes.

11. Wildlife-based activities, such as hunting, fishing, viewing, and photography, provide people with millions of days of outdoor recreation each year and generate billions of dollars for the economy.

AFWA may measure this Core Concept in two ways: by verifying the actual participation rates of wildlife-based activities and their economic contributions, or by assessing the general public's knowledge of the fact that wildlife-based recreation represents a significant contribution to the economy.

For the first measurement, the U.S. Fish and Wildlife Service's National Survey is the most direct method of assessment, since the National Survey provides considerable data regarding participation in wildlife and natural resource-based activities, as well as extensive information on avidity rates and trip expenditures analyzed by various demographic categories. The NSRE represents the other primary data source for this Core Concept. For the second measurement, AFWA may wish to develop one or several survey questions similar to the items listed under Core Concept 10, designed to measure awareness of the economic contributions and benefits of wildlife-based recreational activities.

Appendix A: U.S. Forest Service NSRE questions intended to measure beliefs about Forest Service Management. Note that questions may be copyrighted.

Responses to the following questions are measured on a 1 to 5 scale of strongly/moderately agree/disagree.

A role of the Forest Service should be to…

- Expand access for motorized off-highway vehicles on National Forests and Grasslands (for example, snowmobiling or 4-wheel driving).
- Develop and maintain continuous trail systems that cross both public and private land for motorized vehicles such as snowmobiles or ATVs.
- Develop and maintain continuous trail systems that cross both public and private land for non-motorized recreation such as hiking or cross-country skiing.
- Designate some existing recreation trails on National Forests and Grasslands for specific use (for example, creating separate trails for snowmobiling and cross-country skiing, or for mountain biking and horseback riding).
- Develop new paved roads on National Forests and Grasslands for access for cars and recreational vehicles.
- Designate more wilderness areas on National Forests and Grasslands that stops access for development and motorized uses.
- Conserve and protect National Forests and Grasslands that support water resources, such as streams, lakes, and watershed areas.
- Preserve the natural resources of our National Forests and Grasslands through such policies as no timber harvesting or no mining.
- Protect ecosystems and wildlife habitats on National Forests and Grasslands.
- Preserve the ability to have a 'wilderness' experience on National Forests and Grasslands.
- Preserve Native American's and Native Hispanic's cultural uses of National Forests and Grasslands such as fire wood gathering, herb/berry/plant gathering, and ceremonial access.
- Provide natural resources from National Forests and Grasslands to support communities dependent on grazing, mining, or timber harvesting.
- Restricting mining, oil drilling, and other mineral removals on National Forests and Grasslands.
- Restrict timber harvesting and grazing on National Forests and Grasslands.

- Making it easier to get permits for some established uses of public land such as mining, grazing, logging, and commercial recreation.

- Develop a national policy that guides natural resource development of all kinds on National Forests and Grasslands, for example, the amount of timber cut or barrels of oil pumped, and the regulation of environmental impacts.

- Expand commercial recreation on National Forests and Grasslands (for example, ski areas, guide services, or outfitters).

- Develop volunteer programs to improve National Forests and Grasslands (for example, planting trees, or improving water quality).

- Develop volunteer programs to maintain trails and facilities on National Forests and Grasslands, for example, trail maintenance, or campground maintenance.

- Inform the public about recreation concerns on National Forests and Grasslands such as safety, trail etiquette, and respect for wildlife.

- Inform the public on the potential environmental impacts of all uses associated with National Forests and Grasslands.

- Inform the public on the economic value received by developing our natural resources.

- Encourage collaboration between groups in order to share information concerning uses of National Forests and Grasslands.

- Use public advisory committees to advise on public land management issues.

- Allow for diverse uses of National Forests and Grasslands such as grazing, recreation, and wildlife habitat.

- Make management decisions about National Forests and Grasslands at the local level rather than at the national level.

- Increase the total number of acres in the National Forest and Grassland system.

- Introduce a recreation fee to support National Forests and Grasslands.

Source: U.S. Forest Service NSRE web page, "Types of Questions Asked in the NSRE," 7 August 2010, http://www.srs.fs.usda.gov/trends/Nsre/vsummary.htm

Appendix B: U.S. Forest Service NSRE questions intended to measure opinions about the environment. Note that questions may be copyrighted.

Please tell me which one of these 5 issues most concerns you.

1 Reducing the public debt
2 Reducing crime
3 Saving social security
4 Protecting and improving the natural environment
5 Reforming the health system
6 Don't know
7 Refused

Which one next most concerns you?

1 Reducing the public debt
2 Reducing crime
3 Saving social security
4 Protecting and improving the natural environment
5 Reforming the health system
6 Don't know
7 Refused

We are faced with many problems in this country, none of which can be solved easily or inexpensively. With this in mind, do you think we're spending too much, too little or about the right amount of money on protecting and improving the environment?

1 Too much
2 Too little
3 About the right amount
4 Don't know
5 Refused

There are differing opinions about how far we've gone in this country with environmental protection laws and regulations. At present, do you think our environmental protection laws and regulations have gone too far, not far enough, or have struck about the right balance?

