

INSIGHTS INTO THE ECONOMIC VALUE OF GRIZZLY BEARS IN THE YELLOWSTONE RECOVERY ZONE

CINDY SORG SWANSON,¹ U.S. Department of Agriculture Forest Service, Northern Region, P.O. Box 7669, Missoula, MT 59807
DANIEL W. MCCOLLUM, U.S. Department of Agriculture Forest Service, Rocky Mountain Forest and Range Experiment Station, Ft. Collins, CO 81133
MARY MAJ, U.S. Department of Agriculture Forest Service, Northern Region, P.O. Box 7669, Missoula, MT 59807

Abstract: The grizzly bear (*Ursus arctos*) is listed as a threatened species in the lower 48 states by the U.S. Fish and Wildlife Service under the Endangered Species Act. The purpose of that act is to provide for the conservation of both threatened and endangered species and the ecosystems upon which they depend. It is biological in its orientation. However, the act also has economic implications. Affording "threatened" status to grizzly bears implies the economic value of the bears is very high—society will do almost anything necessary to preserve and maintain grizzly bears in the 6 national forests and 2 national parks that comprise the Yellowstone Recovery Zone. The purpose of this paper is to explore the economic ramifications of the Endangered Species Act as it applies to grizzly bears in the Yellowstone Recovery Zone. The paper also explores how economic information can be used in management decisions that affect bears and people in this zone. To address these issues, this paper considers: (1) identification of the components of economic value as applied to grizzly bears in the Yellowstone Grizzly Bear Recovery Zone, (2) evidence of the potential magnitudes of those values, (3) their management implications, and (4) whether some components of economic value can be captured in the communities surrounding Yellowstone.

Int. Conf. Bear Res. and Manage. 9(1):575-582

The Endangered Species Act of 1973 defines "conservation" as "the use of all methods and procedures which are necessary to bring an endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary." As defined by the act "using all methods and procedures necessary" implies it is not necessary to compare economic benefits of recovery to the costs (U.S. Water Resources Council 1979, 1983). The act implies that the economic value of a species in question does not need to be measured; society will do most anything necessary to bring the species back to viable population levels. While amendments to the act (1978, 1982) have attempted to strengthen the need to do benefit-cost analysis, successful applications have been limited because the admitted difficulty in quantifying benefits of preservation.

In a world of increasing human populations and increasing resource scarcity, decisions on species recovery or extinction become more difficult to make. Allocation of budgetary resources becomes more competitive. Because the costs of preservation are often the only economic data available, the debate over species preservation may tend to be skewed toward the cost to society with little recognition of benefits. Such a reliance on costs to make policy decisions could result in only "low cost" species being preserved.

Since passage of the Endangered Species Act, the publics directly involved and affected by threatened or endangered species recovery have shifted from small,

local publics to the general American public. As the public at large becomes directly affected by recovery decisions, it might behoove resource managers to become directly involved in encouraging and enhancing the public's understanding of the resources. This understanding may prove to be a vital link to the public's commitment to resource preservation. It was once stated that understanding leads to appreciation which leads to commitment. We can no longer assume the public will be supportive of further research and management without their thorough understanding and involvement in what we do and how our efforts contribute to recovery.

Because it is listed as a threatened species in the lower 48 states, measures to return the grizzly bear to viable population levels do not have to be subjected to economic analysis. While not necessary in meeting the letter of the law, the economic value of grizzly bears in the Yellowstone Recovery Zone can provide insight into management alternatives available to the agencies responsible for recovery. In particular, through an understanding of the economic value of the bear one may come by a practical way to manage human-bear interactions. Equally important is the opportunity for the public to experience bears in a way that fosters their understanding of the bear's recovery needs. It also provides a basis from which to compare the costs of grizzly bear protection to the value people place on bears. In order to provide some insights into the economic value of grizzly bears in the Yellowstone

¹ Present address: USDA Forest Service, 14th and Independence, S.W., P.O. Box 96090, Washington, D.C. 20090-6090.

Recovery Zone, the paper addresses: (1) the components of value associated with grizzly bears, (2) evidence of the magnitude of those values, (3) management implications, and (4) ways the economic value can be captured. Further information on economic valuation as it relates to wildlife can be found in McCollum et al. (1992) and Loomis et al. (1984). Bishop (1978, 1979) provides an economist's perspective on species extinction.

