

# ATTITUDES TOWARD AND RELATIVE VALUE OF ALASKAN BROWN AND BLACK BEARS TO RESIDENT VOTERS, RESIDENT HUNTERS, AND NONRESIDENT HUNTERS

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**Abstract:** We describe and compare the economic benefits to and attitudes of 3 groups who use Alaskan brown bears (*Ursus arctos*) and black bears (*U. americanus*) for viewing and hunting. We compare benefits each group derived from use of bears with benefits derived from use of other wildlife species. The groups analyzed were resident and nonresident hunters who purchased hunting licenses in 1991 and Alaskan voters who were registered in 1990. Benefits of wildlife use by nonhunting nonresident tourists was not measured in this study. Each of the 3 groups was sampled in 1992 via a mailed survey designed to document their expenditures and net economic value (value from the resource in excess of what it cost to obtain) of an overnight hunting or wildlife viewing trip taken in 1991. We also documented willingness to pay for a hypothetical wildlife viewing opportunity.

Alaskan voters and hunters supported hunting for meat, but only 22% of voters and 50% of resident hunters supported trophy hunting. About half of Alaskan voters and hunters indicated tolerance for bears in urban environments. A third of Alaskan voters reported that they sometimes avoided trips into the countryside because of concerns about bears. Most voters (63%) opposed baiting as a black bear hunting technique, but more hunters favored (47%) than opposed (39%) baiting.

The average gross value (expenditures plus net value) of a voter's primary purpose wildlife viewing trip was calculated based on species seen. Trips on which bears were seen had higher average gross values (\$759) than trips on which other species were seen. Average gross value of a bear hunting trip (species combined) for an Alaska resident was \$1,048 (\$1,541 for a brown bear hunting trip). Trip-related expenditures were higher for nonresident brown bear hunters (\$10,677) than for resident hunters (\$1,247). Alaska resident hunters, nonresident hunters, and Alaskan voters were willing to pay more for a hypothetical day trip to view brown bears (\$404, \$364, and \$485, respectively) than for other wildlife species. We calculated total social benefit as the product of average gross value of overnight hunting or viewing trips and the estimated number of such trips taken by each of the 3 populations sampled. Total social benefit calculations permitted comparisons of the total direct benefits received by different groups of a particular wildlife use (overnight trips to view or hunt different species of wildlife in our study). Resident hunting of wildlife (all species) provided more total social benefit (\$84.25 million) than primary purpose wildlife viewing trips by residents (\$52.96 million) or nonresident hunting trips (\$41.92 million). For trips involving bear hunting or viewing, total social benefit was higher for primary purpose wildlife viewing trips when bears were seen (\$29.11 million) than for bear hunting trips taken by nonresidents (\$17.05 million) or for bear hunting trips by residents (\$4.15 million). Our analysis should be a useful component in the process of allocating wildlife uses among the claimants for priority in the use of these public resources.

*Ursus* 10:357-376

**Key words:** Alaska, attitudes, bear baiting, black bear, brown bear, contingent value, economics, economic value, hunting, nonresident hunters, opinions, questionnaire, resident hunters, social benefit, survey, *Ursus americanus*, *Ursus arctos*, wildlife viewing.

Rapidly growing human populations increase demands on natural resources of all kinds, forcing resource managers to make difficult allocation decisions between competing resource uses. Economics, the science of allocating scarce resources, can provide relevant information and useful tools to enhance managers' ability to evaluate and choose between alternative uses. We do not suggest resource allocation decisions be based solely on economic information. Rather, economic information can help identify and clarify trade-offs among policy and management alternatives and the consequences of choosing one over the other.

Economic value is an expression of the relative worth of a good, service, or resource to a person or group in a particular context, usually measured in monetary units. In theory, it captures everything that benefits a person. In recent decades, several approaches toward pricing prod-

ucts derived from wildlife have been developed (Freeman 1979, Loomis et al. 1984, Mitchell and Carson 1989, McCollum and Bergstrom 1992). Applications of these techniques have demonstrated that products from wildlife are frequently very highly valued relative to competing uses of these resources (Walsh et al. 1988, Thomas et al. 1992).

In this paper we introduce a new approach, total social benefit, to evaluate the benefits to society of the wildlife uses we describe. We use the total "willingness to pay" of an individual participating in a use as a measure of the individual's benefits derived from that use. This is fundamentally different from traditional cost-benefit analyses. On an individual basis, the participant weighs benefits received against costs incurred. Expenditures associated with participation (wildlife-related trip expenditures in our study) are costs. Benefits can be measured by how

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much more (or less) the individual would have been willing to pay (their net willingness to pay). However, when an agency asks the question of who is benefiting from a specific use, we believe they should look at the total amount the individual paid plus their net willingness to pay (gross economic value) to indicate how much the individual personally valued their participation. Summing the personal benefits of all individual participants provides a measure of the "total social benefit" of that specific use. The total social benefit concept should be useful in developing agency policy as it provides a measure of the relative benefits society realizes from different uses of a resource.

Economic analysis may help guide allocation decisions between user groups and between uses of different kinds of wildlife. The economic comparisons presented here concentrate on values associated with resident and non-resident hunting and Alaska resident viewing of wildlife. These comparisons are important because of increasing allocation conflicts between uses even though individuals may participate in >1 use. Those who want to close more areas to hunting contend with some hunters who resist such closures. The groups we discuss are not homogenous, and each contains a range of views which can be further classified into subgroups (Miller et al. 1994).

We also contrast values associated with hunting and viewing of bears with values associated with hunting and viewing of other Alaskan wildlife species. There are increasing conflicts between management objectives for different wildlife species, as evidenced by a 1994 state law mandating "intensive management" of predators to benefit hunters of preferred prey species ("An act relating to the powers of the Board of Game and to intensive management of big game to achieve higher sustained yield for human harvest" [Alaska Statutes 16.05.255]). This law led to adoption, in 1995, of regulations designed to significantly reduce brown bear numbers in 2 portions of Alaska. Additional areas are under consideration for similar reduction in bear numbers. These reductions in bear numbers are intended to increase the number of moose (*Alces alces*) available for harvest by resident hunters.

Bears, especially brown bears, are good subjects for comparisons of relative value from different management strategies. Habitat destruction and human intolerance has led to the extirpation of brown bears from 99% of their original range south of Canada (Servheen 1989). Outside Alaska, fewer than 900 brown bears remain in the United States (Servheen 1989). Canada retains a population of about 25,000 brown bears but they have been eliminated from 24% of their original range and are in "at-risk" status in 63% of their current range (Banci et al. 1994).

Alaska has about 31,700 brown bears of generally secure status (Miller 1993). Alaskan brown bear populations, however, are subject to many of the same attitudes and decimating factors that led to reduction or extirpation of brown bears in portions of Canada and the United States (Schoen et al. 1987, Servheen 1989, Banci et al. 1994, Miller and Schoen In Press). Alaska is the only place in North America with well-developed and popular viewing opportunities for wild brown and black bears. These are adjacent to or overlap areas where brown bears may be hunted. This proximity permits comparison of the economic value of bear hunting with values of nonhunting alternatives.

Our analysis concentrates on values associated with uses of bears in Alaska; however, our methods have general applicability to other areas and resources. We believe the relationships we establish between relative values of different uses are likely to be similar in kind, if not in degree, elsewhere. Components of economic value associated with bear viewing were earlier addressed for the Yellowstone ecosystem and other areas by Swanson et al. (1994) and attitudes towards bears by Kellert (1994).

The Alaska Wildlife Users Survey, on which this report is based, was made possible by contributions from the following agencies: the Alaska Department of Fish and Game, The U.S. Forest Service Rocky Mountain Forest and Range Experiment Station, The U.S. Fish and Wildlife Service Federal Aid Program, the U.S. Forest Service Region 10, The U.S. National Park Service, the U.S. Bureau of Land Management, the U.S. Fish and Wildlife Service—Alaska Region, and the University of Alaska Fairbanks. Support for S.D. Miller and S.M. Miller during preparation of this paper was provided by Federal Aid in Wildlife Restoration Projects W-24-2, Study 4.24 and W-24-4, Study 22, respectively. We appreciate comments on drafts of this paper from J. Schoen, M. Hicks, C. Matt (Alaska Dep. Fish and Game), M. Munson-McGee, B. McLellan, and from 2 anonymous referees.

## METHODS

Data were obtained from responses to 3 questionnaires ("The Alaska Wildlife Users Survey") mailed in spring 1992 to randomly selected samples of 3 wildlife user groups: people registered to vote in Alaska in 1990, people who purchased Alaska resident hunting licenses in 1991, and people who purchased nonresident Alaskan hunting licenses in 1991 (hereafter voters, resident hunters, and nonresident hunters, respectively). The questionnaire was slightly different for each group. Voters were used as a proxy for the general resident population

of adults. People selected to receive the questionnaire received an introductory letter, and the survey was mailed to all individuals whose introductory letter was not returned by the Post Office as undeliverable. The questionnaire asked about wildlife use in 1991 and included a cover letter, a 25-page survey, and a page of questions and answers about the study. As suggested by Dillman (1978), 2 follow-up mailings of the questionnaire packet were sent to nonrespondents. Estimated and reported expenses and values are for trips taken in 1991, so values reflect 1991 dollars. The final response rate for voters, resident hunters and nonresident hunters, respectively, was 57.2% , 58.6%, and 73.4% (Table 1).