1 Too far
2 Not far enough
3 About the right balance
4 Don't know
5 Refused

The state and federal parks and forests in this country are to be managed for the benefit of current and future generations. Which of the following should be emphasized in the management of our public parks and forests?

1 Improving their natural conditions, such as wildlife, water and scenery
2 Developing commercial opportunities such as timber, tourism and mining
3 Balancing natural conditions and commercial opportunities about equally
4 Don't know

5 Refused

How satisfied are you with the level of environmental protection in your state? Are you:

1 Very satisfied
2 Somewhat satisfied
3 Neither satisfied nor dissatisfied
4 Somewhat dissatisfied
5 Very dissatisfied
6 Don't know
7 Refused

How serious a problem do you think the amount of commercial development and traffic is in the area where you live? Is it:

1 Very serious
2 Serious
3 Somewhat serious
4 Not at all serious
5 Don't know
6 Refused

Responses to the following questions are measured on a scale of strongly/moderately agree/disagree.

- Human skill and resources will ensure that we do not make the earth unliveable.
- Humans are severely abusing the environment.
- Humans have the right to modify the natural environment to suit their needs.
- Humans were meant to rule over nature.
- Humans will eventually learn enough about how nature works to be able to control it.
- If things continue on their present course, we will soon experience a major ecological catastrophe.
- The balance of nature is delicate and easily upset.
- The so-called "environmental crisis" has been greatly exaggerated.
- We are approaching the limit to the number of people this earth can support.
- When humans interfere with nature, it often produces disastrous consequences.

Source: U.S. Forest Service NSRE web page, "Types of Questions Asked in the NSRE," 7 August 2010, http://www.srs.fs.usda.gov/trends/Nsre/vsummary.htm

Appendix C: Responsive Management survey questions measuring opinion on fish and wildlife management issues, knowledge of fish and wildlife agencies, and opinions on the credibility of agencies in the northeast United States [multi-state survey; specific state and agency names were inserted into survey language according to the respondent's state of residence]. Note that questions may be copyrighted.

Questions measuring agency awareness and priorities for agency:

- Which government agency would you say is most responsible for managing and protecting fish and wildlife in [STATE]?
- The [AGENCY] is responsible for managing and protecting fish and wildlife in [STATE]. Before this survey, would you say you knew a great deal, a moderate amount, a little, or nothing about the [AGENCY]?
- Overall, are you satisfied or dissatisfied with the [AGENCY] as a governmental agency in [STATE], or do you not know?
- The [AGENCY] primarily serves the interests of hunters and anglers. Do you agree or disagree with this statement?
- The [AGENCY] effectively balances the interests of anglers, hunters, conservation groups, and the general public. Do you agree or disagree with this statement?
- Scientific fish and wildlife methods serve as the primary guide for the work of the [AGENCY]. Do you agree or disagree with this statement?
- The work of the [AGENCY] is primarily influenced by environmental and/or conservation groups. Do you agree or disagree with this statement?
- The [AGENCY] is doing enough to protect our state's fish and wildlife populations. Do you agree or disagree with this statement?
- The staff at the [AGENCY] really cares about fish and wildlife. Do you agree or disagree with this statement?

Questions measuring priorities for wildlife and natural resource management:

- What would you say is the most important fish or wildlife issue facing [STATE] today?
- Are there any other important fish or wildlife issues facing [STATE] today?
- Is it important or unimportant to you that wildlife exists in [STATE]?
- Is it important or unimportant to you that fish and wildlife populations are being properly managed and conserved in [STATE]?
- Is it important or unimportant to you that people have the opportunity to fish in [STATE]?
- Is it important or unimportant to you that people have the opportunity to hunt in [STATE]?
- Is it important or unimportant to you that people have the opportunity to view wildlife in [STATE]?
- Is it important or unimportant to you that ecologically important habitats and lands in [STATE] are being protected and preserved?
- Is it important or unimportant to you that natural areas exist in [STATE] for enjoying and experiencing nature?
- Is it important or unimportant to you that [STATE]'s water resources are safe and well protected?

Questions measuring importance of various agency programs and efforts:

- Do you think protecting endangered species is an important or unimportant program for the [AGENCY]?
- Do you think restoring native fish and wildlife species to the state is an important or unimportant program for the [AGENCY]?
- Do you think managing fish populations is an important or unimportant program for the [AGENCY]?
- Do you think managing wildlife populations is an important or unimportant program for the [AGENCY]?
- Do you think protecting citizens against diseases from animals such as Lyme disease and rabies is an important or unimportant program for the [AGENCY]?
- Do you think protecting citizens from harm from predators such as coyotes and bears is an important or unimportant program for the [AGENCY]?
- Do you think providing opportunities for the general public to view wildlife is an important or unimportant program for the [AGENCY]?
- Do you think providing opportunities for recreational fishing is an important or unimportant program for the [AGENCY]?
- Do you think providing opportunities for hunting is an important or unimportant program for the [AGENCY]?
- Do you think providing educational programs on the state's fish and wildlife is an important or unimportant program for the [AGENCY]?
- Do you think enforcing fish and game laws is an important or unimportant program for the [AGENCY]?
- Do you think protecting and preserving fish and wildlife habitat is an important or unimportant program for the [AGENCY]?