COMPONENTS OF ECONOMIC VALUE

Whether in New York City or a town like Hamilton, Montana, the mere mention of "grizzly bears" provokes vivid images in the minds of listeners. The images may vary from a close encounter on a wilderness trail to a special segment on National Geographic viewed from the safety of one's own living room. In either case, the image can be put into an economic framework.

In the broadest sense, value can be defined as an intangible human attitude whereby people attribute worth or significance to things. Grizzly bear recovery is important to a wide range of individuals because of a variety of personally held values (see Brown 1984). As discussed by Shaw and Zube (1980), those values may have their roots in: (1) market terms (goods and products measured in dollars), (2) psychological terms (attitudes, preferences, or satisfactions), (3) social terms (social trends, religion, or traditions), and (4) ecological terms (diversity or energy roles). All of these motivations can affect behavior, which implies a value that may be estimable by economic analysis. Economic analysis cannot capture all values, but many can be estimated.

Two broad categories of economic value must be differentiated when considering the value of grizzly bears in the Yellowstone Recovery Zone—economic impact and net economic efficiency. Economic impact refers to expenditures and other economic activity generated in a region because the grizzly bears are there. Tracking expenditures through the local or regional economy points out the local employment and sales directly or indirectly supported by the local grizzly bear resources. Expenditures can include dollars spent on gas, lodging, photography, camping, or food by recreationists or researchers.

Net economic efficiency values measure the benefit received over and above expenditures related to a resource. In the case of bears, that would be reflected in what individuals would be willing to pay beyond current expenditures if costs associated with bear-related activities increased or access fees were

charged to view bears in the Recovery Zone, etc. These net economic efficiency values measure the net addition to societal well-being associated with the local bears. It is these values that are used in benefit-cost analysis.

Having pointed out the distinction between these broad concepts of value, we first turn to the components of net economic efficiency value.

Net Economic Efficiency

Use Value.—If you have ever seen a grizzly bear in the wilds of Yellowstone, it undoubtedly left a vivid and lasting image. The economic value associated with hunting, viewing, or photographing bears in their native habitat is referred to as use value. However, you never have to set foot in Yellowstone to have a use value associated with grizzly bears. Watching nature programs featuring grizzly bears, browsing magazines, books, calendars, or renting videos, about grizzly bears or even seeing them at a zoo all represent use value. It might be difficult to imagine a person who has not engaged in some use of bears at some time.

Option Value.—A trip to Yellowstone Park for the chance to see a bear in the wild may be a once-in-a-lifetime event. As such, individuals may be willing to pay a premium to be guaranteed grizzly bears are thriving in the Recovery Zone so they can visit the site in the future and know that bears will be there. Option value is reflected in that willingness to pay to ensure future availability.

Existence and Bequest Value.—People who have no intention or desire to see a grizzly bear in the wild may receive benefit from knowing that others have opportunities to see them, or they may gain satisfaction just knowing that grizzly bears are thriving in the Yellowstone Recovery Zone. This value is referred to as existence value. Related to existence value is bequest value, whereby individuals receive benefit from knowing that a healthy grizzly bear population will be maintained in the Yellowstone Recovery Zone for future generations. These values are referred to as "nonuse values" because they do not depend on the person having a personal encounter with the resource.

Values in the categories outlined above may be negative in some cases. Individuals may receive benefit from not having grizzly bears available in the Yellowstone Zone for any current or future use, and have a willingness to pay to for that outcome. Such values must also be considered when analyzing the benefits to society at large of a healthy grizzly bear population in the Yellowstone Recovery Zone.

Economic Impact

Economic impact analysis measures market transactions related to a particular resource or activity, and tracks those expenditures as they move through the economy. It should be pointed out that economic impact does not measure economic value except as an absolute lower bound—the resource is worth at least as much to the person as he or she spends to use it. One product of an economic impact analysis is a set of expenditure multipliers. These multipliers summarize the total amount of economic transactions that result from an additional dollar spent in a particular economic sector as it moves through the economy. Money spent in one sector stimulates activity in other sectors. For example, when more tourists come to an area, they spend money on motels, restaurants, and other services. Wages are paid to workers in those establishments. Those workers, in turn, buy food, clothing, housing, and other goods, which results in wages for others, and so on. If \$10,000 were spent by tourists in a local economy (the direct effect of tourism), that spending might generate another \$10,000 in economic activity in the region (the indirect and induced effects) as the original \$10,000 flows through the economy. The total impact of the tourists' expenditures was \$20,000, double the amount actually spent by the tourists, so the multiplier for those tourism dollars would be 2.