Characteristics of each sample were compared to known population characteristics and, where necessary, weights were constructed. The voter responses were weighted to obtain equal representation from all legislative districts. The resident hunter responses were weighted to obtain equal representation by age as the population of resident hunters. The nonresident hunter responses were weighted by sex and age to reflect the population of nonresident hunters.

We used a contingent valuation method which estimated value by asking survey respondents how much they would be willing to pay to acquire a particular good or service. In our study, respondents were asked how much more they would have been willing to pay, in expenses, for a specific wildlife-related trip they took before that trip would no longer have been worth the cost. This was an open-ended format—respondents filled in any dollar amount. In another part of the study, respondents were asked if they would have been willing to pay a specified amount for a day trip to a hypothetical wildlife viewing site of a specified type. This was a dichotomous choice or closed-ended format, where respondents said yes or no to a specified dollar amount. Different contexts may make one or the other more appropriate (Mitchell and

Carson 1989, Kealy and Turner 1993, Brown et al. 1996). Differences in the formats are mitigated when, as is done here, comparisons are confined to differences between species using the same valuation format.

The resident hunter and voter questionnaires included questions on beliefs, attitudes, and opinions about wildlife, wildlife use, and wildlife management. The resident hunter questionnaire included questions on expenditures on hunting-related equipment and supplies not attributable to any particular trip and on expenditures and the net economic value of a specific overnight big game or waterfowl hunting trip they actually took. Resident hunters were given a mechanism to randomly select 1 of their overnight hunting trips to tabulate expenses and estimate net economic value. Few nonresident hunters made more than 1 trip, so these hunters were asked to provide the economic information for their longest trip in Alaska. Resident voters were asked about expenditures on nonconsumptive wildlife-related equipment and supplies not attributable to any particular trip and expenditures and net economic value of 1 specific, randomly selected, wildlife viewing trip.

We excluded day trips to view or hunt wildlife to assure that we captured the bulk of expenditures associated with these activities. Day trips for viewing would be less expensive and, probably, more prevalent. Excluding day trips caused an underestimate of the total economic values associated with wildlife viewing. Excluding day trips for hunting may also underestimate total value of hunting trips, but we suspect that, except in rural areas, relatively few hunting trips are not overnight trips.

Respondents listed their 1991 overnight viewing or hunting trips and were asked to provide information on motives and some basic characteristics of each trip, including the wildlife species they wanted to see or hunt (targeted) on that trip. This provided information on which wildlife species motivated each trip. Elsewhere in

**Table 1. Sample size and return rates for questionnaires mailed to 3 groups of users of Alaskan wildlife resources in 1992.**

	Population size	Initial mailing	Sample receiving questionnaires <sup>a</sup>	Number ultimately returned	Percent responding
Random sample of resident hunters who bought licenses in 1991	85,525	4,000	3,546	2,077	58.6
Random sample of nonresident hunters who bought licenses in 1991	7,009	1,000	882	647	73.4
Sample weighted by legislative district of Alaskans voting in 1990	284,444	4,725	4,141	2,370	57.2

<sup>a</sup> Excludes the initial mailings returned as undeliverable.

the questionnaire, respondents were asked to provide detailed economic information about a trip randomly selected from this list. In this section they were asked to list the species they actually saw or killed as well as the species they wanted to see or hunt (targeted).

Respondents to the voter questionnaire frequently wrote in "bears" as the target of their viewing trip or as the species they saw without specifying which species (black or brown bear). In the hunter questionnaires, respondents usually specified which species they targeted or bagged. In our analysis we separated brown bears from black bears when respondents were specific. However, to permit direct comparisons between responses from hunters and from voters, we created an "any bear" response category. This category included all cases where the responses were brown bear, black bear, or "bear" (species unspecified). For viewing trips by voters, we believe almost all benefits calculated for the any bear category reflected benefits from brown bear viewing, as there are few places to see black bears. For hunters, black bear and brown bear responses do not total to the any bear responses because some hunts targeted both species.

When multiple species were reported to have been seen, targeted, or bagged on the same trip, the expenses and net economic value reported by respondents for that trip were tabulated for each species. For primary purpose viewing trips by voters, this enhanced reported benefits for viewing of ubiquitous species. Voters probably reported a higher value for trips on which relatively rare species like bears or wolves (*Canis lupus*) were seen in addition to more commonly seen species like moose. In our analysis, however, this higher reported trip value was tabulated for moose as well as for the more uncommon species reported.

In the voter's questionnaire, wildlife was defined as including "all wild animals, except fish." Wildlife viewing was defined as "a term we use to mean all activities involving wildlife, *except hunting and trapping* [emphasis in the original]. Activities such as watching, photographing, tracking, painting, or listening to wildlife are included in the term wildlife viewing." These terms were not defined in the resident and nonresident hunter questionnaires.

Questionnaire responses were tabulated and presented in 6 volumes of reference tables (Miller and McCollum 1994a,b,c; McCollum and Miller 1994a,b,c) and 2 books of summary reference tables (Miller and McCollum 1994d; McCollum and Miller 1994d); these volumes include the questionnaires used. Most of the data presented in this report were extracted from these summary volumes although some, such as the "any bear" values, are

new tabulations of the original data. Slight differences between the economic values reported here and those in the above-cited references reflect minor errors in the earlier tabulations. Available information does not include value of nonconsumptive wildlife use by nonresidents of Alaska (tourists and other visitors). Similar data from tourists were collected in 1995 and are being analyzed.

## Potential Economic Demand for Viewing

The voter and resident hunter questionnaires asked respondents to consider several hypothetical wildlife-use scenarios designed to evaluate willingness to pay for viewing different wildlife species (McCollum and Miller 1994d). Both voters and resident hunters were asked how often they thought they might take a day trip, over the next 5 years, to visit a site where they could view specified species of wildlife if it cost a specified amount. The amount specified varied between questionnaires, allowing estimation of a probability distribution for the values placed on these specific viewing opportunities for the different species. Persons responding "more than once" or "at least once" were collapsed into a single "yes" category. "Never" and "yes" responses were then used as dependent variables in a logistic regression with the specified dollar amount and a constant term as independent variables. For each viewing scenario, this results in a distribution which describes the cumulative probability of a yes response as a function of the gross value. Mean value was calculated from the distribution for each scenario (Parzen 1960:211). The interpretation of the mean value is the average gross value placed on 1 day trip over the next 5 years to a site where the respondent can view the wildlife specified (here termed demand value). The demand value calculated in this way captured both the trip expenses and the additional amount the user would have been willing to pay (consumer surplus) and represented, on average, the maximum amount an individual would pay.

The value of wildlife viewing scenarios were phrased slightly differently for nonresident hunters. They were asked: "Please tell us how likely you think you would be to include sites like the following in your visit if you were to plan another trip to Alaska," followed by the same species and range of dollar amounts as those posed to resident hunters and voters. Nonresident hunter responses of "very likely" and "somewhat likely" were collapsed to "yes" and "not very likely" and "unlikely" were collapsed to "no".

## Trip Economics

In the voter questionnaire, respondents who reported taking  $\geq 1$  overnight trip that included nonconsumptive

wildlife use (termed “wildlife viewing” in this paper) were asked to list these trips in a table. The questionnaire then led respondents through a process in which they: (1) classified their trips as having a primary or a secondary purpose to view wildlife, and (2) followed a process to randomly select 1 of their overnight trips about which to provide detailed information. Primary purpose wildlife viewing trips were those which respondents would not have made to that place had they not been planning to view wildlife. Based on this response, all expenses and benefits associated with primary purpose wildlife viewing trips were attributed to wildlife viewing. When the respondent reported taking no primary purpose wildlife viewing trips, the respondent was asked to provide the expense and benefit data for a secondary purpose wildlife viewing trip. For the secondary purpose trips, we could not determine the proportion of expenses and benefits attributable to wildlife viewing.

### Trip Expenditures

Respondents were asked to provide detailed information on expenditures of the overnight trip (hunting or viewing) randomly selected as described above. These data provided information on average expenditures/trip. Respondents were prompted to provide information on expenses in various categories; voters, for example, were asked to provide information on transportation expenses, fuel and oil for any vehicle used, other vehicle expenses, lodging or camping expenses, groceries and beverages, restaurant meals and bars, commercial trips and tours, wildlife viewing and photographic supplies, equipment rental, shipping, and other items. When multiple species were reported seen or bagged, all reported expenses were tabulated for each species.