Questions measuring awareness of and attitudes toward funding sources:

- How do you think the [AGENCY] is funded?
- Fees from hunting and fishing licenses, excise taxes on hunting and fishing equipment, and a portion of the existing tax on motorboat fuel are the only source of funds for the [AGENCY]. It does not receive funding from general state tax revenues. Do you agree or disagree with this statement?
- The [AGENCY] is funded from a variety of sources, including general state tax revenues, excise taxes on hunting and fishing equipment, a portion of the existing tax on motorboat fuel, and hunting and fishing license fees. Do you agree or disagree with this statement?
- Overall, do you think the fees for hunting licenses are too high, too low, or about the right price in [STATE]?
- Overall, do you think the fees for fishing licenses are too high, too low, or about the right price in [STATE]?
- Would you support or oppose increases in user fees, such as hunting and fishing licenses, to cover the costs of protecting and managing fish and wildlife?
- Would you support or oppose increases in user fees, such as hunting and fishing licenses, if it meant more opportunities for these activities?

- Do you agree or disagree that costs for managing fish and wildlife should be paid with specific user fees, such as hunting and fishing licenses?
- Would you support or oppose the use of general state tax revenues to provide information on fish and wildlife matters?

Questions measuring ratings of various agency programs and efforts:

- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of protecting endangered species?
- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of restoring native fish and wildlife species to the state?
- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of managing fish populations?
- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of managing wildlife populations?
- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of protecting citizens against diseases from animals such as Lyme disease and rabies?
- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of providing opportunities for the general public to view wildlife?
- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of providing recreational fishing opportunities?
- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of providing hunting opportunities?
- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of providing educational programs regarding fish and wildlife?
- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of enforcing fish and game laws?
- Would you say the [AGENCY] is doing an excellent, good, fair, or poor job of protecting and preserving wildlife habitat?

Questions measuring credibility of various information sources:

- In general, where do you look for information on fish, wildlife, hunting, angling, wildlife watching, or other forms of outdoor recreation?
- Do you think a biologist with the [AGENCY] is very credible, somewhat credible, or not at all credible as a source of information on fish and wildlife and outdoor recreation?
- Do you think a biologist from the state department of environmental protection is very credible, somewhat credible, or not at all credible as a source of information on fish and wildlife and outdoor recreation?
- Do you think a biologist from the U.S. Fish and Wildlife Service is very credible, somewhat credible, or not at all credible as a source of information on fish and wildlife and outdoor recreation?

- Do you think a professor of environmental science or biology at [STATE UNIVERSITY] is very credible, somewhat credible, or not at all credible as a source of information on fish and wildlife and outdoor recreation?
- Do you think a spokesperson from the National Wildlife Federation is very credible, somewhat credible, or not at all credible as a source of information on fish and wildlife and outdoor recreation?
- Do you think a spokesperson from the American Society for the Prevention of Cruelty to Animals is very credible, somewhat credible, or not at all credible as a source of information on fish and wildlife and outdoor recreation?
- Do you think a spokesperson from a local environmental organization is very credible, somewhat credible, or not at all credible as a source of information on fish and wildlife and outdoor recreation?

Questions measuring wildlife management and natural resource values:

- Hunting and fishing are part of scientific management of healthy fish and wildlife populations. Do you agree or disagree with this statement?
- The use and development of land should be restricted to protect fish and wildlife. Do you agree or disagree with this statement?
- Landowners should be allowed to develop their land regardless of its impact on wildlife. Do you agree or disagree with this statement?
- I can make a significant difference in protecting fish and wildlife habitat. Do you agree or disagree with this statement?
- I feel that efforts to preserve wildlife habitat in [STATE] are adequate. Do you agree or disagree with this statement?
- If it came down to a choice between preserving wildlife habitat or providing land for new homes, we should always side with providing new homes for the residents of our state. Do you agree or disagree with this statement?

Source: *Public Opinion On Fish And Wildlife Management Issues and the Reputation and Credibility of Fish And Wildlife Agencies in the Northeast United States*, Responsive Management, 2004.

Appendix D: Responsive Management questions included in a survey evaluating recruitment and retention programs. The questions were intended to measure environmental stewardship and were asked of youth respondents. Note that questions may be copyrighted.

Responses to the following questions are measured on a scale of extremely, very, somewhat, slightly, or not at all important.

- How important is it to you that there are natural areas, like woods, forests, fields, and rivers, where people can visit and to enjoy or have fun?

- How important is it to you that YOU personally get the chance to visit and enjoy natural areas like woods, forests, fields, or rivers?

- How important is it to you that fish and wild animals are taken care of and the areas where they live are protected?

- How important is it to you to do things to help take care of fish and wildlife and to protect the areas where they live?