An example of an economic impact analysis related to outdoor recreation is the study by Boyce et al. (unpubl. data) of the big game guiding industry in Alaska. McCollum et al. (1992a, 1992b) discuss methods and interpretations related to economic impact analysis, as does Walsh (1986).

Other Values

This paper focuses on those economic values of grizzly bears that can be quantified. However, there are other values that have economic meaning but do not readily lend themselves to being quantified. While not easily measured, ecological, spiritual, and quality of life values are important human values and should be considered qualitatively in decision-making. Ecological value of grizzly bears stems from their role in the ecological processes of the Yellowstone Recovery Zone. While humans may not directly benefit from the ecological role of bears, we value the role they play and directly benefit from the biological diversity that results from bears being in the ecosystem. Further discussion of ecological economics related to wildlife can be found in Decker and Goff (1987).

Native American cultures surrounding Yellowstone have long interacted with the grizzly bear. The early

nomadic tribes with their simple weapons pursued wildlife for their value in providing food and clothing. The grizzly undoubtedly provided these values along with formidable opposition. As these people's cultures changed including the pursuit of varying food so did their relationship with the grizzly. Revered for its strength, the grizzly has long been thought of as a "cousin" or even a god and remains a source of many sacred articles, stories of courage, wisdom, and ceremony to these people (Schullery 1986). Work is emerging on these "hard-to-define" values for wildlife and other natural resources. Such hard-to-define values include values placed on natural resources by particular peoples or groups for spiritual or religious or cultural reasons. They also include values emanating from a land ethic or relationship between humans and the earth. While these values are not likely to be quantifiable, they are relevant in many policy and management decisions. Dustin et al. (1993) are putting together a text, incorporating work from 40 authors, that will be seminal in bringing these hard-to-define values to the attention of policy makers and resource managers.

Humans choose where they live, work, and play partly based on the environment that surrounds them. Regions of the country that harbor grizzly bears are spectacular places to live and the added benefit of living in these places is not reflected in the paycheck one receives. Yet people take lower paying jobs so they can live in the Yellowstone area. Employers may locate in a particular area because of the ability to attract both workers (often at lower pay) and clients (often at higher pay). Placing an economic value on quality of life is difficult (see Power 1988) yet it represents a real value. Quality of life, community satisfaction, and other psychological and sociological benefits related to recreation and natural resources are discussed in Driver et al. (1991).

MAGNITUDE OF ECONOMIC VALUES

No study has tried to directly measure the value of grizzly bears in the Yellowstone Recovery Zone, but studies related to wildlife viewing in Yellowstone Park and grizzly bear studies elsewhere cast some light on the value of those bears to the American public.

Use Value

A study by Duffield (1989) found that 94% of visitors to Yellowstone reported participating in wildlife observation. That was a higher share than for any other activity measured: seeing geysers (77%), hiking

(39%) and fishing (14%). Similarly, 95% of visitors reported that observing a variety of wildlife was a "very important" or "moderately important" reason for visiting the park. This suggests that the single most important reason people visit Yellowstone Park is to view wildlife, and that virtually all trips to Yellowstone have wildlife viewing as a primary or secondary purpose. These wildlife viewers spent an average of \$563 on their trip to the park. The study also estimated net willingness to pay of those visitors based on whether they saw elk. Visitors from the surrounding states of Montana, Wyoming, and Idaho valued trips on which they saw elk at \$172.24 per day (this is the value they place on seeing elk over and above current expenditures). Visitors from those states who did not see elk reported a willingness to pay over and above current expenditures of \$84.82 per day. Visitors from outside the surrounding area valued trips on which they saw elk at \$324.88 per trip, and trips on which they did not see elk at \$313.03 per trip. While the study did not specifically ask about grizzly bears, the magnitudes of the numbers for participation in wildlife viewing and the average spending of the 2.5 million annual visitors largely interested in viewing native free roaming wildlife do provide some indication of the value of the Yellowstone Recovery Zone for wildlife viewing.

