

# Endangered Species UPDATE

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# Status of the Steller Sea Lion, *Eumetopias jubatus*, in Alaska

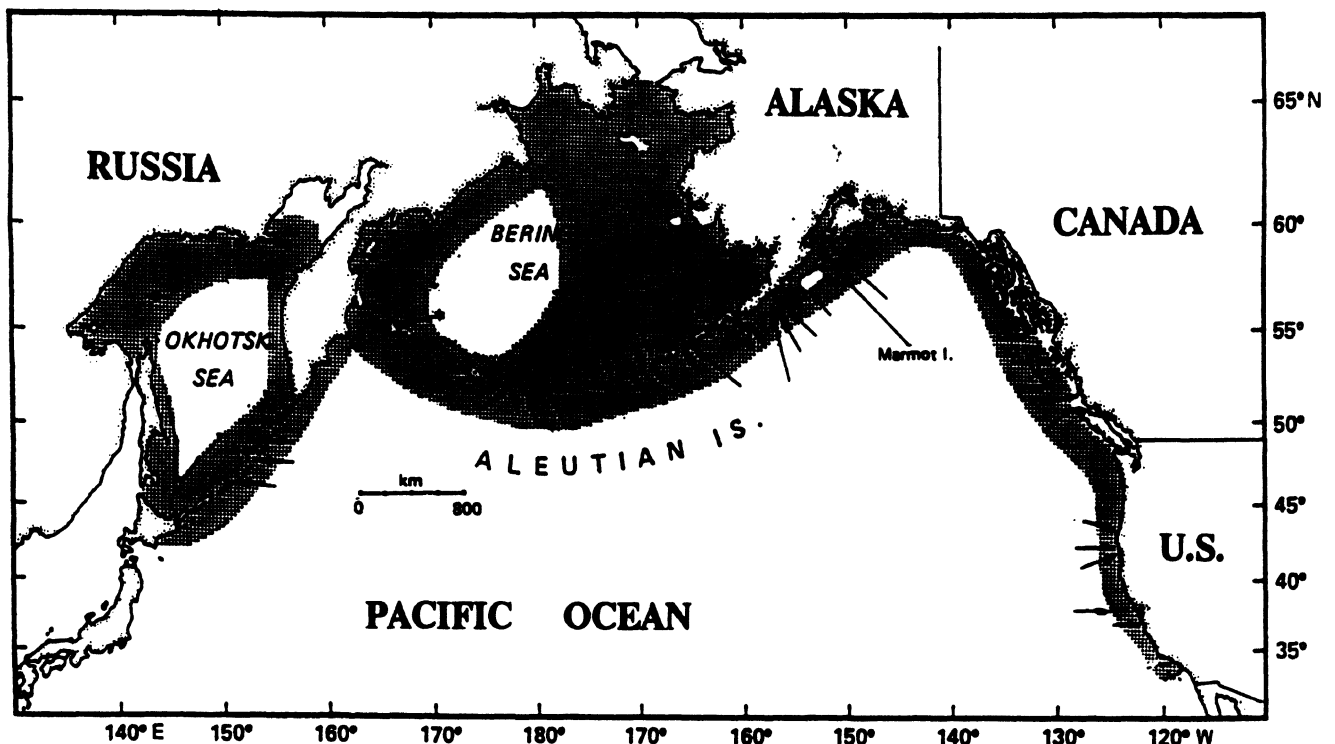
by  
Susan Mello

Steller sea lions are the largest members of the otariid pinniped family, and a conspicuous marine mammal of coastal waters of the North Pacific. Their range extends along the North Pacific Ocean rim from the Kuril Islands and Okhotsk Sea, through the Aleutian Islands and Bering Sea, and south along the North American coast to California. Within their geographic range, the Steller sea lion's center of abundance is the Gulf of Alaska and Aleutian Islands, where prior to the current population decline over 75% of the world's population occurred. Although commonly seen near shore, Steller sea lions are capable of extensive trips into offshore waters. They are polygynous breeders, highly gregarious on land, and use traditional, remote island locations for breeding, pupping, and resting. Once abundant, Steller sea lion numbers have declined precipitously over the last 20 years in the heart of their geographic range.

In the 1960s, the Steller sea lion population appeared healthy, and its abundance worldwide was estimated at between 240,000 and 300,000 individuals (Kenyon and Rice 1961). Total population estimates from extensive surveys made between 1975 and 1980 were similar; however, during these surveys, researchers noted a large decline in abundance in the eastern Aleutian Islands (Braham et al. 1980, Loughlin et al. 1984). At the time, this local decline was thought to be caused by a redistribution of animals to adjacent areas.

By the mid-1980s, it was clear that Steller sea lions were no longer as abundant as they once were. Aerial surveys of adults and juveniles conducted in the central Gulf of Alaska through the central Aleutian Islands documented an overall decline of 52%, from 140,000 animals counted onshore between 1956-60 to 68,000 in 1985 (Merrick et al. 1987). From 1985-1989, the population

in the area of the central Gulf of Alaska to the central Aleutian Islands decreased by greater than 50%, and by 1990 similar declines had been documented in Prince William Sound, the western Aleutian Islands, and throughout the Steller's Russian range (Merrick et al. 1992). The National Marine Fisheries Service (NMFS, 1995) estimates that the U.S. Steller sea lion population west of Prince William Sound has declined from about 192,000 non-pups in 1960 to about 33,600 non-pups in 1994, a decline of greater than 80%. During this same period, the number of Steller sea lions in Southeast Alaska, British Columbia, Oregon, and most of California has been stable to increasing (Steller sea lion adult/juvenile numbers in Southeast Alaska, Oregon, California are estimated to have been about 15,000 in the 1960s and 18,600 in 1994).



Map of the North Pacific Ocean showing the range of Steller sea lions (stippled area) and the locations of major rookeries (arrows).

## Reasons for the decline

The causes of the drastic decline in Steller sea lion numbers in Alaska remain uncertain. Several possible factors have been postulated and investigated, including disease, commercial fisheries, toxic contaminants, commercial and subsistence sea lion harvests, and natural predators. Of these, the most likely candidates include disease, intentional and unintentional mortality associated with commercial fisheries, and changes in the availability and/or quality of prey.

Although disease studies to date cannot be considered conclusive, there is no evidence of a widespread epizootic, such as the distemper outbreak that reduced the number of harbor seals in the Northeast Atlantic in 1988. Various pathogens have been isolated from Steller sea lion carcasses found stranded and from sea lions collected by researchers, but the significance of disease agents to the population is unclear. One area of ongoing research is determining the possible role of pathogens, e.g., *Chlamydia*, in the relatively high rate of abortions observed in Steller sea lions in the Gulf of Alaska.

The decline of Steller sea lions has coincided temporally and spatially with the development of large commercial groundfish fisheries in the Bering Sea, Aleutian Islands, and Gulf of Alaska. Many Steller sea lions have been killed incidental to these commercial trawl fisheries through entanglement in fishing gear. Perez and Loughlin (1990) estimated that over 20,000 Steller sea lions were killed incidental to commercial groundfish trawl fisheries in the Bering Sea, Aleutian Islands, and Gulf of Alaska during 1973-1988. They concluded that incidental take in commercial fisheries accounted for about 6% of the observed decline in the Gulf of Alaska, and about 16% of the decline in the Bering Sea and Aleutian Islands. In recent years, the incidental take in commercial groundfish fisheries has been greatly reduced (to less than 30 animals/year), and incidental take in fisheries is no longer considered a significant factor for the population.

Killing of Steller sea lions by fishermen is another possible fishery-re-

lated factor in the population decline. Fishermen have been reported shooting sea lions at haulouts and rookeries and in open water. However, it is not possible to determine how many sea lions have been killed, or the significance of this mortality to the population. Shooting Steller sea lions was prohibited in 1990; it is thought that this prohibition, as well as peer pressure, has reduced the incidence of intentional mortality associated with fisheries.

Fisheries may also indirectly affect the health and reproductive success of Steller sea lions by reducing the availability of prey. The most compelling evidence that the nutritional status of Steller sea lions may have changed during the decline period comes from a study conducted by the Alaska Department of Fish and Game (ADFG). ADFG collected Steller sea lions in the Gulf of Alaska in the 1970's (pre-decline) and in the 1980's (during the decline), and found that in the 1980's sea lions were significantly smaller at age (length, weight, and girth) than sea lions collected from the same location in the 1970's (Calkins and Goodwin 1988). The observation of reduced size at age suggests that either less food was available to foraging sea lions or that the available food was lower in quality in the 1980s as compared to the 1970's. ADFG's 1980's Steller sea lion collections were made in the vicinity of Shelikof Strait, the site of a large pollock roe fishery that occurred from 1981 through 1985. Their observation raised concerns that the commercial groundfish fisheries could be reducing the local abundance of fish stocks important to Steller sea lions, and as a result affecting the abundance of sea lions as well.

The Bering Sea, Aleutian Islands, and Gulf of Alaska commercial groundfish fisheries target important prey species of Steller sea lions, notably walleye pollock and Atka mackerel. Whether or not these fisheries actually deplete food resources of Steller sea lions is unclear. Data on fish stocks, their migrations, and seasonal distribution are relatively poor for many North Pacific stocks: long time-series of data are unavailable, research surveys are relatively infrequent, and data are only resolvable on a

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Readers include a broad range of professionals in both scientific and policy fields. Articles should be written in an easily understandable style for a knowledgeable audience. For further information, contact the editor.

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Cover: Steller sea lion (*Eumetopias jubatus*). Photo by Richard Merrick, National Marine Fisheries Service.

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large geographic scale. Analyses that have compared fishery harvests with changes in Steller sea lion abundance have been inconclusive, but this may be due to the limitations of the available data (Loughlin and Merrick 1989, Ferrero and Fritz 1994).