- How important is it to you to think about how YOUR activities and the things you do might help or harm fish, wild animals, and the areas where they live?

- How important is it to you to be responsible when you are hunting, shooting, or fishing?

- How important is it to you to tell other people what you think could be done to help take care of fish and wild animals and to protect the areas where they live? For example, telling a teacher or writing to your congressman about an idea to clean up a stream or protect wild animals from construction projects.

- How important is it to you to do something that helps take care fish and wild animals or to protect the areas where they live? For example, actually helping a group or club clean up a stream or pick up litter?

- How important is it to you that fish and wild animals are taken care of in the best way possible?

- How important is it to you that fish and wild animals are taken care of and the areas where they live are protected so that people in the future will be able to enjoy them?

Source: Responsive Management 2010 evaluation on recruitment and retention programs, conducted with the National Wild Turkey Federation (ongoing).

Appendix E: Responsive Management questions included in a survey evaluating recruitment and retention programs. The questions were intended to measure environmental stewardship and were asked of adult respondents. Note that questions may be copyrighted.

Responses to the following questions are measured on a scale of extremely, very, somewhat, slightly, or not at all important.

- How important is it to you that natural areas exist for enjoying and experiencing nature?
- How important is it to you personally for YOU to enjoy and experience nature?
- How important is it to you that fish and wildlife resources and habitat are properly managed and conserved?
- How important is it to you personally to participate in efforts to conserve fish and wildlife resources and habitat in your area?
- How important is it to you to think about how YOUR activities might affect fish and wildlife and their habitat?
- How important is it to you personally that YOU act responsibly in the field while hunting, shooting, or fishing?
- How important is it to you personally to VOICE YOUR OPINION in support of conservation of fish and wildlife resources and habitat, such as writing a letter to a government official or representative?
- How important is it to you personally to TAKE ACTION in support of the conservation of fish and wildlife resources and habitat, such as volunteering for a conservation organization or participating in activities like cleaning up a waterway?
- How important is it to you that fish and wildlife resources are being properly managed and conserved?
- How important is it to you that fish and wildlife resources and habitat are conserved for future generations?
- How important is to you that fish and wildlife are protected even if it means the use and development of land is restricted?
- How important is it to you that fish and wildlife are protected from the impacts of land development even if it means less housing development and housing becomes more expensive?

Source: Responsive Management 2010 evaluation on recruitment and retention programs, conducted with the National Wild Turkey Federation (ongoing).

Appendix F: Unedited tables showing outdoor recreation participation rates.

Edited versions of the tables below appear in the "Outdoor Recreation Participation" section. Here they are reproduced in their original forms to show all outdoor recreational activities as measured by the original data sources.

Table 4—NSRE trends in participation in outdoor activities and sports in 1999-2001 and 2005-2009 (for activities with greater than 50 million participants in 2005-2009)

Activity	1994-1995 Total participants age 16 and older (millions)	1999-2001 Total participants age 16 and older (millions)	2005-2009 Total participants age 16 and older (millions)	2005-2009 Percent of population age 16 and older	Percent change 1999-2001 to 2005-2009
Walking for pleasure	138.4	175.6	198.2	84.3	12.9
Gathering of family/friends	128.2	157.6	174.4	74.1	10.7
Gardening/landscaping for pleasure	.	140.8	157.3	66.9	11.7
Viewing natural scenery	.	127.1	147.5	62.7	16.1
Visiting outdoor nature center/zoo	110.9	121.0	130.8	55.6	8.2
Sightseeing	117.5	109.0	120.9	51.4	11.0
Picnicking	112.1	118.3	119.8	50.9	1.3
Viewing wildflowers/trees	.	93.8	119.3	50.7	27.3
Driving for pleasure	.	107.9	116.9	49.7	8.3
Viewing wildlife besides birds and fish	62.8	94.2	116.6	49.5	23.8
Outdoor pool swimming	99	85.0	99.7	42.4	17.3
Visiting historic sites/monuments	91.6	96.1	99.5	42.3	3.5
Visiting a beach	128.8	84.4	99.1	42.1	17.4
Swimming in lakes, ponds, etc.	87.4	85.5	95.1	40.4	11.1
Bicycling for fun/exercise	77.8	81.9	90.9	38.6	11.0
Viewing or photographing birds	54.3	68.5	82.0	34.9	19.8
Day hiking	53.5	69.1	77.8	33.1	12.6
Gathering mushrooms/berries	.	60.0	75.6	32.1	25.9
Visiting a wilderness area	.	67.2	75.5	32.1	12.3
Visiting farm or	.	58.6	73.8	31.4	26.1

Activity	1994-1995 Total participants age 16 and older (millions)	1999-2001 Total participants age 16 and older (millions)	2005-2009 Total participants age 16 and older (millions)	2005-2009 Percent of population age 16 and older	Percent change 1999-2001 to 2005-2009
agricultural setting					
Viewing salt/freshwater fish	27.6	52.3	62.9	26.7	20.3
Camping (developed)	46.5	55.3	55.9	23.8	1.0
Warmwater fishing	49.3	47.6	54.4	23.1	14.3
Motorboating	59.5	50.7	54.4	23.1	7.3
Visiting waterside besides beach	.	53.2	53.4	22.7	0.5

Source: NSRE 1994-1995 (n=17,217), NSRE 1999-2001 (n=52,607), and NSRE 2005-2009 (n=24,073). Notes: Snorkeling in 1994-1995 included scuba diving. 1994-1995 participants based on 201.26 million people age 16+ (Woods & Poole Economics). 1999-2001 participants based on 214.02 million people age 16+ (2000 Census). 2005-2009 participants based on 235.30 million people age 16+ (2008 Census estimate). Missing data indicates that participation was not collected for the activity during that time period.