Brown Bear viewing at the McNeil River State Game Sanctuary in Alaska is perhaps the most vivid example of the value of viewing grizzly bears. Once nicknamed "River of the Bears," McNeil offers an unparalleled opportunity to live with and observe large numbers of wild bears fishing for salmon. Although there are other locations in Alaska (most notably Pack Creek on Admiralty Island, discussed below) at which one can view bears, none offer the sheer numbers seen at McNeil or the strong wilderness experience. The sanctuary is managed for the welfare of bears, not anglers, viewers, or other human users. Human behavior and access are carefully controlled in the sanctuary.

During July and August, as many as 60 brown bears can be observed at one time feeding on chum salmon at McNeil Falls. In order to avoid bear-human conflicts, the Alaska Department of Fish and Game developed a system in 1973 which limits daily visitation to 10 visitors. Fourteen 4-day periods between 1 July and 25 August have been established for which a total of 140 individual permits are issued by lottery. Each applicant pays a \$10 application fee and a \$40 use fee (refunded if no permit is issued). In 1986, 806 applicants applied for 140 permits. As a result of increased television exposure, applicants rose to 1,646 in 1987. Applicants

in 1988 and 1989 numbered 1,049 and 1,305, respectively (Hill 1988). Individuals not successful in the lottery can visit the site as a standby visitor. If a permit holder does not use his or her permit on a particular day, a mechanism has been established to fill spaces with standby visitors.

Research by Clayton and Mendelsohn (1991) indicates that individuals would be willing to pay between \$174 and \$270 for a 4-day permit in addition to the \$40 user fee they already pay; resulting in a total net user value in the range of \$24,360 to \$37,800 per year for this unique, but limited use area. This value relates to use of the site for bear viewing, however it is likely that individuals would be willing to pay to maintain the sanctuary even if no visitation were allowed (Swanson et al., 1992). Note that this value is over and above current expenditures for visiting the site.

Work by Hill (1988) estimates visitors to the McNeil Sanctuary for bear viewing would be willing to pay between \$188 and \$300 per person per trip. Hill further states that, considering the costs associated with getting to McNeil and other related expenses, the total user value of the McNeil River Sanctuary for bear viewing is conservatively estimated to be between \$113,000 and \$128,200 annually. The value placed on the McNeil River bears by people other than those who actually visit the site is unknown, but Hill speculates that it could be large.

The Pack Creek Cooperative Management Area in Alaska offers another opportunity to view brown bears in relative safety in a wilderness setting. The site is on the Tongass National Forest and has a viewing tower erected to avoid bear-human contact. Visitation is tightly controlled on the site—only 24 people per day are allowed on the tower with a maximum group size of 12 people. The total site capacity between 10 July to 25 August is 1,080 visitors.

In 1985, the Alaska Department of Fish and Game, U.S. Department of Agriculture (USDA) Forest Service, and the University of Alaska began a cooperative study of the bears at Pack Creek. Although the original and main emphasis of the study was multi-generation bear play behavior, a considerable amount of data have been collected on human-bear interactions at the site. That information is proving valuable to managing agencies in minimizing human impacts on bears. Rapidly increasing use of the area in the mid-1980s led to 2 planning efforts that ultimately called for maintaining the primitive character of the site and minimizing impacts on the bears. Visitors must obtain a permit in Juneau where they also receive

information on the management area. All visitors receive a short briefing on the area, the bears, bear-human interactions they may encounter, and bear behavior they are likely to observe. They are then free to travel in designated areas throughout the management area unaccompanied by rangers, though rangers are always on duty during the peak bear-viewing season. Not everyone is comfortable with this type of experience. For those who are not, guides-outfitters offer quality interpretation, trip planning, and bear-wise escorts at Pack Creek.

No economic data have been collected to show the value associated with recreational bear viewing at Pack Creek. Based on the expense of getting to the site, the value of this site for bear viewing is likely to be quite high. Demand for these Alaska sites is high suggesting opportunities to provide additional bear viewing sites; particularly when the viewing can be provided in an undeveloped wilderness setting.