One general conclusion is that where and how fisheries operate could be significant to Steller sea lions even if fishery removal levels appear conservative. Fisheries that harvest large quantities of fish in relatively small geographic areas and short periods of time may deplete the local abundance of fishery resources. When a fishery occurs in important Steller sea lion foraging habitat, and targets Steller sea lion prey species or has a significant bycatch of Steller prey species (as in the pollock and Atka mackerel fisheries), the fishery may make it more difficult for sea lions to obtain food. This is likely to be more important in the winter when alternate food resources are fewer and sea lion metabolic costs higher, and to be more significant to newly-weaned juveniles, which are less adept foragers.

The observed reduction in the nutritional status of Steller sea lions could also be related to environmental change. Changes in the abundance of several species of fish, shellfish, birds, and other marine mammals in the Bering Sea, Aleutian Islands, and Gulf of Alaska have been documented over the last 20 years. In particular, some important forage fish stocks, such as capelin and sand lance, appear to have declined in both the Bering Sea and Gulf of Alaska during the 1970's and 1980's. While



Photo by John Hyde, Alaska Department of Fish and Game

some of the observed changes in the ecosystem can be linked to human activities (e.g., fisheries, marine mammal harvests, hatcheries), others appear to be rooted in natural phenomena (e.g., oceanic temperature changes).

Although no one cause for the Steller sea lion decline can be identified, significant changes in the ecosystem on which they depend have occurred during the period of their decline. Reduced abundance of forage fish stocks, increased fishery removals from sea lion foraging habitats, and intentional and unintentional mortality in commercial fisheries are all likely to have played a role in the population decline. Diseases that might be insignificant in a healthy population may become significant in a stressed or much reduced population.

### Management Actions

The National Marine Fisheries Service (NMFS) is the U.S. Federal agency responsible for management of most species of marine mammals that occur within U.S. waters, including the Steller sea lion. On May 6, 1988, NMFS announced its intention to list Steller sea lions as a depleted species under the Marine Mammal Protection Act

(MMPA) because of the documented population decline in most of Alaska. On November 21, 1989, in response to the alarming 1989 sea lion survey results and the continued silence by NMFS on its promised protected species listing, the Environmental Defense Fund, on behalf of itself and 17 other environmental groups, formally peti-

tioned NMFS to list the Steller sea lion as endangered under the Endangered Species Act (ESA). On April 5, 1990, the Steller sea lion was listed as a threatened species under the ESA by emergency action; the listing was made final on November 26, 1990. Because distinct populations could not be delimited at the time of the listing, the entire U.S. population was listed as threatened.

Coincident with the ESA listing, NMFS established three regulations to aid the species' recovery: (1) NMFS prohibited shooting at or near Steller sea lions; (2) NMFS prohibited vessel approach within 3 nautical miles (nm) of the 37 rookeries west of the Kenai Peninsula (the area of decline at the time of listing); and (3) NMFS reduced the allowable level of incidental take of Steller sea lions in commercial fisheries off Alaska (established under the MMPA) by one half.

Additional regulations to protect Steller sea lions were implemented in 1991 and 1992 under the Magnuson Fishery Conservation and Management Act; however, the ESA was the driving force behind these regulations as well. Section 7 of the ESA requires that Federal agencies ensure that any action they take, authorize, or fund is not likely to jeopardize the continued survival of a

listed species, and establishes a process whereby the likely significance of a considered action to a protected species can be assessed. Section 7 consultation by NMFS on groundfish fisheries managed by NMFS in the Bering Sea, Aleutian Islands, and Gulf of Alaska (the subject of a lawsuit brought by Greenpeace in 1991<sup>1</sup>) resulted in new fishery regulations to protect Steller sea lions. These fishery regulations were based on data analyses that showed that during the sea lion population decline commercial groundfish harvests in the Bering Sea and Gulf of Alaska had become concentrated in nearshore areas important for sea lion foraging and during winter months (when the pollock's value is highest). NMFS hypothesized that this compression of fishing effort may have made it more difficult for Steller sea lions to obtain food, and established regulations to move fishery harvest away from Steller sea lion rookeries and to disperse fishing effort. NMFS implemented year-round no-trawling zones of 10 nm around the 37 Steller sea lion

rookeries west of Kenai, expanded no-trawling zones to 20 nm around 6 of these rookeries during the Bering Sea winter pollock roe fishery, and spatially allocated the pollock quota in the Gulf of Alaska to disperse the fishery.

Many individuals in the fishery were disturbed by these regulations since NMFS could not then, and cannot now, show a cause and effect relationship between fisheries and the Steller sea lion decline. Nor can it be proven that these management actions will benefit sea lions, although it is hard to imagine how minimizing disturbance in essential breeding and foraging areas could be anything but beneficial. Despite objections by fishermen, the closures have not affected the total amount of fish caught, nor significantly diminished the speed with which the harvest quotas are attained; the largest effect is that fishermen have been forced to travel farther to obtain their catch.

Another significant management action was the publication of the Recovery Plan for Steller sea lions in December

1992; the Recovery Plan provides the guiding focus for Steller sea lion research and management direction (NMFS 1992). The Plan was written by the Steller Sea Lion Recovery Team, a NMFS-appointed group comprised of state and Federal government Steller sea lion experts, university scientists with expertise in pinniped ecology, and individuals with expertise in commercial fisheries in Alaska. Since the underlying cause of the decline is unknown, it was not possible for the Recovery Team to define the precise actions needed to recover the Steller sea lion population. Because a lack of knowledge is a major obstacle, the Recovery Plan outlines a detailed research program for determining the cause of the population decline. Management actions to reduce human disturbance of sea lions and their habitats, reduce sources of mortality, and raise public awareness are also an essential part of the Recovery Plan.

Critical habitat for Steller sea lions was officially designated under the ESA in August, 1993. Designated habitat

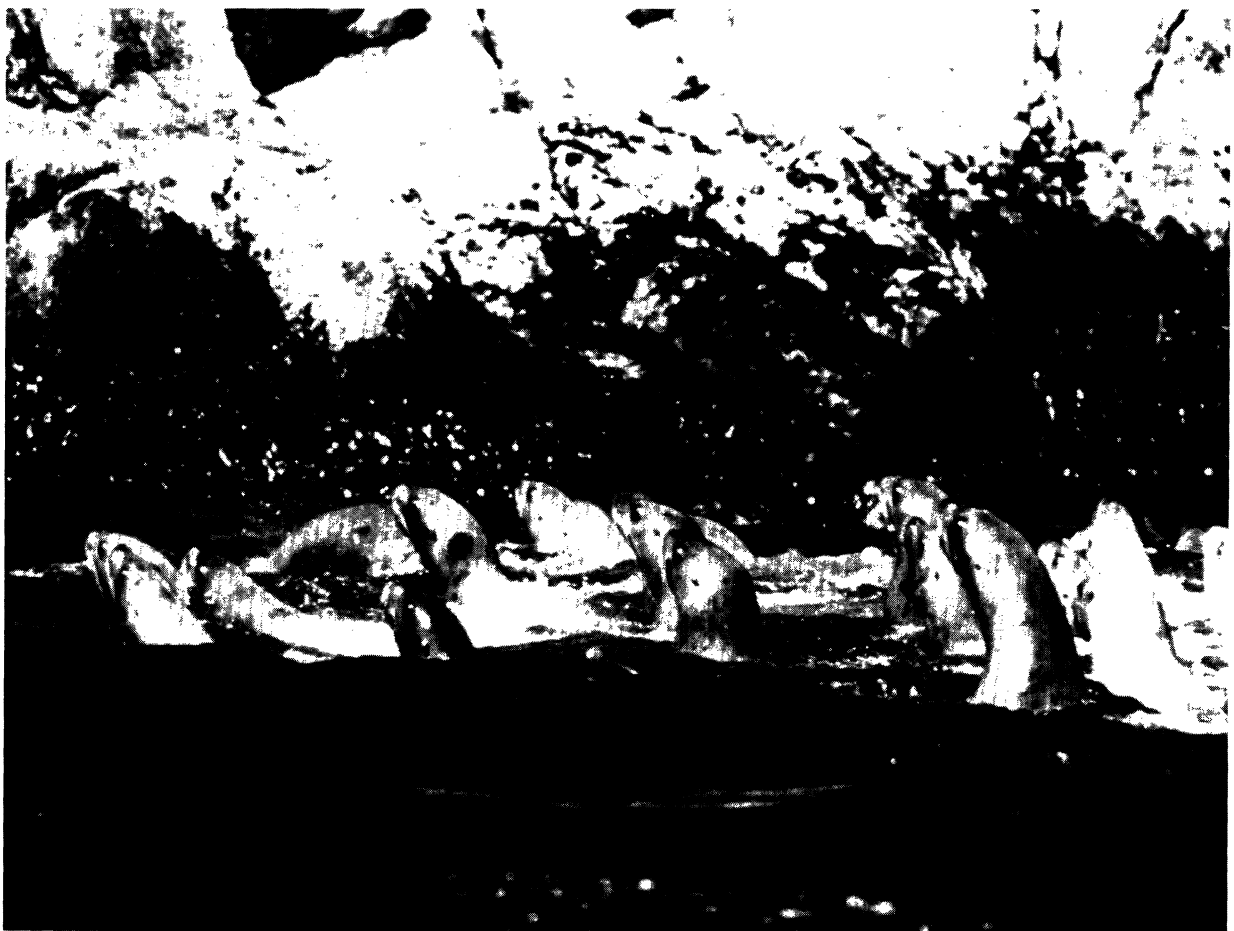


Photo by Anne Raup, Anchorage Daily News



Photo by John Hyde, Alaska Department of Fish and Game

includes all rookeries and major haulouts in Alaska, landward, seaward, and skyward zones adjacent to these habitats, and three aquatic foraging habitats in the Gulf of Alaska, Bering Sea, and Aleutian Islands. No prohibitive regulations were implemented with the critical habitat designation.

### Research Program

Preferred terrestrial habitats of Steller sea lions are remote, hard-to-reach, rugged islands often surrounded by fog and rough seas. Steller sea lions are large, wary animals easily disrupted by human presence; thus, immobilization drugs are needed to capture and handle all but the newborn pups. Steller sea lions are often found perched on sheer ledge or cliffs just seconds away from a return to the sea, frustrating researchers. All of these attributes make research on these animals extremely difficult and costly.

