Endangered Species UPDATE

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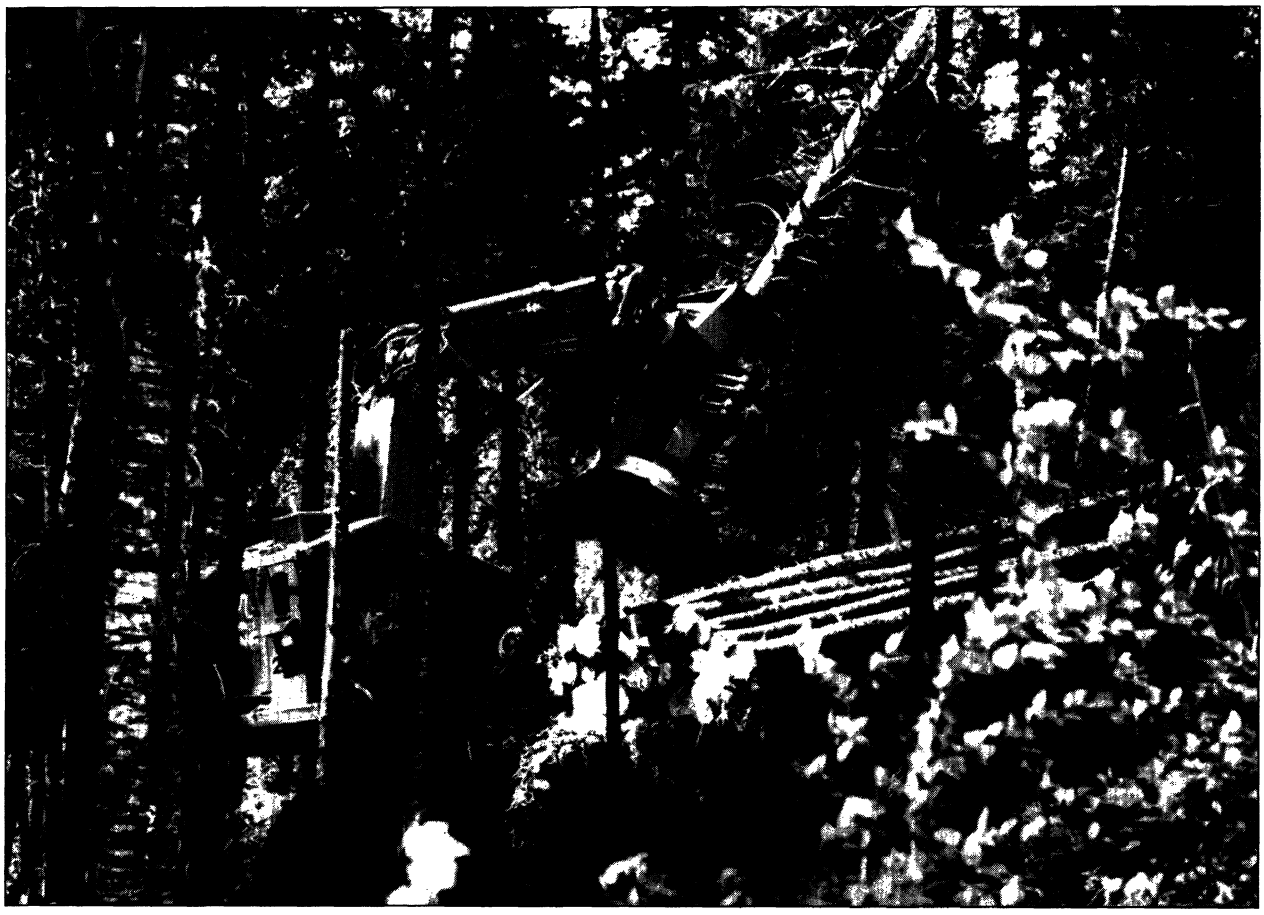