### Net Economic Value

Consumers commonly obtain value in excess of costs especially for products like wildlife viewing. In such cases, the correct concept of value is average consumer surplus (McCollum et al. 1992). Consumer surplus measures an individual’s willingness to pay for a good or service above the cost of obtaining it; this is the net value associated with consumption of the product and is the appropriate value for cost–benefit analysis (Loomis and Thomas 1992). Consumer surplus for the respondents’ selected trip was estimated by asking (emphasis in the original):

Suppose your costs had been higher. How much could the cost of your SELECTED TRIP have increased before you would have decided it was just not worth it and you *would not have taken*

your SELECTED TRIP? In other words: up to how much more, in addition to what you actually paid for your SELECTED TRIP, would you have paid to take your SELECTED TRIP?

I would have paid as much as \$\_\_\_\_\_ more than I actually paid to take my SELECTED TRIP.

Respondents who answered \$0 to this question were asked whether their response was because (1) “The trip was worth exactly what I paid and no more,” (2) “because I could not put a number on how much more I would have paid,” or (3) for “other reasons” (with a place to specify what those were). Based on comments written on the surveys, the “other” reasons specified were largely that they could not estimate a value or they did not think monetary values should be placed on wildlife and wildlife viewing. Conservatively, we treated all such cases as \$0 net value responses although the true value for some of them may be greater.

### Average Gross Value of Selected Trips

For each selected trip, the average gross value was the sum of expenditures and net economic benefit of that trip. Because of missing values in individual responses, the average gross value was not necessarily the same as the sum of the average expenditure plus the average net benefit. The gross value represented the total amount users were willing to pay for their overnight trip. This total willingness to pay was conceptually the same as the “demand value” discussed above for a hypothetical viewing scenario. However, our average gross value was calculated for an overnight trip that was actually taken. While only the net value (or consumer surplus) is relevant for cost–benefit analysis, average gross value is relevant because it represents the total area under the demand function for the selected trip (McCollum and Miller 1996). By definition, that area measures gross benefit received by the individual from the selected trip.

### Total Social Benefit

We developed the concept of “total social benefit” of a wildlife use as a measure of the cumulative benefits accrued by all participants in a specific resource use (McCollum and Miller 1996). In this report, the specific use was overnight wildlife-related trips. Our calculation of total social benefit provides policy makers with a measure of how benefit is realized by the different populations engaged in different wildlife uses (resident viewing, resident hunting, nonresident hunting, comparisons between species targeted, etc.). It allows policy makers to gauge the effects of management alternatives based on their relative benefit to society.

We calculated total social benefit as the product of the average gross value of the selected trip and the estimated number of trips taken by the relevant population. For example, the total social benefit for primary purpose wild-life viewing trips taken by Alaskan voters during which bears (either species) were seen was:

$$(38,357 \text{ trips})(\$759 \text{ per trip}) = \$29.11 \text{ million.}$$

The number of trips taken was calculated as the product of participation rate (for example, 0.13485 trips/year/voter on which any bear was seen) and the total population (284,444 voters).

Total social benefit is total in that it captures the value experienced by individual participants totaled over all participants. It is social in that the accumulation of individual benefits in the population provided a measure of benefits to society. Total social benefit captures the entire area under the demand function for the resource activity under consideration. It does not, however, reflect the total value of that resource activity because it excluded alternative direct use values, nonuse values, and passive use values such as existence values. Our concept of total social benefit also should not be confused with the economic impacts of a resource use. Economic impacts measure the cumulative value of expenditures on a particular good or service as these expenditures percolate through the economy generating a ripple effect of associated expenditures and economic benefits (McCollum and Bergstrom 1992). We do not discuss these economic impacts.

## RESULTS

### Attitudes toward Bears, Hunting, and Viewing

In general, Alaskans are very interested in and tolerant of wildlife. A large percent of Alaskan voters (96%) agreed with the statement "Wildlife adds a great deal to my enjoyment of living in Alaska" (80.8% strongly agreed with this statement). Few voters disagreed with this statement (1.2%) or had no opinion (0.8%).

About half of Alaskan voters and resident hunters liked having bears in urban environments (Table 2). Voters with no history of hunting (those who had never purchased a hunting license) were more tolerant of urban bears than voters with a hunting history (Miller and McCollum 1994*d*). There were differences in tolerance for urban bears between male and female voters ( $P < 0.05$ ) (Table 2).

Concerns about bears were reported by about a third of Alaskan voters as sometimes keeping them from going into the countryside, but more respondents strongly disagreed that they felt such constraints (Table 2). More females and fewer respondents with a history of hunting reported these concerns ( $P < 0.05$ ).

In Alaska, baiting is a legal hunting technique for black bears although subject to numerous restrictions. A majority of the Alaskan voter sample and a majority of the voter sample with a history of hunting opposed black bear baiting (Table 3) with differences in responses based on gender and history of hunting ( $P < 0.05$ ). More male respondents favored baiting (30%) than female respondents (14%) (Miller and McCollum 1994*d*). Respondents without a history of hunting were more opposed to baiting than those with a hunting history (Table 3). In the hunter questionnaire, 47% of resident hunters supported and 39% opposed baiting as a hunting technique for black bears (Table 3).

Alaskan hunters and voters were more skeptical about trophy hunting than about hunting for meat. Alaskan voters supported hunting wildlife for meat (87%) but were dramatically less supportive of hunting for trophies (22% in favor, 71% opposed) (Table 4). A bare majority of Alaskan hunters supported hunting for trophies (50% in favor and 46% opposed). More than a quarter of Alaskan hunters strongly opposed hunting for trophies (Table 4). This attitude has social and political implications for bear hunting because most bear hunters, especially brown bear hunters, hunt for the trophy of the hide and skull rather than for meat. In response to public concerns over trophy hunting, in 1996 the Alaska Board of Game adopted regulation requiring the salvage of meat from black bears taken in spring seasons or under the terms of subsistence hunting regulations. Alaskan brown bear hunters are not required to salvage the meat unless bears are taken under subsistence regulations.

Alaskans like wildlife viewing areas but, in general, are not willing to sacrifice hunting opportunities to obtain them. A majority of voters but a minority of hunters agreed with the statement "I think more areas in the state should be managed and developed for wildlife viewing" (Table 4). Most hunters disagreed with developing new viewing areas if it meant closing some areas to hunting (74%); more voters also disagreed (50%) than agreed (40%; Table 4). Voters disagreed even more strongly (58% disagreed, 25% agreed) with the statement "I believe more areas of the state should be closed to hunting" (Table 4).

Bagging an animal was more important to nonresident hunters than to resident hunters. A majority of residents

**Table 2. Percent of responses by Alaskan voters and Alaska resident hunters to inquiries about their attitudes toward bears based on a 1992 survey.**

	Agreement		Disagreement		Other
	Strong	Moderate	Moderate	Strong	
<i>I like having bears in and around urban areas in Alaska.</i>					
Resident hunters	19.9	29.9	22.6	18.1	5.8
Alaskan voters	19.1	28.8	24.0	21.2	4.6
Male voters	20.6	30.3	22.3	17.1	5.9
Female voters	15.4	27.4	21.5	25.2	5.0
<i>Concern about bears sometimes keeps me from going into the countryside.</i>					
Alaskan voters	10.9	23.5	21.7	39.2	2.5
Voters with hunting history	7.8	20.0	21.5	48.2	1.5
Voters with no hunting history	16.3	30.8	23.5	25.2	4.0
Males	5.5	19.1	21.5	50.3	2.3
Females	16.8	28.1	21.9	27.1	2.7

disagreed that a trip was unsuccessful if an animal was not bagged (64%), but a majority of nonresidents agreed (77%; Table 4).

Currently, Alaskan brown bear hunting regulations in 2 areas of the state are designed to reduce bears in an effort to improve survival of moose calves. A question asking about the acceptability of such regulations was not asked in the questionnaire, but a related question was asked about the acceptability of reducing wolves to benefit moose and caribou (*Rangifer tarandus*) populations. More Alaskan voters were willing to reduce wolves to increase moose and caribou numbers (48%) than were opposed (37%); an even larger number of hunters were in favor of such actions (65%; Table 4).

### Potential Demand for Viewing Opportunities

Potential demand for viewing opportunities of different wildlife species was evaluated by asking respondents whether they would pay specified amounts for day trips

to easily accessible wildlife viewing sites. Because of how scenarios were specified and described, these responses are primarily useful to index how bear viewing opportunities are valued relative to similar opportunities for other wildlife species and to contrast values different groups place on wildlife viewing opportunities. The values presented are most appropriately viewed as the potential average gross value of a new viewing site if that were the only new viewing site built. There would doubtless be substitution between different viewing sites that was not measured in our approach.