Congressional appropriations pro-

vide the necessary financial backing for Steller sea lion research programs today; NMFS and ADFG, working with other state and university researchers, have undertaken a substantial research program over the last 5 years. Since relatively little research had been conducted on Steller sea lions in Alaska prior to the decline, there is no historical baseline to aid interpretation of current research results. To overcome this obstacle, much of today's research seeks to compare observations of Steller sea lions within the declining population with observations from stable parts of the geographic range. Research projects include: (a) health and physiology studies, (b) foraging ecology studies using satellite-linked time depth recorders (SLTDR) to define foraging habitats and habits, stable isotope analyses and scat collections to identify prey, and surveys to assess prey availability, (c) demographic and behavioral studies on rookeries and haulouts, (d) mark-recapture studies to assess animal movements and survival, (e) genetics studies, and (f) population monitoring.

A thorough understanding of research findings can be attained only by reviewing recent publications (see NMFS 1995 or Strick 1994) but some interesting findings are worth noting. In general, most animals that have been handled in recent years appear healthy. Newborn pups on rookeries within the area of the decline appear as healthy as pups in stable areas, and may be larger. Although some Steller sea lions take

long feeding trips during the winter, most observed feeding trips are relatively close to shore; in general, based on SLTDR observations, juveniles appear to be more restricted in foraging range - they do not dive as deep to attain food as adults. Food habits data indicate that some changes in diet may have occurred during the decline. Behavioral observations indicate that female sea lions with pups on a declining rookery in the Gulf of Alaska spent significantly more time at sea foraging than did sea lions on a stable rookery in Southeast Alaska - perhaps indicating differences in food availability. Demographic studies suggest that juvenile survival has been greatly reduced during the last 20 years, and that this may be a significant factor in the population decline. Genetic and marking/tagging studies and demographic analyses indicate that at least two distinct populations can be defined, and support separate management under the ESA of the declining and stable U.S. populations (Loughlin 1994).

### Prospects for the Future

Prospects for humans involved with Steller sea lion research and management are somewhat easy to predict. NMFS will make a determination this year on whether or not Steller sea lions should be reclassified as an endangered species; it is likely that NMFS will propose that sea lions be listed as distinct population segments under the ESA rather than range-wide. An evaluation of the existing management program and revision of regulations, as needed, is planned for 1995. A broader approach to management that includes protection for haulouts in addition to rookeries, and that considers the effects of state-managed fisheries and subsistence harvests as well as Federal fisheries, is needed. The new Congress and the upcoming reauthorization of the ESA may affect these management plans. Researchers are expected to deemphasize population monitoring, which has consumed much of the available research funds, and place a greater focus on research into the health and foraging ecology of juvenile sea lions.

Speculating on prospects for the

future of Steller sea lions is a more formidable task. Genetic evidence indicates that the current decline is a novel event in the Steller sea lion's evolutionary history, and not part of a normal population cycle for this species. Population modelling indicates that if the current trend continues, Steller sea lions in the Gulf of Alaska, Bering Sea, and Aleutian Islands will be rare in 20 years, and could be extinct within 100 years (Merrick and York

1994). However, the usefulness of population models is limited by the lack of understanding of causal relations. All that is certain is that the longer the decline continues, the greater the risk that this population will not be able to recover. Despite the best efforts of scientists and managers who want to see the Steller sea lion population recover, our most significant role may be that of concerned spectators. In the meantime, we strive to do the obvious - protect breeding and feeding habitats, reduce disturbance and mortality, and search for causes and solutions.

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Photo by Anne Raup, Anchorage Daily News

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<sup>1</sup> Although NMFS won the lawsuit, Greenpeace's external pressure was a key ingredient to NMFS's establishment of unpopular fishery restrictions.

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# The Northern Forest: Conservation Biology, Public Policy, and a Failure of Regional Planning

by

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Stephen C. Trombulak

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On 23 September 1994, the gavel came down for the last time on the deliberations of the Northern Forest Lands Council. The work of the Council, which began in 1990 and ended four years and \$4.5 million later, had the potential to influence the maintenance and restoration of biological integrity in a 26 million acre region of forested land in northern Maine, New Hampshire, and Vermont, and the Adirondack Park and Tug Hill regions of New York. Yet compared to other regional conservation issues, such as that of old-growth forests in the Pacific Northwest or the tundra of the Arctic National Wildlife Refuge, little awareness of the Northern Forest or the policy debate associated with it existed outside of the region. Indeed, even within the Northern Forest there was little awareness or understanding of the issue.

Yet the story of the Northern Forest policy process provides important lessons on the future of conservation in North America. My purpose here is to describe briefly the history of the Northern Forest policy debate, identify why it is of importance with respect to the preservation and restoration of threatened and endangered species, and explore why the process, with respect to conservation, was a complete and utter failure.

Perhaps the single most important natural aspect of the Northern Forest is the forests themselves. Two basic types of forests dominate the region: the spruce-fir forests of northern Maine and the northern hardwood (or maple-beech-birch) forests of New Hampshire, Vermont, and New York (Trombulak, 1994).

In many places, spruce, fir, and northern hardwood species grow alongside one another and change along elevational gradients, indicating that these forest types are not unvarying units but general categories that commonly intergrade with one another.

But the Northern Forest is, in essence, a political region with little ecological coherence. The boundaries of the Northern Forest were drawn to include townships in these four states where forest-products industries contribute a large fraction of the local economy and to exclude townships with substantial amounts of federal public land. The spruce-fir and northern hardwood forests extend southward through the Green and White Mountains of Vermont and New Hampshire, and are part of the Laurentian Mixed Forest Province of the Bailey-Kuchler system that stretches from Maine to Minnesota, yet these areas were not included.

## Ecological Conditions in the Northern Forest

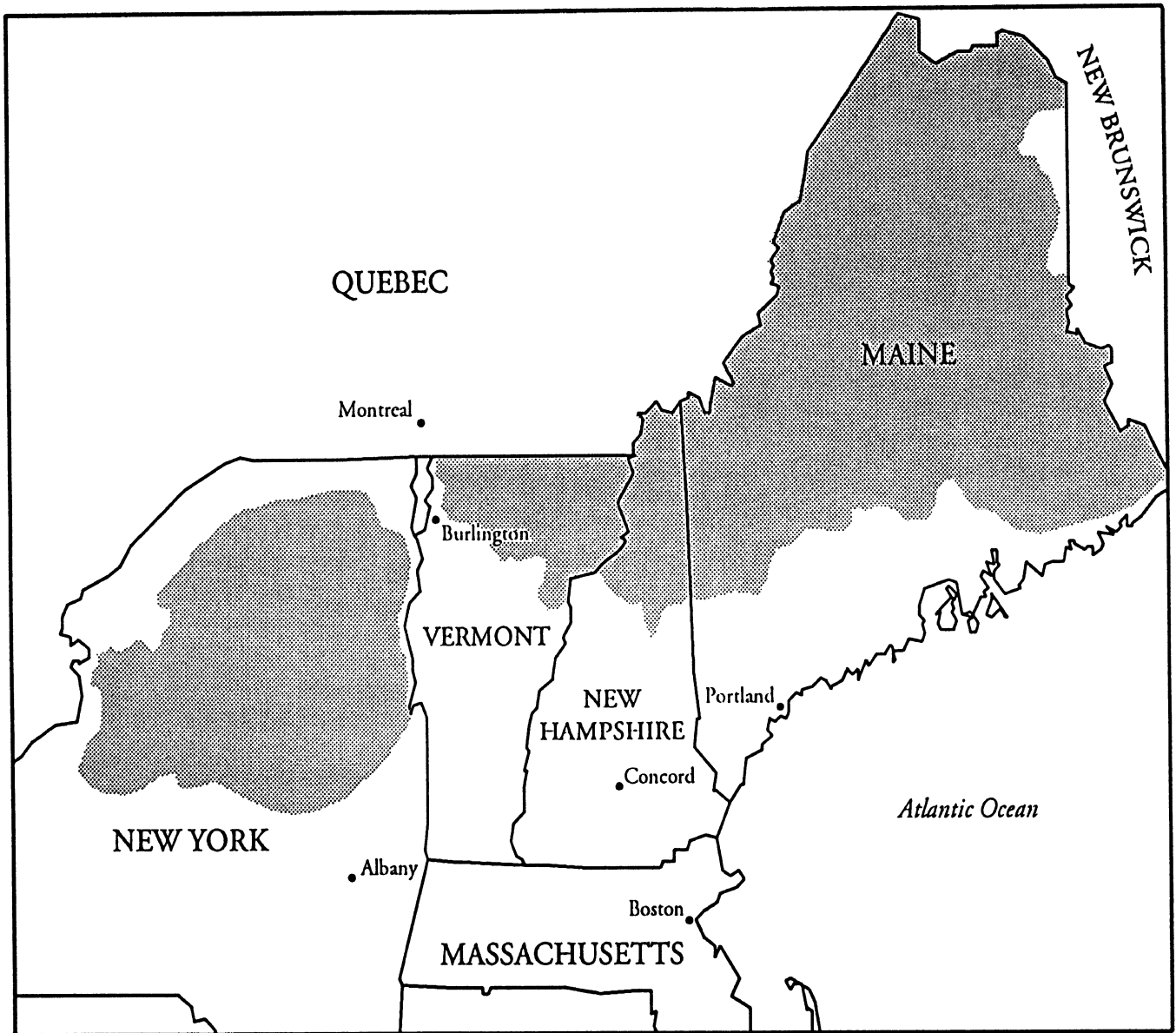
The ecological health of this region is extremely poor. It would miss the point entirely to talk only about the threats to biological diversity here. Conditions are far worse than simply facing threats. A threat is what Pearl Harbor faced on 6 December 1941. Conditions in the Northern Forest are more like Pearl Harbor on 7 December: devastation, with tremendous challenges ahead. A brief summary of ecological conditions in the Northern Forest region (compiled from numerous sources in Trombulak [in press]) is sobering.