Other studies provide indications of the value of wildlife viewing in general. McCollum et al. (1990) estimated net values ranging from \$25 to \$30 per trip on western national forests. Bergstrom and Cordell (1991) estimated an average value of \$46 per trip for wildlife viewing nationwide.

Option and Existence Values

Brookshire et al. (1983) conducted a survey to measure: (1) how much hunters would be willing to pay to retain a right to hunt grizzly bears in the future (option value), and (2) how much they would be willing to pay to maintain grizzly bears even if opportunities to hunt them in the future were not available (existence value). One group of Wyoming hunters was asked their maximum willingness to pay, on an annual basis, to participate in a drawing for licenses to hunt grizzly bears. Mean bids, across varying probabilities of success in being drawn for a permit ranged from \$9.70 to \$25.90. A second group was asked their maximum willingness to pay, on an annual basis, to preserve grizzlies if no hunting were permitted. Bids from this sample of Wyoming hunters ranged from \$15.20 to \$24.00. Preservation of grizzlies appears to be as valuable to hunters as hunting them. These values cannot be extrapolated to the general public, but they do provide an indication of the benefits received from preserving grizzly bears.

Estimates of value can be found for other threatened or endangered species as well. Boyle and Bishop (1987) reported values for maintaining the existing bald eagle (*Haliaeetus leucocephalus*) population in Wisconsin under scenarios where people would and

would not be likely to have opportunities to view the eagles. "Wildlife viewers" (people who had made a trip on which viewing bald eagles was one of the reasons for the trip) placed an average value of \$75 on the scenario where viewing opportunities would be likely and \$28 on the scenario in which viewing opportunities would not be likely. That implies an average annual "nonuse" value (no actual use of the eagles) of \$28 for bald eagles and an average use value of about \$47. "Nonviewers" (people who had never taken a trip on which bald eagle viewing was one of their intentions) reported average values ranging from \$10 to \$30. Because this latter group classified themselves as nonusers of bald eagles, their values were interpreted completely as nonuse (existence) values.

Stoll and Johnson (1984) used samples of: (1) visitors to the Aransas National Wildlife Refuge in Texas, which is a wintering ground for the world's only breeding flock of whooping cranes (*Grus americana*), (2) general residents of Texas, and (3) residents of 4 major metropolitan areas outside Texas to estimate existence values for whooping cranes. The estimated annual existence values for those samples were \$9.33, \$1.03, and \$1.24, respectively.

Rubin et al. (1991) estimated average annual household willingness to pay to be \$35, \$37, \$21, and \$15 for residents of Washington, Oregon, California, and the rest of the United States, respectively, "to be 100% sure that the northern spotted owl would exist in the future." That translates to an annual total value of \$1.5 billion. It is somewhat unclear, though, how much of that willingness to pay is for preserving the owls and how much is for preserving the old growth forest habitat in general.

These studies show the high values placed on rare, endangered, and threatened species. They may be indicative of the nonuse (existence and bequest) values held for grizzly bears in the Yellowstone Recovery Zone. It is useful to compare values across use categories. This gives a relative indication of the total value (sum of use, option, existence, and bequest) associated with a species. Looking only at use values does not provide an accurate picture of why the public values a species. In the case of grizzly bears in the Recovery Zone, it might be interesting to explore how much each component contributes to total value.

Measures of Economic Impact

There is virtually no information on the economic impact associated with threatened or endangered species. A few studies have been done addressing the economic impact of hunting, fishing, and outdoor

recreation in general. These studies are discussed by Walsh (1986) who also discusses economic impact analysis applied to outdoor recreation. McCollum and Bergstrom (1992) discuss performing an economic impact analysis related to wildlife.

Multipliers associated with recreational activities in the contiguous United States typically average around 2—every recreation dollar that comes into the state (or region) generates a second dollar of economic activity within the state. Of particular interest are the dollars that come in from outside the region. These represent new money to the economy and are a source of economic growth and diversification. The study by Duffield (1989) is relevant in this context; many people come into the Yellowstone region from outside the region to view wildlife. On average, they spend \$563 while on their trip. Much of that money is spent in the Yellowstone region. To the extent that grizzly bears draw people to the region to spend time and money, or induce visitors to spend more time and money in the region, they can be considered a resource for economic growth.