One scenario posed was for a day trip to visit a site where the respondent could see “a large concentration of brown bears.” The willingness to pay for this opportunity exceeded values for all other wildlife viewing scenarios presented for all 3 survey groups: Alaskan voters (\$485), resident hunters (\$404), and nonresident hunters (\$364; Table 5). The relative ranking between groups was the same for most viewing scenarios with Alaskan voters willing to pay the most in all cases and nonresi-

**Table 3. Percent of Alaskan voters and Alaska resident hunters supporting baiting for black bears as a hunting technique based on a 1992 survey.**

	Yes	No	No opinion or answer
<i>Some people think baiting or attracting black bears with food allows hunters to be more selective in choosing which bear to kill. Do you support allowing hunters to use bait to hunt black bears?</i>			
All Alaskan voters	22.2	62.9	15.0
Voters with a history of hunting	30.9	59.2	9.9
Voters without a history of hunting	8.1	72.5	19.3
Resident hunters	47.0	38.6	14.4

**Table 4. Percent of Alaskan voters, Alaska resident hunters, and Alaska nonresident hunters that agree and disagree with statements about wildlife viewing and hunting based on a 1992 survey.**

	Agreement		Disagreement		Other
	Strong	Moderate	Moderate	Strong	
<i>In general, I approve of hunting wildlife for meat.</i>					
Alaskan voters <sup>a</sup>	60.8	25.9	5.0	2.6	5.8
<i>In general, I approve of hunting wildlife for trophies.</i>					
Alaskan voters <sup>a</sup>	8.4	14.0	19.0	51.8	6.8
Resident hunters <sup>b</sup>	20.8	29.2	18.5	27.2	4.3
<i>I think more areas in the state should be managed and developed for wildlife viewing.</i>					
Alaskan voters <sup>c</sup>	20.1	36.0	21.0	10.6	12.4
Resident hunters <sup>b</sup>	12.1	21.1	24.9	31.2	10.0
<i>I think more areas in the state should be managed and developed for wildlife viewing, even if that means closing some areas to hunting.</i>					
Alaskan voters <sup>a</sup>	16.7	23.3	21.8	27.8	10.4
Resident hunters <sup>b</sup>	7.9	11.5	19.4	55.0	6.1
<i>I believe more areas in the state should be closed to hunting.</i>					
Alaskan voters <sup>a</sup>	11.4	13.3	22.9	34.9	17.5
<i>I do not consider a hunting trip to be successful unless I bag an animal.</i>					
Resident hunters <sup>b</sup>	13.8	19.1	23.1	40.6	3.4
Nonresident hunters <sup>d</sup>	8.7	68.3	16.5	2.8	3.7
<i>I support killing wolves in some areas of Alaska to increase the numbers of moose and caribou.</i>					
Alaskan voters <sup>a</sup>	21.9	25.6	16.8	20.1	15.6
Resident hunters <sup>b</sup>	35.8	29.3	14.4	13.3	7.2
<i>It is reasonable to require nonresidents to hunt with a guide-outfitter, or a close Alaska relative, for brown/grizzly bear, Dall sheep, and mountain goats.<sup>e</sup></i>					
Nonresident hunters <sup>d</sup>	38.0	19.8	11.8	26.5	3.8
Used guide	52.1	23.3	7.7	14.7	2.2
No guide	27.4	18.2	15.0	36.8	2.6

<sup>a</sup> Significant differences based on respondents' gender, history of hunting, and history of wildlife viewing ( $P < 0.05$ ).

<sup>b</sup> Significance differences based on respondents' gender and whether they had completed a hunter education course ( $P < 0.05$ ).

<sup>c</sup> Significant differences based on respondents' history of hunting and history of wildlife viewing ( $P < 0.05$ ) but not on gender ( $P > 0.05$ ).

<sup>d</sup> Significant differences based on whether respondents used a guide and whether they had a hunter education course ( $P < 0.05$ ).

<sup>e</sup> Dall sheep (*Ovis dalli*), Mountain goat (*Oreamnos americanus*).

**Table 5. Estimated average willingness to pay for a day trip to a hypothetical wildlife viewing scenario in Alaska based on a 1992 survey.<sup>a</sup>**

Scenario	Estimated average gross value, \$US		
	Alaskan voters	Alaska resident hunters	Nonresident hunters
A large concentration of brown bears	485	404	364
Typical marine life and about half the time you would see whales	338	221	147
A pack of wolves either from the ground or from an airplane	309	247	247
A herd of caribou	300	174	142
A large concentration of eagles	274	167	95
Several Dall sheep	227	162	193
A large concentration of seabirds	155	91	38
Moose	125	79	122
Sample size	2,370	2,077	647

<sup>a</sup> Respondents were asked whether they would pay \$x to take a day trip over the next 5 years to visit a site where they could see the specified species (the value of x varied between questionnaires). Responses from Native Americans are excluded.

dent hunters willing to pay the least in 6 of 8 scenarios (Table 5). For Dall sheep and for moose, nonresident hunters were willing to pay more than resident hunters perhaps because many Alaskan hunters are from places where these species are commonly seen while these species are relatively exotic to nonresidents. Similarly, the high value placed on the brown bear viewing scenario reflects the rarity of the scenario presented. Unlike Dall sheep and moose, most Alaskans would find it difficult to name an area, outside of 2 national parks in Alaska, the McNeil River State Game Sanctuary on the Alaska Peninsula, and Pack Creek in southeastern Alaska, where they could see even a single brown bear much less a large concentration. Rarity doesn't fully explain this high value, however, as there are even fewer places to view a pack of wolves. Willingness to pay to see a pack of wolves was lower than for seeing a large concentration of bears for voters (64% of the value for a brown bear concentration), resident hunters (61%), and nonresident hunters (68%) (calculated from data in Table 5).

In the voter sample, nonhunters and wildlife viewers were willing to pay more for wildlife viewing than hunters or those with no history of viewing trips. For a day trip to see a large concentration of brown bears, nonhunters in the voter sample were willing to pay \$621 compared to \$414 for the hunters in the voter sample (Table 6). Alaskan voters with a history of wildlife view-

ing trips reported being willing to pay \$552 to see a concentration of bears compared to \$258 for voters reporting no history of viewing trips (Table 6). All 4 groups had a higher willingness to pay to see a large concentration of brown bears than to see the viewing sites for other species (Table 6).

### Economics of Overnight Trips

*Expenditures.*—Expenditure responses for Alaskan voters were compiled based on the species seen by respondents and by species targeted on the selected primary trip for wildlife viewing. For bear viewing trips, this distinction was especially important because there were many more trips on which bears were seen (46.5% of selected primary purpose viewing trips) than trips on which bears were the target species for the trip (2.1%). The percent for all different species seen total >100% because multiple species could be seen on the same trip.

Respondents to the voter survey reported average expenditures of \$582 for wildlife viewing trips on which brown bears were seen (Table 7) and \$688 for trips on which brown bears were the targeted species (Table 8). On trips on which any bear (including species unspecified) was reported seen, expenditures were \$594 (Table 7). As noted earlier, in most cases where respondents saw bears but didn't specify species, we believe they saw brown bears. Typically, Alaskan voters reported higher

**Table 6. Estimated average willingness to pay to different groups of Alaska voters for a day trip to a hypothetical wildlife viewing scenario in Alaska based on a 1992 survey.<sup>a</sup>**

Scenario	Estimated average gross value, \$US			
	Hunters <sup>b</sup>	Nonhunters <sup>b</sup>	No history of wildlife viewing <sup>c</sup>	With history of wildlife viewing <sup>c</sup>
A large concentration of brown bears	414	621	258	552
Typical marine life and about half the time you would see whales	267	500	194	381
A pack of wolves either from the ground or from an airplane	288	347	167	352
A herd of caribou	271	329	177	328
A large concentration of eagles	229	348	180	303
Several Dall sheep	243	208	137	258
A large concentration of seabirds	137	184	70	178
Moose	116	140	88	135
Percent of sample (excludes Native Americans)	61.8	37.7	23.3	76.6

<sup>a</sup> Respondents were asked whether they would pay \$x to take a day trip over the next 5 years to visit a site where they could see the specified species (the value of x varied between questionnaires). Responses from Native Americans are excluded.

<sup>b</sup> Based on response whether respondent had ever purchased a hunting license in Alaska or some other place. Percentages do not sum to 100 because missing responses were not included.

<sup>c</sup> Based on response to question on whether respondents have ever gone on an outing which included wildlife viewing as one of the things they planned to do. Percents do not sum to 100 because missing responses were not included.