The percentage of the native species in each well-inventoried taxa that is listed as rare, threatened, or endangered by each state is staggering. Accurate data are not available for the Northern Forest townships alone, but statewide the percentages of taxa listed by each state's Natural Heritage Programs are high: ferns and allies (33%, 25%, and 43% for Maine, New Hampshire, and Vermont, respectively), conifers (6%, 19%, and 13%), flowering plants (25%, 28%, and 36%), reptiles and amphibians (23%, 3%, and 46%), birds (12%, 5%, and 17%), and mammals (25%, 5%, and 28%). The number of known or suspected extinctions is also quite high. In Vermont, 70 vascular plants (4.9% of the known native flora) are known only from historical records, with similar numbers for New Hampshire (53 of 1397 native species, or 3.8%) and Maine (93 of 1449, or 6.4%).

Over 27% of all the vascular plants in northern New England are exotics, introduced primarily from Europe and Asia. A smaller percentage of animals are introduced, but include such notable species as zebra mussel, gypsy moth, pear thrips, and sea lamprey.

With respect to forest cover, the amount of forest has almost returned to levels that existed prior to European settlement (about 95%). Yet the age and physical structure of these forests are far from natural. Only about 0.5% of the native forest remains, scattered in fewer than 100 stands throughout the 26 million acres. Of the 127,000 acres of native forest that remain, over 60% of it (79,000 acres) is found in Adirondack Park. In the Northern Forest portion of





Map showing the area (shaded) of the Northern Forest. (From Trombulak, 1994)

northern New England, only 0.003% of the forest is native. The ecological consequences of this loss will never be completely known because so little forest is left and no complete inventories of taxa were done prior to deforestation. But several species of beetles and lichens are known to be primarily associated with old-growth forests in this region, leading to the obvious conclusion that the massive loss of these forests must have resulted in numerous undocumented extinctions.

The remaining stands of old growth are also not representative of ecosystems across their natural range of variation. In Maine, 66% of old-growth forests (by area) are balsam fir, which comprised only 6.5% of forest land there in 1982. The age and physical structure of

the regenerating forest is still much altered from that of the original forest. In the most recent forest surveys, the percentage of trees that were greater than 29 inches dbh was at most 1.5% (in 1983), which is still far smaller than the size of trees in the native forest.

The debate over the future of this region clearly has a profound influence on biological integrity, because so little of the native forests remain and so many species are extinct or at risk.

#### The Northern Forest Policy Process

Yet, despite the poor and declining condition of ecological health in northern New England, the Northern Forest originally became a public policy issue

due solely to economics, not ecology. The region has long depended economically on timber production, despite the diverse patterns of land ownership throughout the region. For example, 7.7 million acres in Maine (36% of the state's total area) is owned by large timber companies, and most of the townships in the northern part of the state have no permanent residents. The Adirondack Park region, on the other hand, is the largest single park in the continental U.S. (2.8 million acres), with over 20% of it designated as wilderness. Ownership in New Hampshire and Vermont tends more toward small, non-industrial private parcels. In all four states, however, the forest-products industry contributes a large portion of the regional economy.

The sale of land, sometimes extremely large parcels, is a normal part of the forest-products industry. Such sales usually occur between different forest-products companies, and therefore rarely garner attention. In 1982, a land sale occurred that permanently changed this (Reidel, 1994). Sir James Goldsmith, a British-French entrepreneur, purchased Diamond International Corporation in a leveraged buyout for about \$700 million. This purchase included over 1.5 million acres of forest land across northern New England and New York. To generate a profit on his investment, Goldsmith sold the paper mill assets to another timber company (at a price equivalent to his original total purchase) and the land to a European telecommunications firm, which later sold it in parcels to various real estate development firms. In New Hampshire, concern spread that about 90,000 acres of the former Diamond International land would be developed (e.g., second-home development, waterfront recreation) and taken out of timber production. A coalition of the U.S. Forest Service, the state of New Hampshire, and the Society for the Protection of New Hampshire Forests developed a scheme to purchase over 46,000 acres in northern New Hampshire (the Nash Stream Tract north of the White Mountain National Forest plus some inholdings in the National Forest itself) for \$12.75 million in order to prevent this from happening.

The Nash Stream Tract acquisition is simultaneously an example of the best and the worst of public conservation policy. It was exemplary in that a public-private partnership could be formed so quickly and effectively to keep a significant forested ecosystem intact. It was a shame that this partnership could only form to protect this ecosystem in the face of a crisis, and be forced to pay an amount far above what it had been acquired for only a short time before.

Much of the remaining land originally owned by Diamond International eventually transferred to other forest-product companies, state ownership, or The Nature Conservancy because the re-

cession of the late 1980's drove many of the real estate development firms that were involved into bankruptcy. Yet, the potential for land conversion had been made clear. Concern spread that the leveraged buy-out frenzy of the 1980's would spread and increase the amount of land taken out of timber production. Based on the belief that the existing timber industries had "served the region well" and should be reinforced, Congress funded a two-year study of conditions in this "Northern

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**"One aspect of the Northern Forest Lands Council that was a great source of pride at the start was the idea that it would conduct its business as a model of consensus building and participatory democracy."**

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Forest" region, especially as they related to the maintenance of an economy based on timber production.

Because of regional concerns about the role of the federal government in the region and protection of private property rights, two parallel, independent, but inter-related bodies were formed. The first was the Governors' Task Force (GTF), a 12-person study commission. The governors of Maine, New Hampshire, Vermont, and New York each appointed three people to the commission, with representation in each state's contingent from the timber industry, environmental community, and state government. The second body was the Northern Forest Lands Study (NFLS), a three-person research team from the U.S. Forest Service. The GTF acted as a board of directors for the NFLS to help guide the direction of the NFLS' research.

The first thing that the GTF/NFLS did was to define "The Northern Forest" as the northern portion of Maine, New Hampshire, and Vermont, and the Adirondack and Tug Hill portions of New York. As stated above, the specific boundary was based on political units, including those townships where timber production was an important

part of the local economy and excluding regions with substantial federal ownership (all of the Green Mountain and most of the White Mountain National Forests).

The relationship between the two bodies was occasionally strained, but in April 1990 a combined report was issued (Harper et al., 1990) which identified the greatest threat to the future of the Northern Forest as changes in land ownership toward residential and recreational development driven by escalating

land values and economic pressures on forest landowners, especially inequitable tax policies. They also noted the potential for long-term impacts on biodiversity and water quality. The GTF/NFLS ended by recommending that their work, representing a state and federal partnership, be continued to investigate in more detail strategies to solve

these, and other, problems that threatened the Northern Forest.

It is important to note that up to this point I have said little about concern within the policy process over the ecological health of the region. Although during the GTF/NFLS process the regional environmental activist community and some members of the GTF worked to place conservation issues on the agenda, they were effectively blocked by the timber industry, which viewed attention to conservation at anything other than the most superficial level as a threat to timber production. No specific policy recommendations related to conservation were proposed by the GTF/NFLS. Under threat of veto by or withdrawal of the Maine contingent, all discussion of public land acquisition or establishing areas with region-wide land use restrictions (as exemplified by the Adirondack Park) was blocked. Sadly, the regional academic conservation community played no role in the GTF/NFLS process despite the ecological significance of the forested ecosystems in this region and the long history of stress placed on its biological integrity.

## The Northern Forest Lands Council

Despite increasing hostility from the regional property rights movement and a lack of clear Congressional authorization, the Northern Forest Lands Council (NFLC) was formed in 1990 directly from the GTF/NFLS with the goal of reinforcing the timber-products industry. The 17-member Council (now including one representative from each state representing local interests and one representative from the U.S. Forest Service) adopted the following as its mission statement:

*The mission of the Northern Forest Lands Council is to reinforce the traditional patterns of land ownership and uses of large forest areas in the Northern Forest of Maine, New Hampshire, New York,*

*and Vermont, which have characterized these lands for decades. This mission is to be achieved by:*

*(a) Enhancing the quality of life for local residents through the promotion of economic stability for the people and communities of the area and through the maintenance of large forest areas;*

*(b) Encouraging the production of a sustainable yield of forest products; and,*

*(c) Protecting recreational, wild-life, scenic, and wildland resources.*

Thus began the most recent phase of investigations concerning the future of this region. The Council organized its work around a number of subcommittees, originally focusing solely on land conversion and tax policies, and later expanding to include recreation and tourism, conservation, and local forest-based communities. Each subcommittee was

charged with developing findings to be used in making final recommendations to Congress. The Council specifically restricted itself from taking any administrative actions and gave itself a 48-month life span.

One aspect of the NFLC that was a great source of pride at its start was the idea that it would conduct its business as a model of consensus building and participatory democracy. In a region of the U.S. strongly characterized by independence and dislike of federal government, the Council wanted to signal that its work would not represent further intrusive bureaucracy, but rather an opportunity for local communities to play a significant role in shaping their own futures.

To further advance the cause of regional conservation and to provide a counter to the bias of the Council toward economic issues, a group of 24 non-



Photograph by Steve Gorman

governmental conservation organizations in the region formed a loose coalition as the Northern Forest Alliance. The Alliance spanned a wide range of political philosophies, ranging from the conservative (e.g., The Maine Audubon Society) to the progressive (e.g., RESTORE: The North Woods). Despite their own difficulties in setting priorities and common goals, the Alliance was successful in eventually getting the NFLC to consider the ecological dimension of the future of the region.

In 1992, the NFLC created the Biological Resources Diversity Subcommittee (later renamed the Biological Diversity Subcommittee), which eventually became a lightning rod for much of the Council's remaining work. With respect to the science of biological conservation, the only thing this subcommittee actually did was to host a forum in late 1992 to provide the Council with some specific information. Four scientists were invited to provide testimony: Malcolm L. Hunter, Jr. (University of Maine, Orono), Sharon Haines (International Paper Co., Georgia), Rainer Brocke (State University of New York at Syracuse), and me (Middlebury College, Vermont). We were asked to prepare in advance answers to four questions:

1. How would you assess the current status of the diversity of biological resources in the Northern Forest region?
2. If current land use patterns and trends continue in the Northern Forest, how will the diversity of biological resources be affected?
3. What is the single-most useful recommendation the NFLC could make to enhance biological resource diversity?
4. What is the single worst thing the NFLC could do, or fail to do?