Table 5—NSRE trends in participation in outdoor activities and sports in 1994-95, 1999-2001, and 2005-2009 (for activities with between 25 and 49 million participants in 2005-2009)

Activity	1994-1995 Total participants age 16 and older (millions)	1999-2001 Total participants age 16 and older (millions)	2005-2009 Total participants age 16 and older (millions)	2005-2009 Percent of population age 16 and older	Percent change 1999-2001 to 2005-2009
Visiting archaeological sites	36.1	44.0	48.2	20.5	9.7
Driving off-road	35.9	36.0	47.3	20.1	31.5
Boat tours or excursions	.	40.8	45.7	19.4	12.1
Bicycling on mountain/hybrid bike	.	44.0	42.7	18.1	-3.0
Camping (primitive)	31.4	33.1	33.3	14.2	0.6
Coldwater fishing	25.1	28.4	30.0	12.8	5.7
Sledding	27.7	30.8	26.0	11.0	-15.7

Source: NSRE 1994-1995 (n=17,217), NSRE 1999-2001 (n=52,607), and NSRE 2005-2009 (n=24,073). Notes: Snorkeling in 1994-1995 included scuba diving. 1994-1995 participants based on 201.26 million people age 16+ (Woods & Poole Economics). 1999-2001 participants based on 214.02 million people age 16+ (2000 Census). 2005-2009 participants based on 235.30 million people age 16+ (2008 Census estimate). Missing data indicates that participation was not collected for the activity during that time period.

Table 6—NSRE trends in participation in outdoor activities and sports in 1999-2001 and 2005-2009 (for activities with between 15 and 25 million participants in 2005-2009)

Activity	1994-1995 Total participants age 16 and older (millions)	1999-2001 Total participants age 16 and older (millions)	2005-2009 Total participants age 16 and older (millions)	2005-2009 Percent of population age 16 and older	Percent change 1999-2001 To 2005-2009
Saltwater fishing	22.9	21.4	24.9	10.6	16.5
Backpacking on trails	17.0	21.5	22.9	9.7	6.4
Horseback riding/equestrian	20.7	19.8	22.2	9.5	12.1
Canoeing	17.9	19.3	22.0	9.3	14.1
Using personal watercraft	12.0	19.1	20.6	8.8	8.0
Waterskiing	22.7	16.0	19.5	8.3	22.3
Rafting	19.3	19.1	18.5	7.9	-3.2
Big game hunting	19.0	17.8	16.3	6.9	-8.7
Horseback riding on trails	15.1	15.8	16.2	6.9	2.4
Small game hunting	17.3	14.8	15.9	6.8	7.3
Downhill skiing	22.8	17.4	15.2	6.4	-13.0

Source: NSRE 1994-1995 (n=17,217), NSRE 1999-2001 (n=52,607), and NSRE 2005-2009 (n=24,073). Notes: 1994-1995 participants based on 201.26 million people age 16+ (Woods & Poole Economics). 1999-2001 participants based on 214.02 million people age 16+ (2000 Census). 2005-2009 participants based on 235.30 million people age 16+ (2008 Census estimate). Missing data indicates that participation was not collected for the activity during that time period.