MANAGEMENT IMPLICATIONS

In 1986, the Congressional Research Service provided an overview of management issues and recommendations in the Greater Yellowstone Ecosystem to Congress. Their summary states that: "In the public's mind, grizzly bears are the most important indicators of the ecosystem's health. These large animals, whose most heavily used habitat is often critical to many other species, are particularly sensitive to human presence and are thus the first species displaced by development activities." Further, "the impact of human presence on sensitive natural systems throughout the Ecosystem is the source of virtually all conflict in the area." C. Martinka (a Glacier Park researcher) was quoted as arguing that the traditional method of managing bear-human conflicts by taking aggressive action towards problem bears needed to change in the direction of managing visitors (Congressional Research Service 1987).

The Pack Creek Project exemplifies how a closely managed viewing area can be used as a tool to minimize human impacts on bears. Thoughtful planning and layout of the Pack Creek viewing area has: (1) minimized displacement of bears from their primary food sources by creating predictable human activities and movements, and limiting where visitors can travel, (2) removed human food and reversed food conditioning, (3) decreased the likelihood of negative

human-bear encounters and increased the safety of visitors, and (4) provided a quality viewing experience.

Viewing bears in Yellowstone is not the only economic value associated with bears in the Recovery Zone. The general public values bears in the Yellowstone Recovery Zone for a variety of reasons: (1) the option of future use, (2) so that others, now and in the future, can view bears, and (3) because having bears is important in-and-of-itself, even if no one sees the bears. Any fully informed decision having to do with the fate of Yellowstone grizzly bears must consider the total value of the resource. Before applying results of previous studies or collecting more data, however, the analytical questions need to be carefully thought out and specified. Results from economic studies, like biological studies, are contextual and, therefore, before applying the results of a study the assumptions, sampling framework, and specific economic values that were measured must be clearly identified and understood. One value does not fit all situations and care must be taken to ensure the applicability of any values used.

WAYS TO CAPTURE ECONOMIC VALUE

While many visitors to Yellowstone know (or take action to find out on their own) where and when to view grizzly bears, deliberate efforts have not yet been made to actively encourage bear viewing or develop widely available and easily accessible viewing opportunities in the Yellowstone area. Some organized bear viewing opportunities are found in selected courses devoted to bears through educational programs offered in Yellowstone such as the Yellowstone Institute. That being said, one must recognize that the situation in Yellowstone is different than that found at the premier viewing sites in Alaska. Access to the Yellowstone area is much easier for a huge number of people and, to a large extent, could be less easily controlled. The bears at Yellowstone are much less spatially concentrated than at the McNeil site where many bears congregate at the falls. They are seen over a larger area and at greater distances—often a mile or two. That means specialized (and expensive) equipment like spotting scopes is required, which exclude a large share of the visitor population or the items would need to be provided at the site. On the other hand, access to the Alaska sites is limited. Both Alaska sites, but especially the McNeil site, are remote, difficult, and expensive to get to. Both sites also require permits and are managed under tightly controlled visitor numbers.

Experience at McNeil River and Pack Creek

indicates that, under tightly controlled conditions, a potential exists for positive interaction between bears and humans. Developing that potential in the Yellowstone Recovery Zone would expand and highlight the value of bears in the zone. It may also alleviate some of the current unhealthy encounters between bears and humans. The character of potential viewing opportunities may be completely different at Yellowstone than at McNeil River or Pack Creek. It may or may not be possible or feasible to develop more widely accessible bear viewing in the Yellowstone Zone. The point to be taken from the Alaska studies is that bear viewing is a highly desired activity that is valuable in terms of benefits to visitors. Because of that, visitors may be tolerant of "inconveniences" like controlled access and other measures required to maintain a safe, natural, high quality, and sustainable environment for both bears and humans.