Our answers were to be kept to a length that would allow us to present them orally in 15 minutes. The Council and the audience then asked us questions, but at no time were we invited to address each other, clarify points that may have seemed contradictory, or develop a broader perspective on the issues.

Despite the near uselessness of the format, three broad areas of agreement emerged from the four presentations: (a) the concept of biodiversity could be defined roughly as all levels of organization of life and its processes and included more than just high-profile indicator species, (b) the issue of biological conservation was vitally important to the Council's overall mission, and (c) the protection of biological diversity in the Northern Forest would require a system of ecological reserves designed to protect ecosystems as well as species.

In response to this final point, the Subcommittee asked two of the panel members, Mac Hunter and Sharon Haines, to prepare a white paper on the general subject of ecological reserves. Subsequently known as the Hunter/Haines paper (Hunter and Haines, 1993), their work explored in only the most general terms concepts discussed by conservation biologists for years with regard to coarse-grain conservation—size of reserves, representation, and connectivity. Yet, the reaction by some members of the public to the Hunter/Haines paper is illustrative of the challenges faced in placing conservation on the agenda:

*"It sounds like a scheme by two mad scientists to force their radical ideas on the landowners of the Northern Forest Lands and eventually the whole world. ... [Wildlife biologists] had to displace the foresters from the land before they could have their own empire. Now, with such new words as biodiversity and ecosystems they have convinced the gullible public that they can lead us to salvation. They have become the cult leaders of the environmental movement". (Huntress, 1993).*

*"I can only express my tremendous displeasure with this report and consider it a reason to leave the Northern Forest Lands as they are now, with no outside intervention. Economics and technology will take care of the region. The lunacy that this report [the Hunter/Haines paper] indicates has no place in the Northern Forests." (Joslin, 1993).*

The Biological Resources Diver-

sity Subcommittee did little following the Hunter/Haines paper other than contract for an independent study on the role private landowners could play in conservation. Despite the focus of the Subcommittee, no contract was ever made for an assessment of biological diversity in the region or trajectories of ecological health for any parameter. Of the 19 "resource inventories" conducted or supported by the Council, only three (land habitat/cover, large blocks of forest land, and wetlands regulated by states) had any direct relevance to the status of biological diversity. Indeed, to my knowledge the Subcommittee never even looked at a list of the threatened or endangered species in any of the four states.

In October 1993, the Council released a report on the findings of each subcommittee and a list of options for recommendations that could be made in the final report. Although the findings of most subcommittees were detailed and exhaustive, the findings of the Biological Diversity Subcommittee were vague and completely devoid of detail. The tenor of its 16 findings are exemplified by the following highlights: (a) biological diversity is an important issue, (b) any action to conserve biological resources is likely to have economic and social effects, (c) the impacts of forest management activities on biological diversity can either be positive or negative, (d) the forest-products industry can continue to be compatible with maintaining diversity of biological resources, and (e) information on forest management techniques to maintain diversity is difficult to obtain.

Following a period of public comment, the Council released in March 1994 the draft of its final report, which included 33 potential recommendations to Congress. Only one recommendation, #13, related directly to conservation. Briefly, the Council recommended that each state should (a) assess the status of biodiversity and its level of protection on public land and on private conservation lands by voluntary landowner agreement, (b) provide landowners with the information necessary to undertake voluntary conservation measures, (c) provide financial incentives to



Photo by Steve Gorman

landowners for conservation, and (d) create ecological reserves only as a limited component of a public land acquisition program after rigorous scientific justification and external peer review (NFLC, 1994). The message was clear: conservation would occur only to the extent that it could fit into existing socioeconomic traditions. The need for new conservation strategies was dismissed outright.

During the spring of 1994 the Council scheduled a series of "listening sessions" around the region and in a few outlying areas (e.g., Boston, New York City). An analysis of the public comments made at these sessions is enlightening (Vermont Natural Resources Council, 1994). Over 2000 people attended one or more sessions, and of these 741 gave testimony. Despite the fact that the Council's report contained 33 separate recommendations, 86% of all comments related directly to Recommendation 13. Five-hundred-and-sev-

enty people called for the Council to pay more attention to the ecological needs of the region and make stronger recommendations for ecological reserves. Only 63 people felt the language of the recommendation was too strong (Northern Forest Alliance, 1994).

Armed with the opinions of the citizens of the region, the Council then developed its final set of recommendations, released in late September 1994 at the time of its disbanding. Despite the overwhelming public support for a more progressive conservation agenda demonstrated during the public listening sessions, the final recommendation for the conservation of biological diversity was little changed from that of the draft.

Three weeks later, 900,000 acres in Maine were acquired from the S.D. Warren Paper Company in a junk-bond financed buy-out by a consortium of companies, primarily from South Africa (St. Pierre, 1994), ending the public policy process of the Northern Forest as it had

begun. In between were years of willful ignorance of ecological conditions in the region, calls for more study, disregard for public participation, and the wholesale bartering of forest ecosystems.

### What Went Right

A few things are worth noting as important positive signs for the future. First, by the time the Council disbanded, a considerable segment of the public that was involved in the process was demanding that the best available conservation science be used to help develop recommendations for the future of the Northern Forest. Rallied by a scientifically-literate activist community, the Council heard from the general public of the importance of maintaining viable populations, reintroducing top-level carnivores, protecting representatives of all native ecosystem types in ecological reserves, and planning for connectivity.

This represents a major transition for the environmental community, which in decades past was more animated by recreational rather than scientific concerns.

Second, the Council itself contributed to the environmental policy process by making, despite tremendous obstacles, an effort towards regional cooperation.

### What Went Wrong

But, by and large, I feel that the story

away from consideration of small populations of specific species at risk to ecosystem management efforts. What just concluded in the Northern Forest process could have been a model of how such regional efforts could be implemented to meet the needs of all the people and provide for conservation as well, but that opportunity was lost.

Even if the failure to achieve significant conservation gains is ignored, the entire economic premise of the

Second, despite the money available to the Council and the almost unprecedented access to the resources of state and federal agencies, the Council made no request for any information on the status of any species or ecosystem in the region. All information placed into the public record concerning the ecological health of the region was done by people from outside the Council. This virtually guaranteed that any information presented to the Council by mem-



Photo by Steve Gorman

of the Northern Forest policy process was not one of success. This is unfortunate; the ecological problems in the Northern Forest are real and will only get worse with continued denial. Indeed, our ability to ever resolve some of the conservation issues decreases with time. Furthermore, I think that such issues will increasingly be cast in a regional context. Efforts to define the Greater Yellowstone Ecosystem and the Pacific Northwest are examples of how conservation has moved

Council's work ("to maintain traditional patterns of land ownership that have served the region well") was questionable. But we can gain some insight by looking at its failures specifically with respect to conservation. First, the relevance of ecological health to the well-being of the region was acknowledged too late in the process, and even then it was forced to fit into a predetermined socioeconomic plan, whether or not the plan was compatible with conservation.

bers of the public could be ignored in the interest of balancing different viewpoints and "achieving consensus."

Third, the regional academic community did not become involved in the process. Both the Council and the community itself are to blame for this. Why did the Council not contract for work on ecological assessments to regional conservation biologists the way it contracted out economic studies? Why did the Council not solicit a broader range of

scientific opinion on the need for an ecological reserve system in the region? On the other hand, why did the academic community wait (in vain) to be invited to participate? Given the regional context and pressing conservation problems, the Northern Forest policy process was fertile ground for the application of conservation theory, the development of regional biodiversity inventories, and the assessment of impacts of different land use practices. But by and large this did not happen.

Fourth, the potential contributions of conservation biology to evaluating the future of the region was held to different standards than other disciplines. Only for the conservation issues were there requirements that precise definitions be obtained before serious attention could be given, that standardized ecosystem characterization protocols be enacted in all four states, and that "the present be considered the baseline against which all decisions are made" (Northern Forest Lands Council, 1994). In contrast, the issues of tax reform and the forest-based economy were not held to the same standards, and numerous recommendations were made without agreement on terms and supporting data.

Fifth, the process was marred by intimidation and threats from a radical fringe of property rights advocates. In 1991, a meeting of the NFLC in Ray Brook, New York had to be canceled because the safety of the Council members could not be guaranteed in the face of threats of violence. At the public listening session in May 1994 in Glens Falls, New York, a member of one of the Adirondack property rights groups flung her copy of the draft recommendations, a bound book, at one of the Council members. In response to an academic conference on the Northern Forest organized by students at the Vermont Law School, a property rights advocate in Vermont (and independent candidate for governor) published in the local newspaper the home telephone number of the conference organizer and encouraged people to call and demand that the conference be canceled. In short, a segment of the participating public that loudly

lobbies for private property rights, and is loosely affiliated with the broader Wise Use movement, was very quick throughout the entire process to advance its views through aggressive intimidation and to attempt the suppression of others who sought to express their views and participate fully in the process.

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**"We must be aware of the danger ... of legitimizing 'business as usual' under a veneer of 'consensus building' and 'participatory democracy.'"**

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Finally, the actual process carried out by the NFLC was, in fact, not characterized by consensus and democracy to the extent claimed by the Council. From the very beginning, some members of the GTF admitted that they were participating solely to make sure that the acquisition of public lands did not occur, regardless of its merits (Reidel, 1994). By insisting on unanimous agreement as a standard for consensus, the process was transformed into a tyranny of the minority, guaranteeing that nothing substantive was produced. In response to the draft recommendations, the public overwhelmingly called for increased protection of biological diversity, the development of ecological reserves, and greater attention to environmental health in the region. Rather than responding to the voiced will of the people, however, the only change made in the final recommendations with respect to biological diversity was to delete a few lines of text requiring peer review and rigorous scientific justification for the establishment of ecological reserves. Added to the final recommendation was the observation that "given current scientific knowledge, and economic, social, and political constraints, the Council envisions that such a system [of ecological reserves] will be limited."