**Table 7. Trip length, total trip-related expenditures, net economic value, and gross economic value (\$US 1991) of selected primary wildlife viewing trip by species seen, based on a 1992 survey of Alaskan voters.**

Species seen	Trip length (nights away)	Trip related expenditures	Net economic value of trip	Gross economic value of trip
Any bear <sup>a</sup>				
mean	3.89	\$594	\$170	\$759
SE mean	0.45	\$ 54	\$ 23	\$ 69
median	3.00	\$356	\$100	\$465
weighted <i>n</i>	148.72	148.72	146.62	146.62
Brown bears <sup>b</sup>				
mean	3.47	\$582	\$226	\$808
SE mean	0.57	\$160	\$ 95	\$243
median	3.00	\$220	\$100	\$270
weighted <i>n</i>	23.59	23.59	23.59	23.59
Black bears <sup>b</sup>				
mean	4.41	\$414	\$182	\$596
SE mean	1.61	\$168	\$ 59	\$225
median	3.00	\$350	\$100	\$456
weighted <i>n</i>	7.15	7.15	7.15	7.15
Caribou				
mean	3.80	\$565	\$135	\$693
SE mean	0.52	\$ 61	\$ 18	\$ 71
median	2.00	\$290	\$100	\$405
weighted <i>n</i>	121.23	121.23	119.13	119.13
Moose				
mean	3.46	\$510	\$123	\$629
SE mean	0.37	\$ 45	\$ 15	\$ 55
median	2.00	\$275	\$ 50	\$380
weighted <i>n</i>	174.87	174.87	170.54	170.54
Dall sheep				
mean	3.60	\$474	\$132	\$608
SE mean	0.62	\$ 60	\$ 20	\$ 76
median	2.00	\$270	\$100	\$380
weighted <i>n</i>	99.21	99.21	97.61	97.61
Wolf				
mean	3.98	\$611	\$195	\$765
SE mean	0.75	\$139	\$ 45	\$170
median	3.00	\$263	\$100	\$385
weighted <i>n</i>	39.49	39.49	38.65	38.65
Whales				
mean	2.73	\$551	\$152	\$711
SE mean	0.29	\$ 87	\$ 40	\$121
median	2.00	\$370	\$100	\$510
weighted <i>n</i>	42.24	42.24	40.64	40.64

<sup>a</sup> The "any bear" category includes all respondents who indicated they saw or targeted "brown bears," "black bears," or "bears" without specifying species. Thus, the "any bear" values include the responses where brown bears were specifically identified as seen or targeted and are not additive to the brown bear values.

<sup>b</sup> The black bear and brown bear categories are underrepresented because many respondents just indicated they saw or targeted "bears" without indicating species. These are included in the "any bear" category, only responses that were species-specific are included here.

average expenditures for trips targeting brown bears than for trips targeting other species, although differences were frequently not significant and sample sizes were small (Table 8). Sample sizes were larger for trips on which bears were seen (as opposed to being targeted).

Average trip-related expenditures for resident and non-resident brown bear hunters (\$1,247 and \$10,677, respectively, Table 9) were higher than for viewing trips by

Alaskan voters. For both groups of hunters, trip expenditures for brown bear hunts were higher than for other species sought (Table 9). Most nonresident hunters in Alaska are required by state law to hire a guide to hunt brown bears, Dall sheep, and mountain goats which greatly increases the cost of these hunts (nonresidents who hunt with a close relative who is an Alaskan resident are excepted).

**Table 8. Trip length, total trip related expenditures, net economic value, and gross economic value (\$US 1991) of selected primary trip for wildlife viewing by species targeted, based on a 1992 survey of Alaskan voters.**

Species targeted	Trip length (nights away)	Trip related expenditures	Net economic value of trip	Gross economic value of trip
Any bear <sup>a</sup>				
mean	2.64	\$688	\$274	\$ 962
SE mean	0.37	\$198	\$ 65	\$ 232
median	3.00	\$880	\$200	\$1,080
weighted <i>n</i>	6.85	6.85	6.85	6.85
Black bears				
weighted <i>n</i>	0	0	0	0
Caribou				
mean	4.17	\$478	\$126	\$604
SE mean	0.87	\$ 58	\$ 20	\$ 67
median	2.00	\$265	\$100	\$374
weighted <i>n</i>	70.78	70.78	70.78	70.78
Moose				
mean	3.51	\$438	\$101	\$539
SE mean	0.78	\$ 59	\$ 17	\$ 66
median	2.00	\$250	\$ 50	\$362
weighted <i>n</i>	74.47	74.47	74.47	74.47
Dall sheep				
mean	3.87	\$530	\$180	\$710
SE mean	0.49	\$120	\$ 36	\$150
median	3.00	\$218	\$100	\$345
weighted <i>n</i>	45.94	45.94	45.94	45.94
Wolf				
mean	3.62	\$569	\$143	\$671
SE mean	1.00	\$134	\$ 31	\$131
median	2.00	\$218	\$100	\$385
weighted <i>n</i>	24.68	24.68	22.62	22.62
Whales				
mean	3.39	\$580	\$160	\$739
SE mean	0.49	\$108	\$ 40	\$136
median	2.00	\$370	\$100	\$498
weighted <i>n</i>	38.07	38.07	37.04	37.04

<sup>a</sup> All of the "any bear" responses in this case were attributable to brown bears, so values for brown bear and for any bear were identical.

Expenditures are related to length of trip, and bear hunting trips by nonresidents averaged 2.5 times longer than bear hunting trips by residents (Tables 10, 11). Resident bear hunting trips averaged 5.44 nights away (Table 10) compared to 3.89 nights away for trips by voters on which bears were seen (Table 7). For voters, resident hunters, or nonresident hunters, there was little variation in trip length based on species seen, species targeted, or species bagged (Tables 7, 8, 10, 11).

*Net Economic Value.*—The net economic value of the trip or consumer surplus is the amount respondents reported being willing to pay above what they actually paid. For viewing trips taken by Alaskan voters on which brown bears were seen, the consumer surplus was \$226, or 39% of actual expenditures (Table 7). For trips on which any bear was seen, the consumer surplus was 28% of expenditures (Table 7). The net value as a percent of expenditures was higher for bears than for other species, which

ranged from 24% for moose to 32% for wolves (Table 7). Based on species targeted, brown bears also had higher net benefits as a percent of expenditures (40%) than other species (Table 8). The next highest was Dall sheep (34%). These data suggest that respondents who took bear viewing trips or who saw bears on their trips for other species received more benefits as a percent of their expenditures than respondents who saw or targeted other species. Since expenditures were higher for bear viewing trips, we conclude that the benefits of bear viewing were highly valued relative to benefits from other species.

Resident brown bear hunters reported an average net value (surplus) on their hunting trips of \$208 and nonresidents an average net benefit of \$606 (Table 9). Expressed as a percent of expenditures, the net value of brown bear hunts was 17% for resident hunters and 6% for nonresident hunters. These comparisons suggest that the high costs of nonresident brown bear hunting already

**Table 9. Total trip-related expenditures and net economic value of selected primary hunting trip by species targeted by Alaska resident and nonresident hunters based on a 1992 survey (in \$US 1991).**

Species targeted	Trip-related expenditures		Net economic value of trip	
	Resident hunters	Nonresident hunters	Resident hunters	Nonresident hunters
Any bear				
mean	\$841	\$8,717	\$172	\$521
SE mean	\$123	\$ 511	\$ 41	\$ 78
median	\$497	\$8,150	\$100	\$ 0
weighted <i>n</i>	44.04	161.28	41.79	152.09
Brown bears				
mean	\$1,247	\$10,677	\$208	\$606
SE mean	\$ 254	\$ 585	\$103	\$105
median	\$1,242	\$11,040	\$ 20	\$ 0
weighted <i>n</i>	13.56	105.73	12.58	99.21
Black bears				
mean	\$652	\$6,534	\$152	\$366
SE mean	\$123	\$ 750	\$ 39	\$ 85
median	\$311	\$4,460	\$100	\$ 0
weighted <i>n</i>	31.34	74.86	30.06	70.35
Caribou				
mean	\$838	\$5,988	\$168	\$432
SE mean	\$ 79	\$ 316	\$ 15	\$ 50
median	\$493	\$4,295	\$100	\$ 0
weighted <i>n</i>	175.26	255.24	166.15	238.08
Moose				
mean	\$798	\$5,908	\$181	\$393
SE mean	\$ 55	\$ 346	\$ 16	\$ 62
median	\$410	\$4,460	\$100	\$ 0
weighted <i>n</i>	499.11	194.29	479.61	180.56
Dall sheep				
mean	\$1,223	\$9,823	\$267	\$492
SE mean	\$ 170	\$ 843	\$ 44	\$143
median	\$ 655	\$9,116	\$150	\$ 0
weighted <i>n</i>	70.92	57.12	68.12	53.34
Deer				
mean	\$717	\$4,934	\$143	\$222
SE mean	\$ 56	\$ 660	\$ 19	\$ 80
median	\$480	\$3,525	\$ 50	\$ 0
weighted <i>n</i>	150.61	23.53	141.18	23.53

capture a large proportion of the value received by these consumers. Expenditures on black bear hunts were about half those for brown bear hunts, and the net benefits as a percent of expenditures may be slightly higher for resident black bear hunters (23%) than for resident brown bear hunters (17%).