Table 11—NSGA trend data for participation in recreational activities, 1999-2009

Activity	1999 Total participants age 7 and older (millions)	2001 Total participants age 7 and older (millions)	2003 Total participants age 7 and older (millions)	2005 Total participants age 7 and older (millions)	2007 Total participants age 7 and older (millions)	2009 Total participants age 7 and older (millions)
Aerobic exercising	26.2	26.3	28.0	33.7	30.3	33.1
Archery (target)	4.9	4.7	3.9	6.8	6.6	7.1
Backpack/wilderness camping	15.3	14.5	15.1	13.3	13.0	12.3
Baseball	16.3	14.9	15.4	14.6	14.0	11.5
Basketball	29.6	28.1	27.9	28.9	24.1	24.4
Bicycle riding	42.4	39.0	38.3	41.1	37.4	38.1
Billiards/pool	32.1	32.7	33.0	35.3	29.5	28.2
Boating, motor/power	24.4	23.9	24.2	27.5	31.9	24.0
Bowling	41.6	41.9	41.9	45.4	43.5	45.0
Camping (vacation/overnight)	50.1	48.7	53.4	46.0	47.5	50.9
Dart throwing	20.2	16.9	.	.	12.1	12.2
Exercising walking	80.8	78.3	81.6	86.0	89.8	93.4
Exercising with equipment	45.2	43.9	50.2	54.2	52.9	57.2
Fishing	46.7	44.4	42.7	41.6	41.0	32.9
Football (tackle)	8.4	8.2	8.7	9.9	9.2	8.9
Golf	27.0	26.6	25.7	24.7	22.7	22.3
Gymnastics	5.0	.	.	.	.	3.9
Hiking	28.1	26.1	26.7	29.8	28.6	34.0
Hockey (ice)	1.9	2.2	1.9	2.4	2.1	3.1
Hunting with firearms	20.4	16.8	17.7	19.6	19.5	18.8
Hunting with bow and arrow	5.8	4.7	5.0	6.6	5.7	6.2
In-line roller skating	24.1	19.2	16.0	13.1	10.7	7.9
Kayaking	.	.	.	.	5.9	4.9
Kickboxing	3.8	3.7	3.0	.	.	.
Mountain biking (off road)	6.8	6.9	8.2	9.2	9.3	8.4
Mountain/rock climbing	.	.	.	.	4.6	.

Activity	1999 Total participants age 7 and older (millions)	2001 Total participants age 7 and older (millions)	2003 Total participants age 7 and older (millions)	2005 Total participants age 7 and older (millions)	2007 Total participants age 7 and older (millions)	2009 Total participants age 7 and older (millions)
Muzzleloading	3.3	3.2	3.4	4.1	3.6	3.8
Paintball	5.1	5.6	7.4	8.0	7.4	6.3
Running/jogging	22.4	24.5	23.9	29.2	30.4	32.2
Scooter riding	.	12.7	11.9	10.4	10.6	8.1
Scuba diving (open water)	2.3	2.1	.	.	2.4	.
Skateboarding	7.0	9.6	9.0	12.0	10.1	8.4
Skiing (alpine)	7.4	7.7	6.8	6.9	6.4	7.0
Skiing (cross country)	2.2	2.3	1.9	1.9	1.7	1.7
Snowboarding	3.3	5.3	6.3	6.0	5.1	6.2
Snowmobiling	3.4	4.6	.	.	.	.
Soccer	13.2	13.9	13.0	14.1	13.8	13.6
Softball	14.7	13.2	12.4	13.1	12.4	11.8
Swimming	57.9	54.8	52.3	58.0	52.3	50.2
Table tennis	8.2	8.4	.	.	.	13.3
Target shooting (net)	17.7	17.3	17.9	19.9	20.9	19.8
Target shooting – airgun	3.5	2.9	3.8	6.7	6.6	5.2
Tennis	10.9	10.9	9.6	11.1	12.3	10.8
Volleyball	11.7	12.0	10.4	12.2	12.0	10.7
Water skiing	6.6	5.8	5.5	6.7	5.3	5.2
Weightlifting	.	23.9	25.9	33.5	33.2	34.5
Workout at club	24.1	26.5	29.5	34.7	36.8	38.3
Wrestling	3.8	3.5	.	.	2.1	3.0
Yoga	.	.	.	.	10.7	15.7

Source: *Ten-Year History of Sports Participation*, National Sporting Goods Association, 7 August 2010, http://www.nsga.org/i4a/pages/index.cfm?pageid=3479

Table 12—SGMA trend data for participation in outdoor recreational activities, 2007-2009

Activity	2007 Total participants age 6 and older (thousands)	2008 Total participants age 6 and older (thousands)	2009 Total participants age 6 and older (thousands)	Percent change 2008-2009
Outdoor sports				
Backpacking overnight – more than ¼ mile from vehicle/home	6,637	7,867	7,647	-2.8
Bicycling - BMX	1,887	1,904	1,811	-4.9
Bicycling (mountain/non-paved surface)	6,892	7,592	7,142	-5.9
Bicycling (road/paved surface)	38,940	38,114	40,140	5.3
Birdwatching – more than ¼ mile from home/vehicle	13,476	14,399	13,294	-7.7
Camping (recreational vehicle)	16,168	16,517	17,436	5.6
Camping – within ¼ mile of vehicle/home	31,375	33,686	34,338	1.9
Climbing (sport/indoor/boulder)	4,514	4,769	4,313	-9.6
Climbing (traditional/ice/mountaineering)	2,062	2,288	1,835	-19.8
Fishing (fly)	5,756	5,941	5,568	-6.3
Fishing (freshwater/other)	43,859	40,331	40,961	1.6
Fishing (saltwater)	14,437	13,804	12,303	-10.9
Hiking (day)	29,965	32,511	32,572	0.2
Hunting (bow)	3,818	3,722	4,226	13.5
Hunting (handgun)	2,595	2,873	2,276	-20.8
Hunting (rifle)	10,635	10,344	11,114	7.4
Hunting (shotgun)	8,545	8,731	8,490	-2.8
Shooting (sport clays)	4,115	4,282	4,182	-2.3
Shooting (trap/skeet)	3,376	3,669	3,368	-8.2
Target shooting (handgun)	11,736	13,365	12,473	-6.7
Target shooting (rifle)	12,436	13,102	12,730	-2.8
Wildlife viewing – more than ¼ mile from home/vehicle	22,974	24,113	21,291	-11.7