### **Lessons For The Future**

I believe that the protection of rare, threatened, and endangered species everywhere will in the future involve a

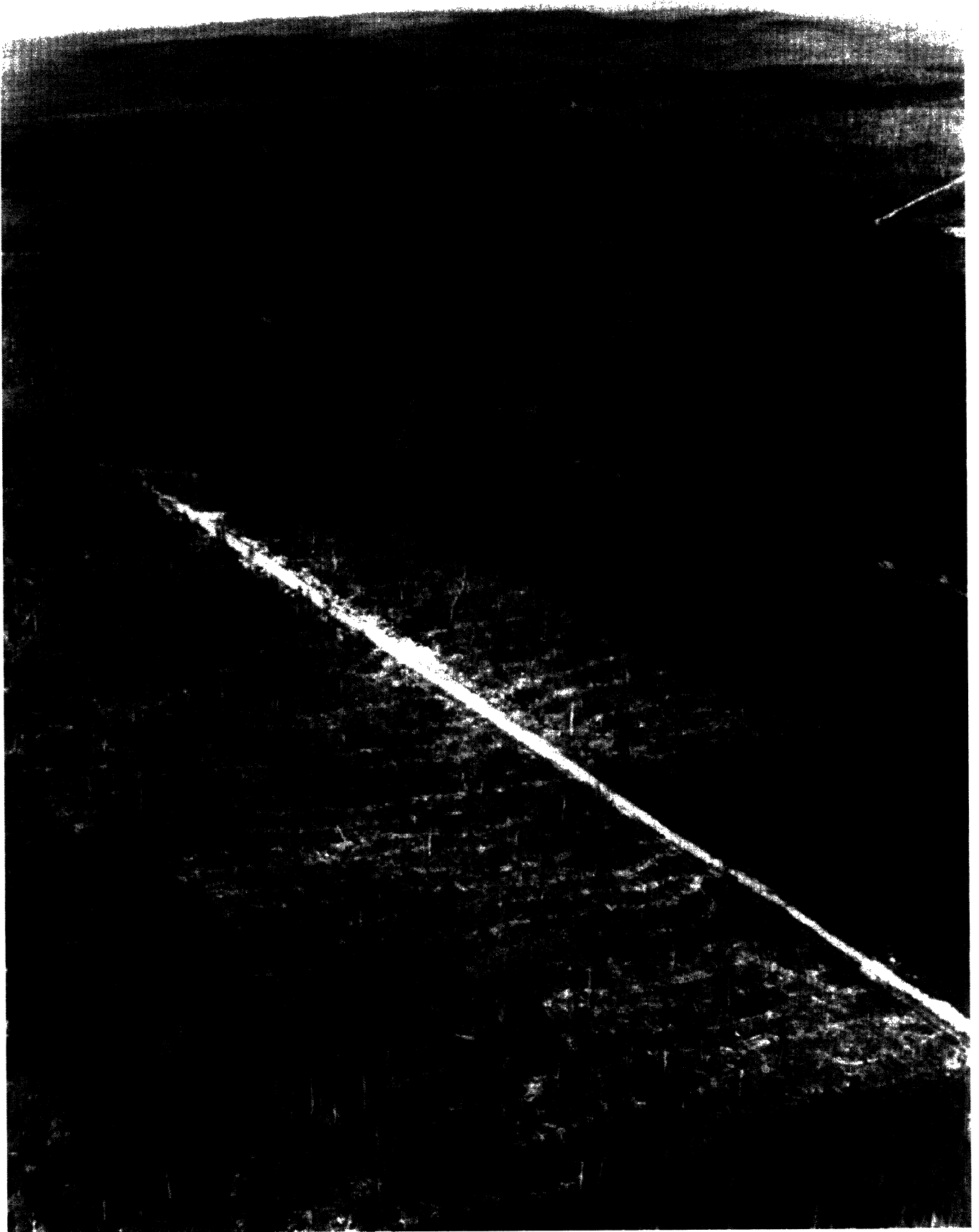
greater degree of attention to landscape-scale or course-filter approaches to conservation that include unconstrained discussions and honest cooperation among all public and private sectors. The failure of such an approach in the northeastern U.S. does not speak well, however, of our ability to take such an approach effectively. What does this failure tell us of what we should do differently next time?

Clearly, the conservation biology community needs to become active at the start of any regional planning effort without

waiting to be invited to take a seat at the table. For a number of reasons, state and federal employees in conservation-related agencies may be constrained against playing this role. This places the responsibility with the academic conservation community to insure that the ecological dimensions of regional planning efforts are given due attention, that the best available science be applied to conservation issues, that the best available data be used and better data be sought, and that a scientific perspective is applied to all dimensions of the issue, including economic and social.

In some ways this runs counter to what many of us are taught about the proper behavior of scientists. On numerous occasions throughout the NFLC process it was pointed out to me that scientists ought to be objective and not become involved in the subjective "details" of application of information to policy. On one occasion it was even suggested that conservation biology was not a true science because the mission statement of the Society for Conservation Biology stated it was a "mission-oriented science" and therefore could not claim objectivity (Coffman, 1993).

This false criticism unnecessarily inhibits many conservation biologists from becoming involved in policy issues as active participants. We do not give up our humanity nor our citizenship when we adopt this profession. It is our responsibility to pursue science as objectively as possible, but at some point in the policy process scientific informa-



Photograph by Steven Gorman



tion must be analyzed with respect to the issue at hand. Who better to be involved in that analysis than the scientists involved in collecting the data, who understand its strengths and limitations?

Another lesson is that increased attention must be given to conducting ecological assessments of specific regions. Conservation concerns were successfully ignored through most of the NFLC process because actual data on ecological conditions in the region were not readily available. The gap analysis and EMAP programs are important and needed, but their completion is years away. Much can be done that would make useful data available before the agendas of other regional planning efforts are set. By the time data sets were developed for the northeast, it was already too late to change the direction of the NFLC's work. As a research community we need to pay closer attention to opportunities for regional monitoring and inventory efforts and the establishment of long-term baseline studies. The work of the Long-Term Ecological Research network is critical, but must expand to include numerous replicate monitoring sites within ecosystems and geographical regions.

Finally, as citizens who are well-informed about the importance of conservation for our country's future, we must be aware of the danger to regional planning initiatives of legitimizing "business as usual" under a veneer of "consensus building" and "participatory democracy." We must insist as participants of the process that those who practice violence or intimidation be sanctioned. We must insist that the participatory process be conducted in such a way as to allow the expression of all views and, importantly, that views be given weight commensurate with the data provided to support the position. And we must hold policy makers, whether they are elected or not, responsible for following a democratic process.

We all know that the protection of rare, threatened, and endangered species will not happen on its own. We need to become increasingly aware that such protection will require our attention to the policy process as well as to the science itself.

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# Empowering Species

by

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Charles C. Mann and Mark L. Plummer

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*The following article was adapted by the authors from their article which first appeared in The Atlantic Monthly of February 1995. Used with permission.*

Many of the battles to come, as a Democratic Administration faces a Republican Congress, will be the sort of meanspirited partisan scuffles that Americans love to deride. But sometimes the smoke and dust of the fray will conceal a matter of philosophy - as in the case of the coming reauthorization of the Endangered Species Act.

The inevitable debate on the reauthorization of the ESA will take place this year, perhaps within a few months. It will be bloody, as they say inside the Beltway. At issue will be the nation's biological heritage, more or less, and a vision of its economic future. Conflict will be engaged by the usual operatives: lobbyists representing some of the nation's most powerful interest groups.

Opponents call for narrowing the scope of the law, claiming that society is spending billions to protect the Penland beard-tongue, the fat pocketbook mussel, the giant kangaroo rat, and a cavalcade of other creatures with absurd sounding names. The ESA, in their view, threatens to usurp so much private property and capsizes so many jobs that it may wreck our very economy. Proponents declare the law inadequately enforced and demand that its protections be extended to more species at a faster rate; otherwise, they claim, we risk trashing our biological life-support system. Weaken or fortify? - that is the tenor of the debate. One question is rarely addressed: Can the law be more responsive to the concerns of both sides?

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The Endangered Species Act orders the U.S. Fish and Wildlife Service to protect species recognized as endangered, without regard to cost. The goal is to banish extinction from the United States. Unfortunately, the present system has failed utterly to do this. Species are going extinct anyway, and the threats are multiplying. For every species that Fish and Wildlife has successfully removed from the endangered list in the past two decades, it has added more than *one hundred* others.

This outcome would have surprised the members of Congress who passed the law, in 1973. Implicit in the debate over the act was the assumption, still held by many conservationists today, that endangered species could be saved without sacrifice: if development affects a species here, we can just move the development or the species someplace else. Since then it has become clear that the reasons species become endangered are not always trivial, and that saving them is not so simple.

Anyone who has walked in the western parts of Albany, New York, can see the problem. A hundred years ago the area hosted one of the world's largest populations of the Karner Blue Butterfly, a lovely little bug that appeared on the endangered list at the end of 1992. The former haunts of the butterfly have been taken over by an interstate highway, a power substation, a campus of the State University of New York, and several hundred middle-class homes. In other words, the butterfly was endangered by the satisfaction of ordinary human desires to drive around, switch on lamps at night, learn about interesting things, and live in a nice home.

Because human interests cannot be ignored, not all species can be saved. Yet the current system demands the unattainable: all species must be saved, and human interests must be ignored.

Amplifying this dissonance has been the unwillingness in Congress to award the Fish and Wildlife Service more than a paltry budget to enforce and administer the law. As a result, the agency has been driven to impose conservation tasks on those private-property owners who are unlucky enough to have land that sustains endangered species. To be safe from possible prosecution, they must verify that using their property will cause the creatures no harm. Endangered species thus become a liability that encourages otherwise responsible citizens to call in the bulldozers at the first glimpse of an endangered bird or lizard.