One reviewer pointed out that bears currently live on natural foods, including spawning trout, in close proximity to human development in the area around the Lake Hotel. While presenting a complex management challenge to do so in a safe manner, and which may or may not be possible, accessible bear viewing opportunities might be developed there in a way that would allow humans to view the bears while leaving the bears relatively undisturbed. The McNeil experience would indicate that the key is highly predictable and nonthreatening behavior on the part of the humans. The challenge is not so much in managing bears as managing humans. One other potential might be to close off some part of the park or surrounding national forest(s), and have restricted access. Antelope Creek in Yellowstone National Park is a good example of an area that has restricted human travel but still allows for bear viewing opportunities. Foot travel in the area is restricted but car pull-offs are available, thereby allowing some access to bear viewing from the road but still protecting bears from direct human encounters. Precedent exists for those kinds of restrictions—access is controlled for campgrounds down in the Grand Canyon, backcountry permits are controlled in some areas, etc. Research might indicate that visitors would be willing to live with such restrictions in order to have a fair chance at gaining access to a high quality bear viewing area. "Fair chance" means a management challenge in designing a method for allocating access—difficult, but not insurmountable. There is also no reason to interpret "widely accessible" and "fair chance" as universally accessible and available. It is reasonable to expect visitors to expend some effort to view bears in the wild. The character of the experience

is a wilderness setting, not a city zoo. Hunters have lived and prospered under conditions of controlled access and participation by permit for a long time. As long as the allocation mechanism is equitable, viewers can be expected to play by the same rules.

Studies could be done to determine the level of interest in grizzly bear viewing (as well as wildlife viewing in general) in the Yellowstone Recovery Zone, and estimate how much people would pay for such opportunities. Whether fees were actually collected would be irrelevant to the net social value, but fees would provide returns to the treasury and, thus, be one means of capturing some of the value attributable to grizzly bears. Further, the study could provide information on the economic activity that might be generated in the Yellowstone region if bear viewing were a viable recreation activity. Conversely, it would give an indication of the economic activity that might be lost in the region if the grizzly bear population were allowed to decrease or become extinct. Such economic activity, in terms of visitors being drawn to the region by the grizzly bear resource to spend time and money, would be another means of capturing some of the value attributable to the bears. Opportunities are becoming available from businesses and enterprises, which provide bear viewing opportunities (Moss 1993). Opportunities might also be created for new enterprises specifically tailored to a wide variety of wildlife viewing in natural settings. Loomis and Thomas (1992) discuss the issue of capturing people's net economic value (or willingness to pay) as state and private revenue.

Whether bear viewing was encouraged or developed or not, the information on expenditures related to bears, and net economic values associated with bears, generated in a study of grizzly bear use in the Yellowstone Recovery Zone would be a measure of the benefits of bear preservation to current users of the resource. Other studies (or study components) are needed to address the issues of option, existence, and bequest values. Finally, scenarios could be constructed to estimate the potential demand for viewing sites that could be developed in the future.

LITERATURE CITED

- BERGSTROM, J.C., AND H.K. CORDELL. 1991. An analysis of the demand for and value of outdoor recreation in the United States. *J. of Leisure Res.* 23:67-86.
- BISHOP, R.C. 1978. Endangered species and uncertainty: the economics of a safe minimum standard. *Am. J. of Agric. Econ.* 60:10-18.