In this Issue

Private Industrial Forests and Bird Conservation in the Northeastern United States

by

John M. Hagan III

During the 1980s and early 1990s several dozen scientific publications reported declines in populations of Neotropical migrant landbird species—those species that breed in the United States and Canada but winter in the New World tropics, south of the United States (see reviews in Terborgh 1989, Askins et al. 1990). This broad group of over 200 species is dominated by the songbirds—warblers, thrushes, vireos, and flycatchers. Considerable debate ensued regarding whether these declines have been caused by problems on the breeding grounds or wintering grounds (Hutto 1988). At a major symposium on the conservation of these species at Woods Hole in 1989, participants generally agreed that the causes for declines were so poorly understood that it served no useful purpose to debate which end of the migratory range was most critical to the conservation of these species (Hagan and Johnston 1992).

Although "Neotropical migrant" may not be quite a household term, almost any scientist in any federal natural resource agency can now describe exactly what Neotropical migrants are, and what their agency is doing about their conservation. Only one year after the 1989 Woods Hole symposium, perhaps the most impressive multi-species conservation program ever devised in the U.S. was initiated by the National Fish and Wildlife Foundation. This program, called Partners in Flight, has an extensive network of over a thousand scientists and land managers working together at regional, national, and international levels, to understand and conserve Neotropical migrants.

The Partners in Flight Program had a rather serendipitous beginning. Representative Sidney Yates, Chairman of the House Appropriations Committee on the Interior, happened to read an article in Smithsonian Magazine about the symposium and the complicated problems faced by Neotropical migrants. He believed action should be taken, and instructed the National Fish and Wildlife Foundation to come up with a plan. They did. Mr. Yates deserves a lifetime subscription to Smithsonian.

Problems both north and south

The primary problem migrants face in the Neotropics is simply habitat loss (Terborgh 1989). Depending on the country, tropical deforestation is occurring at a rate of 1 to 5% per year (Gradwohl and Greenberg 1988). Even young, scrubby, secondary growth in the tropics, which also is used by many Neotropical migrants, may be on the decline. Moreover, because wintering ranges of many species are constricted when compared to more expansive breeding season ranges, one hectare of tropical forest loss can have a greater effect on a species' population than one hectare of temperate forest loss. Unfortunately, it is extremely difficult to scientifically establish tropical habitat loss as a cause of songbird declines (see Robbins et al. 1989).

The evidence that changes in temperate forests affect songbird populations is far more compelling scientifically, but that may be partly because so much more research has been carried out in temperate forests relative to the tropics. The leading temperate causes for declines are related to forest fragmentation and forest degradation. As temperate forests have become more dissected by roads, agriculture, and suburbia, additional forest edge has been produced. Forest edges appear to be good habitat for many animals that prey on the nests of forest-dwelling songbirds (Gates and Gysel 1978, Wilcove 1985, Andren and Angelstam 1988, Yahner and Scott 1988). Thus, reproductive success in the part of the forest near the edge boundary can be lower than reproductive success in the deeper "interior" forest. The increase in the linear amount of forest edge and concomitant decrease in interior forest habitat associated with fragmentation may have a role in observed population declines.

A second problem with forest edges in the temperate zone relates to the Brown-headed Cowbird (*Molothrus ater*). The cowbird lays its eggs in the nests of other birds (nest parasitism), and leaves the host species to feed and raise the cowbird nestlings. Because cowbirds grow so quickly, and because cowbirds are larger-bodied than most of the species it chooses as hosts, the songbird's nest often fledges only cowbirds. Cowbirds may be a significant factor in the declines of some species (Brittingham and Temple 1983), especially in regions where cowbirds are abundant. In an Illinois study, Wood Thrush (*Hylocichla mustelina*) adults raised four times as many cowbirds as Wood Thrushes (Robinson 1992). The cowbird problem seems to be more severe in the midwestern U.S., where cowbird populations have been centered historically. However, their range has expanded where forests have been opened up for agriculture and pastureland.

While nest predation and nest parasitism are known to effect productivity on a local scale, the extent to which they might explain continental-scaled declines in species is unclear. Although configuration of habitat (fragmentation and edges) is certainly a factor in landbird conservation, the importance of the basics—simply the amount of available habitat—cannot be overlooked.