Both sides of the debate recognize these flaws, but they disagree on how to remedy them. Supporters of the law cling to its impossible goal, calling for increased budgets and stricter enforcement. This would turn Fish and Wildlife Service biologists into ecological mandarins, making choices for entire regions which must favor the interests of other species and not people. Such overbearing regulation would increase the incentives for landowners to destroy pristine land, with predictably disastrous environmental consequences.

Not that opponents have a better answer. Many call for compensating landowners for any decrease in the value of their property brought on by species protection. But this amounts to little more than replacing ecological mandarins with economic mandarins, whose decisions would be equally predictable and equally disastrous.

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What will it take to do a better job of saving our natural heritage? The foremost change must be to recognize that our values are manifold. If we valued only trees and streams, we wouldn't hesitate to save them, no matter what the

cost. If we wanted only cement and steel, any part of nature beyond the minimum necessary to sustain life would become expendable. If the past is any guide, the debaters in Washington will blindly favor one side over the other. Progress will be possible only if the unrealistic demands of the Endangered Species Act are scaled back and supplemented with a way of satisfying some of the needs of affected landowners.

The demands of the current law should not be eliminated entirely, though. Even if a species fails a strict cost-benefit test, few people would support its extinction without pausing to reflect. Protecting species is a task that deserves a place in the political life of our country, alongside other basic values such as protecting health, maintaining the nation's defense, and fostering education.

In other words, a balance must be struck. Part of that balance should be for landowners to concede that our ecological inheritance is important enough to justify some regulation of their land. Another, equally important part of the balance should be for conservationists to concede that development plans that threaten species are reflections of the human desire to have stores, roads, schools, homes, and the like. The two concessions point in the same direction: neither species nor developers should win all the time. The question is when and where each should prevail.

Moneyed interests, of course, will always threaten species and other environmental assets that cannot pay their way. The most appropriate counterweight is not to outlaw human nature but to award some money to environmental protection. Merely throwing money at the current system, however, will only exacerbate the problems inherent in the Endangered Species Act.

One solution would be to create an Endangered Species Trust Fund, to promote conservation in ways more compatible with American values and culture. The fund could underwrite a variety of programs, from ecological research to educational advertising to conservation assistance to outright land purchase. It could encourage landowners to share their land with species in trouble. The state of Wisconsin, for example, already

has such a program, which covers seven species on the federal endangered list. Landowners agree to a nonbinding protection plan, and are rewarded with a picture of the species, a certificate of appreciation, ongoing species-management help, and, most important, the belief that they are voluntarily doing the right thing. According to the state, most landowners happily go along, although the program is unlikely to deter big development plans.

Not all species can be protected by voluntary programs, of course, and where necessary the trust fund could help subsidize conservation efforts by landowners. One possible model is a program sponsored by the Defenders of Wildlife, a Washington-based conservation group, which offers a \$5,000 "bounty" to each landowner who has an established wolf den on his or her property. The trust could also promote commercial practices that are environmentally friendlier but costlier than current practices. As the Soil Conservation Service does for farmers and soil conservation, a Biological Conservation Service, funded by the trust, could encourage foresters, ranchers, and miners to modify their activities, thus reducing - though not eliminating - harm to endangered species.

In critical cases the trust fund would have the tools to restrict land use greatly, albeit in a noncoercive manner. It could take a lesson from the Nature Conservancy, which protects some biologically valuable land by paying for a conservation easement - a legal contract that forbids developing a piece of property but allows the landowner to earn income through ecologically benign activities, such as certain types of agriculture. As a final resort, in places where almost any human activity threatens the other inhabitants, the trust fund could buy land and protect it as a biological preserve.

Such an effort would be expensive, but it could go a long way toward removing our natural heritage from the mire of partisan bickering. Indeed, the idea of a trust fund has quietly attracted interest from environmental organizations and from advocates of property rights. Combined with a scaled-back Endangered Species Act, the fund could

help the nation provide environmental protection with less social conflict. Isn't that what it means to make the law responsive to the people and the causes it serves?

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### Science Discovery Camp

The Keystone Science School, in Keystone, Colorado, will once again be offering its science Discovery Camp to children ages 9-13 who are seeking a summer of excitement and discovery high in the mountains of Colorado. Discovery Camp utilizes the outdoor mountain environment as kids experience alpine and aquatic ecosystems, explore the geologic and mining history of the area, and learn basic skills for outdoor survival. These experiences are combined with a climb of one of the nearby 12-14,000 foot peaks, a float trip down the Colorado River, and an overnight trip combined with a sunrise hike. Three sessions, ten days each, will be offered. For more information write:

Keystone Science School, P.O. Box 8606, Keystone, CO 80435, or call 1-800-215-5585.

# Report From the Field

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## Wolf Recovery Debate Moves To Colorado

by Michael Robinson

The recent contentious U.S. Fish and Wildlife Service (FWS) reintroduction of gray wolves (*Canis lupus*) to Yellowstone National Park and the Greater Salmon-Selway Ecosystem of central Idaho concludes the first of three planned years of the most dramatic phase of implementing the Northern Rocky Mountain Wolf Recovery Plan (1987). However, while Republican members of Congress and critics in the ranching industry are calling to shut down further wolf reintroductions into the Northern Rocky Mountains, others are quietly laying the stage for a dramatic expansion of that wolf recovery plan to include the Southern Rocky Mountains of Colorado and beyond.

### Early Opposition

The 1987 recovery plan called for de-listing of the gray wolf when ten breeding pairs of wolves have been established for three years in northwestern Montana, central Idaho, and Yellowstone National Park. In the early 1980's, Colorado Division of Wildlife (DOW) biologists and others had discussed the possibility of designating Colorado regions for wolf recovery. In response, in 1982, the Colorado Wildlife Commission, an appointed body that supervises DOW, and at that time dominated by ranching interests, declared its opposition to "every person or entity which may now or in the future suggest or plan" reintroducing wolves, or for that matter grizzly bears, into Colorado. This resolution chilled the ardor of Federal officials cognizant of the tremendous political obstacles they would face in attempting recovery of the gray wolf anywhere in the West, and as a result no consideration was given to recovering wolves anywhere in the southern Rockies.

### Grassroots Support for Wolves

In 1991 Sinapu, named after the Ute word for "wolves", incorporated to push for wolf recovery and landscape

scale ecological restoration in Colorado. Within a year, the fledgling group persuaded David Skaggs (D-CO) to introduce legislation to study the feasibility of reintroducing wolves into Colorado.



Photograph by Sinapu/ Monty Sloan

That legislation was approved by Congress, and FWS conducted an evaluation that concluded in December 1994.

The agency divided the feasibility study into two components, a biological evaluation and a survey of people's attitudes towards wolf recovery in Colorado. The biological evaluation, focusing on available habitat and prey base, concluded Colorado could likely support 1,128 wolves throughout most of the western (mountainous) half of the state. That report recommended that any future wolf recovery plan for the southern Rockies include almost all Colorado's western slope, and be linked to wolf recovery zones in the northern Rockies and in New Mexico (for the Mexican gray wolf, *Canis lupus baileyi*). That recommendation is an important step toward fulfillment of the federal pledge to implement scientifically based ecosystem management.

The public opinion survey was likewise promising. According to that report, 71% of Colorado residents support wolf reintroduction to the state, including 65% of western slope residents, largely in rural areas. In contrast, polls in Wyoming, demographically similar to rural Colorado, have indicated in the past only 49% support for wolf recovery there.

### **Revised Recovery Plan to Include Colorado?**

The Endangered Species Act (ESA) calls for periodic revisions of recovery plans to reflect new information. With FWS preparing to revise the gray wolf plan, Sinapu is pushing the agency to act on its own studies, and include the southern Rocky Mountains, from southern Wyoming to northern New Mexico, as a single wolf recovery zone. In doing so, Sinapu opposes the use of ESA Section 10(J) to designate wolf populations in the southern Rockies as experimental and non-essential.

Ranching interests, however, are also starting to mobilize against such a dramatic expansion of the wolf recovery plan. A bill that passed the Colorado House (but not yet the Colorado Senate) would ban reintroductions of any endangered species to the state. With the

first wolf reintroductions *a fait accompli* in the northern Rockies, the drama over wolves, the ESA, and federal ecosystem management is moving to a new stage further south.

### **Critical Habitat for Colorado Wolves**

Although the Southern Rocky Mountains have abundant public lands potentially suitable for wolf recovery, because of early incursions for mining claims the region contains fewer roadless areas than the Northern Rocky Mountains. The single largest roadless area is the 800,000 acre Weminuche, in southwestern Colorado. Many of the remaining wild areas, including much of the Weminuche, survive at high elevations ("rocks and ice"), and are not available for winter use by ungulates and the wolves that would prey on them. Fortunately, there are also abundant lower elevation lands in public ownership. However, most of these include a biologically disastrous road network, and many of the lower elevation public lands - winter ranges that wolves will need - are severely grazed by domestic livestock. On some National Forest and BLM lands, cattle displace elk onto private lands. Furthermore, in many other cases public land ranchers do not believe that their operations are compatible with wolf recovery.

For these reasons, Sinapu has not confined itself to advocating solely for wolf reintroduction, but also works on public land habitat restoration. Protected winter ranges on public lands will need to be established to minimize both wolf use of private lands and human-caused wolf mortality, and many National Forests and BLM districts will require lower road densities and less severe livestock grazing pressure to allow wolves, and other sensitive species, to survive and flourish. Use of Section 10(J) of the Endangered Species Act - the experimental, non-essential rule - precludes critical habitat designation. While that approach may be compatible with wolf reintroduction in the Northern Rockies, that is not the case in the Southern Rockies. With fewer existing habitats that are suitable year-round, critical habitat designation will prove important in restoring the habitat needed to safeguard a reintroduced wolf population.

- Michael Robinson

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Michael Robinson is executive director of Sinapu; PO Box 3243, Boulder, CO 80307.