- _____. 1979. Endangered species, irreversibility, and uncertainty: a reply. *Am. J. of Agric. Econ.* 61:376-379.
- BOYLE, K.J., AND R.C. BISHOP. 1987. Valuing wildlife in benefit-cost analyses: a case study involving endangered species. *Water Res. Res.* 23(5):943-950.
- BROOKSHIRE, D.S., L.S. EUBANKS, AND A. RANDALL. 1983. Estimating option prices and existence values for wildlife resources. *Land Econ.* 59(Feb):1-15
- BROWN, T.C. 1984. The concept of value in resource allocation. *Land Econ.* 60(3):231-245.
- CLAYTON, C., AND R. MENDELSON. 1991. McNeil River questionnaire results, summer 1990—final. Rep. to the Div. of Wildl. Conserv., Alas. Dep. of Fish and Game, Anchorage.
- CONGRESSIONAL RESEARCH SERVICE. 1987. Greater Yellowstone Ecosystem. 99th Congress, 2nd session. Washington, D.C. U.S. Gov. Printing Off.
- DECKER, D.J., AND G.R. GOFF. 1987. Valuing wildlife: economic and social perspectives. Westview Press, Boulder, Colo.
- DRIVER, B.L., P.J. BROWN, AND G.L. PETERSON. 1991. Benefits of leisure. Venture Publishing, Inc. State College, Penn.
- DUFFIELD, J. 1989. Nelson property acquisition: social and economic impact assessment. Rep. to Mont. Dep. of Fish, Wildl. and Parks, Helena.
- DUSTIN, D.L., T. BALTIC, B.L. DRIVER, G. ELSNER, AND G.L. PETERSON. 1993. Final prospectus for a text: understanding emerging hard-to-define elements of a multicultural land management ethic. Rocky Mtn. For. and Range Exp. Stn., Fort Collins, Colo.
- HILL, P.J. 1988. The economic value of the McNeil River Sanctuary. Memo to the Reg. Supervisor, Game Div., Alaska Dep. of Fish and Game, Anchorage.
- LOOMIS, J.B., G. PETERSON, AND C. SORG. 1984. A field guide to wildlife economic analyses. *Trans. of the North Am. Wildl. and Nat. Res. Conf.* 49:315-324.
- _____, AND M.H. THOMAS. 1992. Pricing and revenue capture: converting willingness to pay into state and private revenue. Pages 255-274 in G.L. Peterson, C.S. Swanson, D.W. McCollum, and M.H. Thomas, eds. *Valuing Wildlife Resources in Alaska*, Westview Press, Boulder, Colo.
- MCCOLLUM, D.W., AND J.C. BERGSTROM. 1992. Measuring net economic value and regional economic impact. Pages 1135-197 in Peterson, G.L., C.S. Swanson, D.W. McCollum, and M.H. Thomas, eds. *Valuing Wildlife Resources in Alaska*. Westview Press, Boulder, Colo.
- _____, G.L. PETERSON, J.R. ARNOLD, D.C. MARKSTROM, AND D.M. HELLERSTEIN. 1990. The net economic value of recreation on the national forests: twelve types of primary activity trips across nine forest service regions. Res. Paper RM-289. U.S. Dep. of Agric. For. Serv., Rocky Mt. For. and Range Exp. Stn., Fort Collins, Colo.
- _____, _____, AND C.S. SWANSON. 1992. A manager's guide to the valuation of nonmarket resources: what do you really want to know? Pages 25-52 in Peterson, G.L., C.S. Swanson, D.W. McCollum, and M.H. Thomas, eds. *Valuing Wildlife Resources in Alaska*, Westview Press, Boulder, Colo.
- MOSS, M. 1993. Stalking the great grizzly. Pages 12-13. *Newsday*, Sunday, July 11.
- POWER, T.M. 1988. *The economic pursuit of quality*. M.E. Sharpe, London, England.
- RUBIN, J., G. HELFAND, AND J. LOOMIS. 1991. A benefit-cost analysis of the northern spotted owl. *J. of For.* 89(12):25-30.
- SCHULLERY, P. 1986. *The bears of Yellowstone*. Roberts Rinehart, Inc., Boulder, Colo. 263pp.
- SHAW, W.W., AND E.H. ZUBE. 1980. *Wildlife values: a workshop on assessment methodologies and information needs*. Univ. of Arizona, Cent. for Assessment of Noncommodity Nat. Resour. Values.
- STOLL, J.R., AND L.A. JOHNSON. 1984. Concepts of value, nonmarket valuation, and the case of the whooping crane. *Tran. of the North Am. Wildl. and Nat. Res. Conf.* 49:382-393.
- SWANSON, C.S., J.C. BERGSTROM, AND J.N. TRENT. 1992. The total value of McNeil River State Game Sanctuary. Pages 337-357 in Peterson, G.L., C.S. Swanson, D.W. McCollum, and M.H. Thomas, eds. *Valuing Wildlife Resources in Alaska*, Westview Press, Boulder, Colo.
- WALSH, R. 1986. *Recreation economic decisions: comparing benefits and costs*. Venture Publishing, Inc., State College, Penn.
- U.S. WATER RESOURCES COUNCIL. 1979. Procedures for evaluating national economic development (NED) benefits and costs in water resources planning. *Fed. Register*. Dec. 14.
- U.S. WATER RESOURCES COUNCIL. 1983. Economic and environmental principles for water and related land resources implementation studies. *Fed. Register*. Mar. 17.