*Gross Economic Value.*—To estimate the gross economic value of each trip, we added the expenditures and net economic benefit (consumer surplus) reported by each respondent for the selected overnight trip. In most cases, mean values were higher than median values indicating distributions skewed toward the lower values (Tables 7, 8, 10, 11).

The average gross economic value for trips by Alaskan voters on which bears were seen was \$759 (\$808 when respondents specified brown bears, Table 7). These val-

ues were higher than for other game animals, except wolves (Table 7). Average gross economic values were higher on trips specifically designed to see bears (\$962) than on trips on which bears were seen (Tables 7, 8).

The average gross economic value for a hunting trip targeting brown bears by Alaskan resident hunters was \$1,541. This is more than the gross economic value of trips by residents targeting deer, moose, caribou, or Dall sheep (Table 10). The average gross economic value for hunting trips by Alaskan resident hunters targeting black bears was \$823, about the same as for deer (Table 10). Except for brown bear hunts, trips on which the target species was bagged were generally valued higher than trips that just targeted that species (including successful and unsuccessful trips; Table 10).

**Table 10. Trip length and average gross economic value (\$US 1991) of selected primary wildlife hunting trip for Alaska resident hunters based on species targeted and on species bagged based on a 1992 survey.**

	By species targeted		By species bagged	
	Trip length (nights away)	Gross value	Trip length (nights away)	Gross value
Any bear				
mean	5.44	\$1,048	4.86	\$1,149
SE mean	0.72	\$ 135	0.75	\$ 135
median	3.00	\$ 812	5.00	\$1,152
weighted <i>n</i>	44.04	41.79	9.95	10.92
Brown bears				
mean	6.75	\$1,541	5.14	\$1,286
SE mean	1.17	\$ 245	0.88	\$ 190
median	6.00	\$1,472	6.00	\$1,472
weighted <i>n</i>	13.56	12.58	2.26	2.26
Black bears				
mean	4.80	\$823	4.77	\$1,114
SE mean	0.86	\$145	0.96	\$ 166
median	3.00	\$494	5.00	\$1,152
weighted <i>n</i>	31.34	30.06	7.69	8.67
Caribou				
mean	4.83	\$974	5.52	\$1,097
SE mean	0.29	\$ 77	0.52	\$ 116
median	4.00	\$679	4.00	\$ 727
weighted <i>n</i>	175.26	166.15	79.40	84.42
Moose				
mean	5.74	\$943	7.73	\$1,321
SE mean	0.19	\$ 50	0.62	\$ 120
median	5.00	\$553	6.00	\$1,000
weighted <i>n</i>	499.11	479.61	87.56	93.27
Dall sheep				
mean	7.01	\$1,475	7.81	\$1,541
SE mean	0.56	\$ 177	0.67	\$ 257
median	6.00	\$1,067	8.00	\$1,331
weighted <i>n</i>	70.92	68.12	18.49	18.49
Deer				
mean	5.36	\$887	6.36	\$1,033
SE mean	0.37	\$ 65	0.64	\$ 99
median	4.00	\$697	5.00	\$ 836
weighted <i>n</i>	150.61	141.18	76.44	77.16

The average gross economic value for hunting trips targeting brown bears by nonresident hunters was \$11,522; the value was slightly higher for trips on which brown bears were actually bagged (Table 11). These values were higher than for other species, indicating nonresident hunters place relatively high value on brown bear hunts (Table 11).

*Trip Frequency.*—We calculated the frequency with which hunting and viewing trips were taken during which different species were seen, targeted, or bagged by our samples of voters, resident hunters, and nonresident hunters. This was an intermediate step needed to calculate total social benefit.

Moose were the most commonly seen species on primary and secondary purpose wildlife viewing trips, but

bears (brown, black, and species unspecified) were seen more often than caribou or other species (Table 12). The hunting trips reported by resident hunters infrequently targeted brown bears (1.3%) compared to caribou (16.3%), moose (46.5%), or even black bears (2.9%; Table 12). Nonresident hunters targeted brown bears on 19.3% of their reported trips, black bears on 13.7%, and caribou on 46.6% (Table 12).

Our sample of hunters took hunting trips more frequently (1.13 trips annually for resident hunters) than the sample of voters took viewing trips (0.29 trips annually for the primary purpose of viewing wildlife; Table 12). Alaskan voters took an annual average of 0.135 primary purpose viewing trips on which bears were seen (Table 12).

**Table 11. Trip length and average gross economic value (\$US 1991) for selected primary wildlife hunting trip for Alaska nonresident hunters based on species of game targeted and species bagged based on a 1992 survey.**

	By species targeted		By species bagged	
	Trip length (nights away)	Gross value	Trip length (nights away)	Gross value
Any bear				
mean	13.86	\$9,432	13.17	\$10,700
SE mean	0.68	\$ 539	1.02	\$ 660
median	13.00	\$8,520	12.00	\$10,720
weighted <i>n</i>	161.28	152.09	93.94	87.27
Brown bears				
mean	14.76	\$11,522	13.93	\$11,954
SE mean	0.97	\$ 615	1.41	\$ 718
median	14.00	\$11,415	12.00	\$12,033
weighted <i>n</i>	105.73	99.21	66.31	61.46
Black bears				
mean	13.03	\$7,046	11.34	\$8,810
SE mean	0.77	\$ 790	0.72	\$1,226
median	12.00	\$5,335	12.00	\$6,472
weighted <i>n</i>	74.86	70.35	31.68	29.87
Caribou				
mean	13.97	\$6,452	13.94	\$6,536
SE mean	0.65	\$ 339	0.79	\$ 383
median	12.00	\$4,580	12.00	\$4,760
weighted <i>n</i>	254.24	238.08	198.77	188.41
Moose				
mean	15.26	\$6,370	15.06	\$7,846
SE mean	0.65	\$ 366	0.83	\$ 708
median	14.00	\$5,122	14.00	\$6,585
weighted <i>n</i>	194.29	180.56	81.02	74.69
Dall sheep				
mean	15.83	\$10,171	16.88	\$12,273
SE mean	1.45	\$ 852	1.91	\$ 945
median	13.00	\$ 9,635	13.00	\$11,985
weighted <i>n</i>	57.12	53.34	40.94	37.16
Deer				
mean	10.68	\$5,156	9.31	\$4,810
SE mean	0.91	\$ 682	0.77	\$ 850
median	10.00	\$4,200	8.00	\$3,524
weighted <i>n</i>	23.53	23.53	12.68	12.68

We extrapolated from the trip frequency in the sample of respondents to estimate the number of trips taken annually in the entire population (Table 12). Our calculations indicated that resident hunters took more hunting trips for all species of wildlife (96,506) than voters took primary purpose wildlife viewing trips (82,489; Table 12).

Residents, nonresidents, and nonresident aliens are required to purchase tags prior to hunting brown bears (\$25, \$500, and \$650, respectively), and these sales provide comparison data for our estimated trip numbers. In 1991, 6,762 resident and 1,291 nonresident brown bears tags were sold (Miller 1993). These sales were close to our estimates for nonresident bear hunting trips but much higher than our estimated number of resident bear hunting trips (Table 12). We believe few nonresidents would

buy tags if they did not intend to hunt but that Alaska residents frequently buy tags in order to be able to take bears on an opportunistic basis during hunts for other species.

*Total Social Benefit.*—We estimated total social benefit by multiplying estimates of number of trips taken by the average gross economic value of that type of trip. Our total social benefit calculations estimate the total benefit that accrued to members of the population from these trips. We emphasize that the “total social benefits” we report are for total direct use on trips taken and do not include nonuse or passive use values.

For the 3 groups we surveyed, most total social benefit from wildlife-related trips came from resident hunting (\$84.25 million) followed by secondary purpose wildlife

**Table 12. Total number of trips taken annually by Alaskan voters and hunters participating in wildlife viewing and hunting trips by species seen (voters) or by species targeted (hunters), based on a 1992 survey.**

Species	Voter viewing trips		Hunter trips	
	Primary purpose for viewing	Secondary purpose for viewing	Resident	Nonresident
Percent of total number of selected trips taken annually				
Total number of trips reported	687	1,185	2,575	660
Any bear <sup>a</sup>	46.5	20.4	4.1	29.4
Brown bears <sup>b</sup>	7.4	3.5	1.3	19.3
Black bears <sup>b</sup>	2.2	3.2	2.9	13.7
Caribou	37.9	19.3	16.3	46.6
Moose	54.7	54.6	46.5	35.5
Dall sheep	31.0	23.0	6.6	10.4
Calculated mean number of trips/capita taken annually				
All species <sup>c</sup>	0.290	0.500	1.128	0.877
Any bear <sup>a</sup>	0.135	0.102	0.046	0.258
Brown bears <sup>b</sup>	0.021	0.018	0.015	0.169
Black bears <sup>b</sup>	0.006	0.016	0.033	0.120
Caribou	0.110	0.097	0.184	0.409
Moose	0.159	0.273	0.525	0.311
Dall sheep	0.090	0.115	0.074	0.091
Calculated total number of overnight trips reported taken annually				
All species <sup>c</sup>	82,489	142,222	96,506	6,148
Any bear <sup>a</sup>	38,357	29,013	3,957	1,808
Brown bears <sup>b</sup>	6,104	4,978	1,255	1,187
Black bears <sup>b</sup>	1,815	4,551	2,799	842
Caribou	31,263	27,449	15,730	2,865
Moose	45,121	77,653	44,875	2,183
Dall sheep	25,572	32,711	6,369	639
Wolf	10,146	3,556	290	221
Whales	10,889	17,493		

<sup>a</sup> The “any bear category” includes all respondents who indicated they saw or targeted brown bears, black bears, or bears without specifying species. Thus, the “any bear” values include the responses where brown bears were specifically identified as seen or targeted and can not be added to the brown bear values.