Activity	2007 Total participants age 6 and older (thousands)	2008 Total participants age 6 and older (thousands)	2009 Total participants age 6 and older (thousands)	Percent change 2008-2009
Winter sports				
Skiing (alpine/downhill)	10,362	10,346	10,919	5.5
Skiing (cross-country)	3,530	3,848	4,157	8.0
Skiing (freestyle)	2,817	2,711	2,950	8.8
Snowboarding	6,841	7,159	7,421	3.7
Snowshoeing	2,400	2,922	3,431	17.4
Telemarking (downhill)	1,173	1,435	1,482	3.3
Water sports				
Boardsailing/windsurfing	1,118	1,307	1,128	-13.7
Canoeing	9,797	9,935	10,058	1.0
Jet skiing	8,055	7,815	7,724	-1.2
Kayaking (recreational)	5,070	6,240	6,212	-0.4
Kayaking (sea/touring)	1,485	1,780	1,771	-0.5
Kayaking (white water)	1,207	1,242	1,369	10.2
Rafting	4,340	4,651	4,318	-7.2
Sailing	3,786	4,226	4,342	2.7
Scuba diving	2,965	3,216	2,723	-15.3
Snorkeling	9,294	10,296	9,358	-9.1
Surfing	2,206	2,607	2,403	-7.8
Wakeboarding	3,521	3,544	3,577	0.9
Water skiing	5,918	5,593	4,862	-13.1

Source: *2010 SGMA Sports & Fitness Participation Top Line Report*

Table 13—Outdoor Recreation Foundation trend data for participation in outdoor recreation activities, 2007-2009

Activity	2007 Total participants age 6 and older (thousands)	2008 Total participants age 6 and older (thousands)	2009 Total participants age 6 and older (thousands)	Percent change 2008-2009
Walking/running/bicycling				
Adventure racing	698	920	1,089	18.4
Bicycling – BMX	1,887	1,904	1,811	-4.9
Bicycling (mountain/non-paved surface)	6,892	7,592	7,142	-5.9
Bicycling (road/paved surface)	38,940	38,114	40,140	5.3
Running/jogging	41,064	41,130	43,892	6.7
Triathalon (non-traditional/off road)	483	602	666	10.6
Triathalon (traditional/road)	798	1,087	1,208	11.1
Walking for fitness	108,740	111,668	110,095	-1.4
Outdoor activities				
Backpacking overnight – more than ¼ mile from vehicle/home	6,637	7,867	7,647	-2.8
Birdwatching – more than ¼ mile from vehicle/home	13,476	14,399	13,294	-7.7
Camping (RV)	16,168	16,517	17,436	5.6
Camping – within ¼ mile of vehicle/home	31,375	33,686	34,338	1.9
Canoeing	9,797	9,935	10,058	1.2
Climbing (sport/indoor/boulder)	4,514	4,769	4,313	-9.6
Climbing (traditional/ice/mountaineering)	2,062	2,288	1,835	-19.8
Hiking (day)	29,965	32,511	32,572	0.2
Kayaking (recreational)	5,070	6,240	6,212	-0.4
Kayaking (sea/touring)	1,485	1,780	1,771	-0.5
Kayaking (white water)	1,207	1,242	1,369	10.2
Rafting	4,340	4,651	4,318	-7.2
Trail running	4,216	4,857	4,883	-0.5

Activity	2007 Total participants age 6 and older (thousands)	2008 Total participants age 6 and older (thousands)	2009 Total participants age 6 and older (thousands)	Percent change 2008-2009
Wildlife viewing – more than ¼ mile from home/vehicle	22,974	24,113	21,291	-11.7
Fishing				
Fishing (fly)	5,756	5,941	5,568	-6.3
Fishing (freshwater)	43,859	40,331	40,961	1.6
Fishing (saltwater)	14,437	13,804	12,303	-10.9
Winter sports				
Skiing (alpine/downhill)	10,362	10,346	10,919	5.5
Skiing (cross-country)	3,530	3,848	4,157	8.0
Snowboarding	6,841	7,159	7,421	3.7
Snowshoeing	2,400	2,922	3,431	17.4
Telemarking (downhill)	1,173	1,435	1,482	3.3
Wheeled sports				
Skateboarding	8,429	7,807	7,352	-5.8
Hunting				
Hunting (bow)	3,818	3,722	4,226	13.5
Hunting (handgun)	2,595	2,873	2,276	-20.8
Hunting (rifle)	10,635	10,344	11,114	7.4
Hunting (shotgun)	8,545	8,731	8,490	-2.8
Water sports				
Boardsailing/windsurfing	1,118	1,307	1,128	-13.7
Sailing	3,786	4,226	4,342	2.7
Scuba diving	2,965	3,216	2,723	-15.3
Snorkeling	9,294	10,296	9,358	-9.1
Surfing	2,206	2,607	2,403	-7.8
Wakeboarding	3,521	3,544	3,577	0.9