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# Book Review

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## The Wisdom of the Spotted Owl: Policy Lessons for a New Century

By Steven L. Yaffee. 1994. Island Press.  
Washington, D.C. Paper \$26.95, Cloth \$45. 430 pp.

Reviewed by Tim W. Clark  
and A. Peyton Curlee



This book is essential reading for anyone interested in endangered species, wildlife, and natural resource conservation. In addition to telling a fascinating story about an infamous environmental controversy, Dr. Yaffee offers top notch analysis that highlights practical ways to improve conservation policy and management. We strongly recommend the

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*The broad utility of the book stems from Yaffee's excellent analysis of the systems that are at the heart of natural resource management ... throughout much of the world.*

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book to natural resource students and professionals in and out of government. We've already used *The Wisdom of the Spotted Owl* in our conservation work in Australia and the United States; the lessons for improvement in the last three chapters have been especially useful.

The spotted owl controversy is one

of the best known endangered species cases in the world. Yet, despite the high level of scrutiny surrounding this case, most attention has been superficial and has failed to help us understand the institutional, political, ideological, and disciplinary factors that created this controversy and how we can avoid similar problems in the future.

The spotted owl case is used to illustrate the complexity of many contemporary conservation issues and the difficulty that government has in conserving wildlife and natural resources because of major structural and functional weaknesses. The broad utility of the book stems from Yaffee's excellent analysis of the bureaucratic and political systems involved in the spotted owl case; these same systems are at the

heart of natural resource management in this country and throughout much of the world.

The book is divided into three major sections. Part I, including the first five chapters, traces the evolution of the spotted owl controversy from 1945 to late 1993. This section provides a description of the major participants, their

perspectives, and the major incidents over the past fifty years. Yaffee strongly supports his contention that this is a clear instance of government muddling through (or attempting to muddle through).

In Part II, chapters 6 to 10, Yaffee analyzes the story he told in Part I. He

systematically examines the complex dilemmas the management agencies faced, the various influences that framed decision making, and the entrained processes that led the agencies to avoid making needed decisions. The major failure of the agencies was their inability to learn, despite many decades of experience. They stuck with standard operating procedures, regardless of their ineffectiveness.

Part III, including chapters 11 to 13, is the most generally applicable part of the book; it is here that the implications of the spotted owl case for environmental policy in the 1990's and beyond are discussed. This section prescribes useful alternatives to past failures. Emphasis is placed on ways to make agencies and decision making processes more effective, formulate better policies, and create the context that is needed for constructive change. This part of the book is the most useful for professionals because it outlines what we should all be working towards to improve conservation policy and management; from building bridges between public and private organizations to promoting individual and institutional innovation for better conservation outcomes.

We hope that *The Wisdom of the Spotted Owl*, and especially Yaffee's recommendations for reform, will be read and applied widely. Improving natural resource management is a struggle, but with the guidance Dr. Yaffee offers improvements are within reach.

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Tim Clark and Peyton Curlee are President and Executive Director, respectively, of the Northern Rockies Conservation Cooperative in Jackson, Wyoming, 83001.

# Book Review

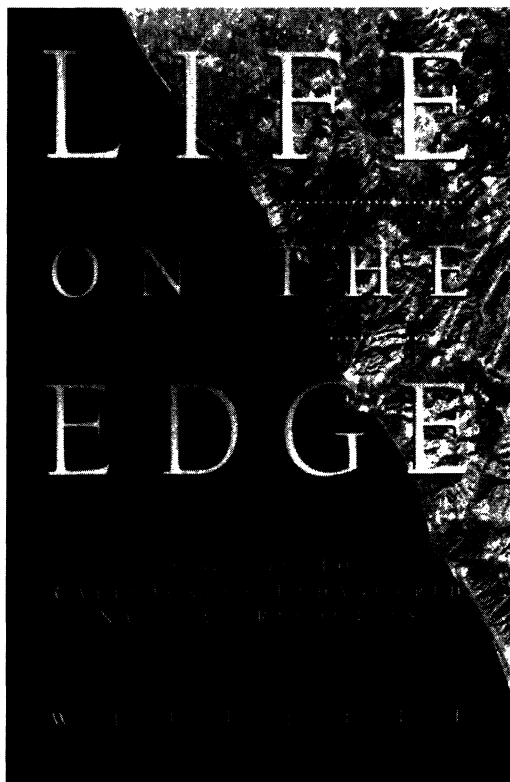
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## Life on the Edge: A Guide to California's Endangered Natural Resources

Carl G. Thelander, Editor in Chief. 1994.

BioSystems Books. Santa Cruz, California. \$45.00. 550 pp.

Reviewed by  
Mark Jerome Walters



*Life on the Edge: A Guide to California's Endangered Natural Resources* is a 550 page epic about California's endangered wildlife. The species covered range from the well-known California condor and northern spotted owl to diminutive, little-revered invertebrates such as the delta green ground beetle and trinity bristle snail.

*Life on the Edge* is encyclopedic, although its evocative layout and clear writing style make it accessible to the lay reader. The biological account of each species is set within a broad context that includes color and black-and-white photographs, illustrations, native American legends, relevant essays on ecology or animal behavior, and even the occasional poem. For example, the account on the desert tortoise is followed by an essay, "Desert Tortoise in Prehistory", and the California Brown Pelican is set next to the piece "Strung Out: The Hid-

den Agonies of Sportfishing", which chronicles the strangulation of pelicans and other seabirds on fishing line. The section of the book devoted to endangered fish includes essays on aquatic habitats, fish biology and behavior, the impact of anglers, and the Karok legend about the origin of salmon. Many of the essays are written by authorities on the subjects, including Peter H. Raven. There are also several interviews in the book with notable conservationists. The skillful integration of scientific pieces with essays, legends, interviews, and stories, as well as the photographs and the rich panoply of illustrations, make *Life on the Edge* an unusual and stellar contribution to the literature of en-

dangered U.S. species.

The core of the book is made up of more than 100 scientific accounts, each of about a thousand words, devoted to individual species. Each account is divided into two parts: the biology of the species and conservation efforts. Each profile includes a photograph of the species (illustrations in a few cases), photographs of the species' habitat, at least one map depicting the historic range and the current range of the species, and major references on that species. In addition, each mammal profile includes a representation of the animal's footprint, like a tracking guide. The depth of these accounts show the great care that went into the design of this book.

The universal themes echoed by the book - human short-sightedness, insensitivity, and, in some cases, last-ditch efforts to right our wrongs, help the work transcend its geographical focus

on California. *Life on the Edge* is not just about species but about our relationship with them, about loss and regret, and also about hope. One can hope that *Life on the Edge* becomes a model for other states to emulate, and that others create the equivalent to this volume as well as the planned companion work on the state's plants planned by the editors.

If loss of species is, as E.O. Wilson argues, what our descendants are least likely to forgive use for, then *Life on the Edge* is an accomplishment for which our descendants might even thank us.

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Mark Jerome Walters, a veterinarian, is a program officer for the Geraldine R. Dodge Foundation. His most recent book, *A Shadow and a Song* (Chelsea Green, 1993), chronicles the extinction of Florida's dusky seaside sparrow.

# Bulletin Board

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## Greater Yellowstone Predators Conference: Call for Papers

The third biennial scientific conference on the Greater Yellowstone Ecosystem, scheduled for September 24-27, 1995, in the Mammoth Hot Springs Hotel in Yellowstone National Park, will take a broad look at predators and ecosystems. The conference aims to look beyond more commonly analyzed predators and consider all predatory species, whether mammal, bird, fish, or invertebrate. Papers within fields traditionally associated with wildlife ecology are welcome, as are papers from other disciplines such as sociology, economics, and environmental history. The proceedings of the conference will be published.

One-page, double-spaced abstracts should be submitted on disk (WordPerfect or ASCII text), with a hard copy. Deadline for submission of abstracts is May 1, 1995. Abstracts should be sent to the Conference Program Committee, Yellowstone Center for Resources, P.O. Box 168, Yellowstone National Park, WY 82190. For additional information, contact Peyton Curlee at the Northern Rockies Conservation Cooperative, (307) 733-6856, or Paul Schullery at the National Park Service, (307) 344-2205.

## Job Announcements

The Nature Conservancy seeks a Landscape Ecologist with an advanced degree (Ph.D. preferred) and three years working experience to be based in its Minneapolis office. The Landscape Ecologist works with Conservancy staff nationally and internationally to utilize the principles of landscape ecology in the design and management of individual nature preserves and systems of preserves. The ecologist will consult with key staff and partners on issues of site design and ecological modeling and provide training in landscape-scale ecological processes, patterns and dynamics. This is a two year position with potential for extension. To apply, send letter and CV to Stephen C. Buttrick, The Nature Conservancy, Eastern Regional Office, 201 Devonshire St., 5th Floor, Boston, MA 02110-1402

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The University of Michigan invites applicants for a joint tenure track position in the Biology Department and the School of Natural Resources and Environment (SNRE). Individuals are sought whose area of scholarship is the ecological basis of the sustainable use of natural resources in the tropics. Candidates must have a Ph.D. in biology, ecology,

or natural resources, and subsequent experience, with a demonstrated research interest and expertise in the ecological sustainability of the tropics. Candidates should submit a cover letter; statements of teaching interests, research objectives, and the relationship of their scholarly activities to international area studies; curriculum vitae; and the names of three references to: Search Committee, Ecological Sustainability, The International Institute, The University of Michigan, Ann Arbor, MI 48109-1220. Tel. (313) 763-9200. Closing date is February 15, 1995 or until position is filled.

## USFWS Endangered Species Technical Bulletin

The most recent Technical Bulletin was published in the September 1994 issue of the *Endangered Species UPDATE*. Once the USFWS produces the next Technical Bulletin, it will be featured in the *UPDATE*.

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*Announcements for the Bulletin Board are welcomed. Some items from the Bulletin Board have been provided by Jane Villa-Lobos, Smithsonian Institution.*

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# Endangered Species UPDATE

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