<sup>b</sup> The black bear and brown bear categories are underrepresented because many respondents just indicated they saw or targeted “bears” without indicating species. These are included in the any bear category; only responses that were species-specific are included here.

<sup>c</sup> Because multiple species could be seen or targeted on a trip, values for individual species do not total to value for all species.

viewing, primary purpose wildlife viewing, and nonresident hunting (Table 13). For trips on which bears (both species) were seen or targeted, the most total social benefit came from primary purpose viewing trips by voters (\$29.11 million) followed by secondary purpose viewing trips (\$19.47 million), nonresident hunting trips (\$17.05 million), and resident hunting (\$4.15 million; Table 13). For trips where brown bears were specifically identified as the target, the highest total social benefit derived from brown bear hunting by nonresidents. As noted previously, however, many voters indicated only that they saw bears on their viewing trips without specifying which species they saw. This lowered the value for trips on which respondents specifically identified bears they saw as brown bears. No viewing trips taken by voters targeted black bears (Table 8).

For Alaskan voters, the highest total social benefit from primary purpose wildlife viewing trips occurred on trips on which bears were seen (Table 13). The total social benefit of primary purpose wildlife viewing trips on which bears were seen exceeded the benefit from nonresident hunting of any species and for resident hunting of any species except moose (Table 13).

## DISCUSSION

Wildlife is very important to Alaska’s economy and to Alaskans. In a national wildlife survey, Alaska ranked highest (93%) among the states in the proportion of its population that participated in fish and wildlife-associated recreation in 1991 (U.S. Dep. Inter. 1993a). Of Alaska residents age 16 or older, 15% participated in hunt-

**Table 13. Calculated total social benefit<sup>a</sup> (million \$US 1991) for trips taken annually by Alaskan voters, resident hunters, and nonresident hunters by species seen (voters) or targeted (hunters), based on a 1992 survey.**

	Voter viewing trips		Hunter trips	
	Primary purpose for viewing	Secondary purpose for viewing	Residents	Nonresidents
All species <sup>b</sup>	52.96	67.27	84.25	41.92
Any bear <sup>c</sup>	29.11	19.47	4.15	17.05
Brown bears <sup>d</sup>	4.93	3.50	1.93	13.68
Black bears <sup>d</sup>	1.08	5.36	2.30	5.93
Caribou	21.67	12.68	15.32	18.48
Moose	28.38	35.10	42.32	13.91
Dall sheep	15.55	18.87	9.39	6.50

<sup>a</sup> Social benefit is the estimated number of trips taken times the average gross value of the trip.

<sup>b</sup> The total social benefit estimates do not add across species to estimate total social benefit derived from all species because a viewing or hunting trip may include more than 1 target species. Adding the benefits from different species would multiple count the same benefits.

<sup>c</sup> The "any bear" category includes all respondents who indicated they saw or targeted brown bears, black bears, or bears without specifying species. Thus, the "any bear" values include the responses where brown bears were specifically identified as seen or targeted and cannot be added to the brown bear values.

<sup>d</sup> The black bear and brown bear categories are underrepresented because many respondents indicated they saw or targeted "bears" without indicating species. These are included in the any bear category; only responses that were species-specific are included here.

ing and 62% in nonconsumptive wildlife activities (viewing, photographing, etc.; U.S. Dep. Inter. 1993b). Alaska Department of Tourism records indicate >1 million tourists visited Alaska in 1993, more than Alaska's population of 599,200 in that year. Many tourists are attracted to the state by the opportunity to view wildlife, an opportunity which is strongly emphasized in Alaska's tourism marketing campaign. Alaska also sells some 85,500 resident and 7,000 nonresident hunting licenses annually.

Wildlife management frequently requires deciding which users of wildlife resources should receive priority as well as deciding whether to benefit users of wildlife resources or to develop alternate uses of the habitat resources on which wildlife depend. Such choices may be made on subjective grounds in response to pressures from special interests. Questionnaires designed to measure public attitudes toward controversial issues such as bear baiting, trophy hunting, closing areas to hunting, or intensive management can be used to test assertions by these interests that their positions represent the views of the wider public. Questionnaires can also be used to identify

topics where information campaigns could help remedy misunderstandings. In both cases, knowledge of public attitudes could forestall efforts to usurp management options through public referenda of the kind that recently closed spring bear hunting seasons and eliminated bear baiting in Colorado (Decker et al. 1993, Loker et al. 1994).

Hunting black bears over bait is controversial in Alaska with 63% of voters and 59% of voters with a history of hunting opposed to this hunting technique. Although this is a lower percent than the 71% opposed to bear baiting in Colorado (Decker et al. 1993), it demonstrates significant opposition that proponents of baiting should acknowledge. In Alaska, opposition to bear baiting has been addressed by proposals to require black bear hunters to salvage the meat of bears they kill. By associating black bear hunting to hunting for meat (which our data indicates is supported by 87% of voters) instead of to hunting for trophies (which is supported by only 22% of voters), Alaskan hunters may defuse opposition to baiting as a hunting technique and prevent management by referendum as happened in Colorado.

The high tolerance for urban bears is interesting given the frequent public demands that wildlife management agencies remove or eliminate urban bears. Such demands come from people viewing urban bears as unsafe or nuisances. The lower tolerance for urban bears by hunters may reveal their greater familiarity with bears and the problems they can cause. It is possible there would be less affection for bears shown by urban residents with direct experience with urban bears than by individuals without such experience.

Economic analysis can reduce subjectivity in making management decisions by providing a common measure to facilitate comparisons. Economic analysis also permits evaluation of effects of management decisions on social benefits, allows comparison of the social benefits and costs of resource management decisions, provides information on which groups benefit and which accrue costs, and provides information to help mitigate changes in distribution of social benefits. Our analysis of the social benefits of bear viewing and hunting opportunities provides information pertinent to allocating among such uses. Our analysis also provides information on how user groups value bears compared to other species.

Willingness to pay for a hypothetical day trip to view a concentration of bears was close to what people actually pay in Alaska for such viewing opportunities. Our sample of Alaska voters reported average willingness to pay of \$485 for such trips. Since our study was completed, private air charter operators in Homer, Alaska, began offering day trips to view bears which are similar to our

hypothetical scenario. These trips typically involve a flight by a float plane into Katmai National Park (about 1.2 hours each way), a sack lunch, and a guided tour to photograph and observe brown bears. In 1996, operators providing these day trips charged \$425–450 per person. In addition to what they pay to the providers of these trips, people buying these trips incur expenses getting to Homer and for photographic equipment.

There are other indicators of a high demand for bear viewing opportunities. The world's most famous site for viewing a large concentration of brown bears is the McNeil River State Game Sanctuary in Alaska, where there are >2,000 applicants annually for <250 four-day lottery permits to view bears fishing for salmon (*Oncorhynchus* spp.) (Aumiller and Matt 1994). Currently, for a 4-day permit to view bears fishing for salmon at the McNeil River State Game Sanctuary, participants pay \$20 to apply for a permit, \$100–\$250 for the permits (depending on whether they are Alaska residents or non-residents), \$310 for transportation (round trip from the nearest access point in Homer, Alaska). In addition, permittees pay for transportation to Homer, camping equipment, photographic equipment, and food. Based on these actual expenditures plus what people were and are currently paying for day trips to view bears in Katmai National Park, it is clear that the estimate of \$250 for willingness to pay for a McNeil River viewing permit (Clayton and Mendelsohn 1993) was an underestimate. During 1994, a concessionaire charged \$1,400 to view bears fishing for salmon at O'Malley Creek on Kodiak Island, Alaska (V.G. Barnes, U.S. Fish and Wildlife Service, Kodiak, Alas., pers. commun., 1995). In 1992, the year of our survey, there was more demand than supply for O'Malley Creek bear viewing permits that cost \$100 in addition to transportation costs (approximately \$600) and food and equipment expenses. These comparisons indicate the gross economic value for bear viewing opportunities was certainly not overestimated in our study. This conclusion is also supported by the average gross value of the primary purpose trips to view brown bears taken by our sample of voters (\$962).