Source: Outdoor Recreation Foundation 2010 Top Line Report, 7 August 2010, http://www.outdoorfoundation.org/pdf/ResearchParticipation2010Topline.pdf

SOURCES AND WEBSITES OF INTEREST

Data sources for outdoor recreation participation:

National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (National Survey):
http://www.census.gov/prod/www/abs/fishing.html

National Survey on Recreation and the Environment (NSRE):
http://www.srs.fs.usda.gov/trends/Nsre/nsre2.html

National Sporting Goods Association (NSGA) survey research:
http://www.nsga.org/i4a/pages/index.cfm?pageid=3346

Sporting Goods Manufacturers Association (SGMA) survey research:
http://www.sgma.com/reports/

Outdoor Industry Foundation survey research:
http://www.outdoorfoundation.org/research.html

Outdoor Recreation in America, a series of surveys (1994-2003) conducted for the Recreation Roundtable by Roper Starch Worldwide:
http://www.funoutdoors.com/node/view/1109

Data sources for conservation education, environmental literacy, and stewardship and civic involvement:

NSRE survey questions measuring attitudes toward wildlife and natural resource values and opinion on management practices:
http://www.srs.fs.usda.gov/trends/Nsre/vsummary.htm

Roper Research environmental survey reports:
http://www.neefusa.org/resources/publications.htm#healthpubs

North American Association for Environmental Education database of resources:
http://naaee.org/cgi-bin/risee/noram/programs?id=

DJ Case report on survey of fish and wildlife agencies (environmental literacy plans, school-based conservation education, etc.)
http://www.fishwildlife.org/pdfs/CE%20Strategy_Survey_3-2010.pdf

Nationally administered tests:
http://www.edsource.org/1532.html

National Center for Education Statistics:
http://nces.ed.gov/

Trends in International Mathematics and Science Study (TIMSS):
http://nces.ed.gov/timss/

PALS, an online resource bank of science performance assessment tasks indexed via the National Science Education Standards (NSES):
http://pals.sri.com/

Children and Nature Network (C&NN):
http://www.childrenandnature.org/research/

Standardized Testing and Reporting (STAR):
http://starsamplequestions.org/index.html

Bureau of Labor statistics regarding volunteers by type of main organization:
http://www.bls.gov/news.release/volun.t04.htm

Federal and state programs focusing on conservation education, environmental literacy, and stewardship and civic involvement:

National Park Service's Junior Ranger Program:
http://www.nps.gov/learn/juniorranger.cfm

National Wildlife Federation's Ranger Rick Program:
http://www.nwf.org/Kids/Ranger-Rick.aspx

Boy Scouts of America description of merit badge for fish and wildlife management:
http://www.scouting.org/scoutsource/boyscouts/advancementandawards/meritbadges/mb-fawm.aspx

South Carolina Department of Natural Resources SC Reel Kids Program:
http://www.dnr.sc.gov/aquaticed/screelkids/

Wisconsin Department of Natural Resources fishing education events and programs:
http://dnr.wi.gov/fish/kidsparents/learningopportunities.html

Arizona Game and Fish Commission Focus Wild Arizona Program:
http://www.azgfd.gov/i_e/ee/environmental_education.shtml

National education standards and related future legislation:

New York Times article on states adopting national educational standards:
http://www.nytimes.com/2010/07/21/education/21standards.html?scp=1&sq=education%20standards&st=cse

Education Week article on Environmental Education Graduation Mandates:
http://www.edweek.org/ew/articles/2010/07/16/37environment.h29.html?tkn=TQXFTeLERU0oD6Y3Von/bHdYD11NEWrvUeM2&cmp=clp-edweek

Overview of No Child Left Inside legislation:
http://www.cbf.org/Page.aspx?pid=687
http://edlabor.house.gov/no-child-left-inside-act/index.shtml

U.S. Department of Education Race to the Top Fund website:
http://www2.ed.gov/programs/racetothetop/index.html

AFWA Conservation Education Strategy newsletter:
http://archive.constantcontact.com/fs046/1102647721525/archive/1103325364430.html#LETTER.BLOCK15

Responsive Management data sources on outdoor recreation participation, conservation/environmental knowledge, and natural resource values:

Public Opinion on Fish and Wildlife Management Issues And The Reputation And Credibility Of Fish And Wildlife Agencies In The Southeastern United States: Southeastern Region Report, conducted for the Southeastern Association of Fish and Wildlife Agencies
http://www.responsivemanagement.com/download/reports/SEAFWA_Regional_Report.pdf

Public Opinion On Fish And Wildlife Management Issues and the Reputation and Credibility Of Fish And Wildlife Agencies in the Northeast United States, conducted for the Northeast Conservation Information and Education Association
http://www.responsivemanagement.com/download/reports/NCIEARegional.pdf

Responsive Management recruitment and retention evaluation survey including environmental questions (see questions listed in appendix)