The average gross economic value for wildlife viewing trips taken by voters on which bears (any species) were seen (\$759) was larger than for trips on which other species of wildlife were seen (except wolves). This indicates that the marginal value of seeing bears is high and adds to the value of viewing trips which may include sightings of many wildlife species.

Our data indicate wildlife viewing trips taken by Alaskan voters on which bears (both species) were seen represented a large fraction (46.5%) of the total trips on

which wildlife viewing was a primary purpose. Bears were seen on a much smaller proportion of trips (20.4%) for which wildlife viewing was a secondary purpose. This suggests that when voters design a trip especially to see wildlife, they are likely to go to an area, such as Denali National Park, where they have a good chance of seeing bears. Outside of parks and similar areas where bears are not hunted, there are few areas on the Alaska road system where bears are likely to be seen. Moose, in contrast, were seen on more primary and secondary purpose wildlife viewing trips than any other species. This reflects the prevalence of moose throughout Alaska, including urban areas.

We calculated the total social benefit realized from trips on which different species of wildlife were seen as the product of the gross economic value of trips on which each species was seen and the number of trips taken on which that species was seen. There was more total social benefit associated with primary purpose wildlife viewing trips taken by voters on which bears were seen than on trips on which any other species was seen. This analysis, like the demand analysis discussed above, suggests that enhancement of opportunities for voters to see bears on their primary purpose wildlife viewing trips would probably result in more social benefit than enhancement of opportunities to see other species. It also indicates that loss of any of the few existing areas where voters can observe bears would represent a significant loss of value to society from wildlife viewing trips.

The high social benefit from primary and secondary purpose wildlife viewing trips on which moose were seen has a different interpretation. Much of this value probably reflects the ubiquitous nature of moose throughout Alaska including the areas where voters took wildlife viewing and other kinds of trips. Much of the value associated with these trips may be derived from the viewing of other, less common, species.

For secondary purpose wildlife viewing trips, it is uncertain how much of the total social benefit we calculated derived from wildlife viewing and how much from the primary purpose for which the trip was taken. A honeymoon trip, for example, would usually be highly valued for primary reasons that have little to do with whether any secondary purpose, such as wildlife viewing, was accomplished.

There was more total social benefit associated with resident hunting of wildlife (all species) than from wildlife viewing by voters, but a different pattern was found for bears. The total social benefit from resident hunting of bears (both species) was low (\$4.15 million) compared

to the social benefit of primary purpose viewing trips by voters on which bears were seen (\$29.11 million) or the total social benefit of nonresident bear hunting (\$17.05 million). The total social benefit of resident brown bear hunting (\$1.93 million) was also low, compared to resident hunting of other species including moose (\$42.32 million), caribou (\$15.32 million), and Dall sheep (\$9.39 million); it was about the same for resident black bear hunting (\$2.30 million).

This analysis clearly documents that bear viewing by residents provides greater total social benefit than bear hunting by both resident and nonresidents. While most of the state is open to bear hunting, few areas have been managed specifically for bear viewing, and there is excess demand for viewing at those sites. The number of trips taken by resident bear hunters in 1991 was 10.3% of the number of primary purpose wildlife viewing trips on which bears were seen. The clear implication of the relatively low value of resident brown bear hunting compared to bear viewing is that more social benefit would derive from policies that emphasized bear viewing even if this occurred at the cost of some bear hunting opportunities to residents. In some areas, however, this policy conclusion is complicated by the high value of moose hunting by residents and the beliefs of some that bears constrain potentially higher moose harvests by hunters. In response to these beliefs, the Alaska Legislature passed an intensive management law (Alaska Statutes 16.05.255) in 1994 that the Alaska Board of Game began to implement in 1995. The regulations adopted are designed to reduce brown bear abundance in 2 areas of the state in expectation that higher moose harvests would result. Because of the high value resident hunters place on moose, these laws and regulations were adopted even though there is little evidence that intensive management of bears in those areas would increase moose harvests (Miller and Ballard 1992). Our data on the economic value of bear viewing and moose hunting, combined with biological information from field studies, provide the basis for cost-benefit analyses of these intensive management regulations.

Our findings on the high social value of viewing for bears and other wildlife species may have implications for geographic zoning of hunting and viewing activities. Alaska has a very limited road system compared to other states, and this leads to heavy hunting and viewing pressure along available roads. For example, local caribou subherds have been greatly reduced by hunting along the Denali and Parks Highways in the vicinity of Cantwell even though, overall, the Nelchina caribou herd inhabiting this area is too abundant for the available range. Similarly, brown bear numbers have been greatly reduced

along the Denali Highway (Miller 1990), which is in the area where intensive management regulations designed to reduce bear abundance have been adopted. There is a clear contrast between the abundance of bears and other wildlife available for viewing from the road within nearby un hunted Denali National Park and the scarcity of wildlife along the heavily hunted nearby Denali Highway. Except in Denali National Park, there is no place along the road system in Alaska where wildlife viewers have a reasonable chance of seeing either brown or black bears. Our data provide a basis to evaluate the relative social benefits of bear hunting and view along roads such as the Denali Highway.

We do not suggest it is always necessary to close an area to hunting to provide opportunities to view bears or other species; these uses may frequently be compatible. In areas where they are not compatible, however, our data suggest more social benefit may be achieved from increased bear viewing opportunities than from bear hunting. This conclusion has implications for a recent controversy over hunting in an area adjacent to the viewing area in the McNeil River State Game Sanctuary on the Alaska Peninsula. In 1993, the Alaska Board of Game rejected a proposal from a group of bear viewers to close bear hunting in a 611 km<sup>2</sup> state game refuge adjacent to the McNeil River Sanctuary. Although the Sanctuary was closed to hunting, annually an average of 2.5 bears were taken by hunters in the adjacent refuge. The argument from hunters was that the Sanctuary remained a valued viewing opportunity in spite of this historical harvest. The argument from the viewing groups was that it was inappropriate to hunt bears habituated to close human proximity and that bear viewing should be emphasized over hunting in this area. The disputed area was only 1% of the area open to hunting on the Alaska Peninsula and produced only 1% of the annual bear harvest from the Alaska Peninsula. Without judging whether bear viewing and bear hunting were incompatible in this area, our analysis suggests that, from the standpoint of maximizing social benefits, it would be appropriate for policy to err on the side of bear viewing in the refuge rather than on the side of maintaining hunting. In 1995, the Alaska Board of Game agreed and closed the refuge to brown bear hunting.

Responses in the voter questionnaire provide information pertinent to the attitudes of Alaskans regarding the controversy over bear hunting in the refuge adjacent to the McNeil River Sanctuary. More voters disagreed (50%) than agreed (40%) that areas should be closed to hunting to provide viewing opportunities for unspecified species. However, a strong majority of Alaskan voters

(71%), and even 46% of resident hunters, disapproved of hunting for trophies. Brown bear hunting is a trophy hunt (pelts and skulls); hunters are not required to salvage the bear meat and few do. Although this question wasn't asked, these responses suggest there would be less opposition to closing areas if the hunting stopped was for brown bears as these are inherently trophy hunts. This possibility is strengthened by the agreement of Alaskan voters with the statement that more areas in the state should be managed and developed for wildlife viewing (56% in favor, 32% opposed).

There were large differences between the total social benefit from hunting bears by residents and nonresidents. The social benefit of bear hunting (any species) was lower for residents (\$4.15 million) than for nonresidents (\$17.05 million). This was because nonresidents hunters, who took less than half as many trips, paid much more for their trips than resident hunters. The total social benefit from resident hunting of black and brown bears was about the same, but nonresidents had much more total social benefit associated with brown bear hunting than with black bear hunting. The social value of bear hunting (any species) by residents was 10% of the social value for resident moose hunting, 27% of resident caribou hunting, and 44% of resident Dall sheep hunting. The low social value of resident bear hunting relative to these other species is reflected in the willingness of some resident hunters to sacrifice bears in the hope of augmenting populations of more valued species like moose and caribou.

Both resident hunters and nonresident hunters indicate a willingness to pay more for their hunting experiences. Alaska resident brown bear hunters pay \$35 for a hunting license and \$25 for a brown bear tag (required in most areas) and report being willing to pay an average of \$208 more for an average hunting trip than they are paying. Nonresident brown bear hunters pay \$85 for a hunting license (\$300 for hunters not resident in the United States), \$500 for a brown bear tag, and \$8,000–\$15,000 for guide fees, but report being willing to pay an average of \$606 more than they are paying for their trips.

There is a similar potential to capture more of the gross value of wildlife viewing trips by Alaskan voters. The net value of viewing trips on which voters saw bears was \$226. Currently, except for permit fees to the McNeil River Sanctuary, none of the value of these trips is directly captured by the State of Alaska or the agency responsible for management of bears and other wildlife in most of the state. We suspect that ongoing economic research will demonstrate even larger demand for bear view-

ing opportunities from nonresident consumers of wildlife viewing opportunities in Alaska (tourists).

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