The Role of the Industrial Forest in the Northeast

In the eastern United States most forestland is privately owned. In a region known as the Northern Forest—26 million acres of forestland that stretches from New York to the northern tip of Maine and includes parts of Vermont and New Hampshire—large forest products companies dominate the ownership pattern. It is therefore important that we engage private landowners, especially the forest products industry, in our efforts to understand the conservation of these species in the region. In the Northeast, focusing our attention only on public lands would miss most of the picture.

In 1991, I approached several timber companies in Maine to propose studies of the effects of industrial forestry on bird populations. Concern for Neotropical migrant conservation was burgeoning at the time. In an effort to get ahead of the issue and to possibly avert an endangered species morass early in the next century, three companies agreed to provide their lands for study: Bowater, Champion, and Scott Paper Co. These companies placed no restrictions on our interpretation or dissemination of the results. The three-year study is now complete, and the news is mixed.

One focus of my work was simply to find out what species use what habitats in the industrial forest, from recent clearcuts to mature hardwood and softwood forest. For example, Northern Maine is considered a part of the Acadian forest, represented by a transition from northern hardwood beech/birch/maple forest to the spruce/fir boreal forest. Thus, there is a great diversity of forest types, which in turn is reflected in the region's avian diversity. Knowing what species use what habitats would enable me to address the question of how much habitat was available for different species, and therefore how populations might change in relationship to habitat changes associated with timber harvesting. This approach seems a bit simple-minded in a time when a great deal of attention is being given to landscape geometry and metapopulation dynamics, but we must understand basic species-habitat relationships.

Using data from 50-m fixed-radius point count surveys at 387 points throughout the industrial forest landscape, I constructed basic species-habitat associations for 72 species. The data showed that early-successional habitats created by industrial forestry, including clearcuts and the scrubby regeneration that follows, were biologically rich habitats. These early-successional habitats hosted a large number of Neotropical migrant species—species that are showing region-wide declines in the U.S. Fish and Wildlife Service's Breeding Bird Survey. In fact, industrial forestry appeared to actually increase avian diversity because of the creation of early successional habitats. By no means were clearcuts ecological deserts. Species such as Common Yellowthroats (*Geothlypis trichas*), Chestnut-sided Warblers (*Dendroica pensylvanica*), Mourning Warblers (*Oporornis philadelphia*), and Nashville Warblers (*Vermivora ruficapilla*) would all take exception to the notion that clearcutting is a unilaterally bad forestry practice.

At the same time, creation of early-successional habitat through clearcutting, or selection cutting, comes at the expense of mature, closed canopy forest, which is important for another whole suite of species that also includes many Neotropical migrants, such as Ovenbirds (*Seiurus aurocapillus*), Bay-breasted Warblers (*Dendroica castanea*), Blackburnian Warblers (*Dendroica fusca*), and Red-eyed Vireos (*Vireo olivaceus*). There are two pressing conservation questions that emerge: (1) is one group of species (early- or late-successional) of greater conservation concern, and (2) can the forest products industry balance the amounts of early- and late-successional habitats such that all species are maintained in the landscape? Neither question can be answered simply.

To explore which species group might be of greater conservation concern, we need some sense of long-term population trends of the various species. The best source of long-term data on bird populations in the U.S. is the Breeding Bird Survey, which began in 1966. The survey is coordinated by the U.S. Fish and Wildlife Service, and relies on

Endangered Species UPDATE

A forum for information exchange on endangered species issues
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The *Endangered Species UPDATE* welcomes articles related to species protection in a wide range of areas including but not limited to: research and management activities and policy analyses for endangered species, theoretical approaches to species conservation, and habitat protection. Book reviews, editorial comments, and announcments of current events and publications are also welcome.

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: K-220 feller forwarder harvesting machine, used especially in softwood stands. Photo by John Hagan.

The views expressed in the *Endangered Species UPDATE* are those of the author and may not necessarily reflect those of the US Fish and Wildlife Service or The University of Michigan.

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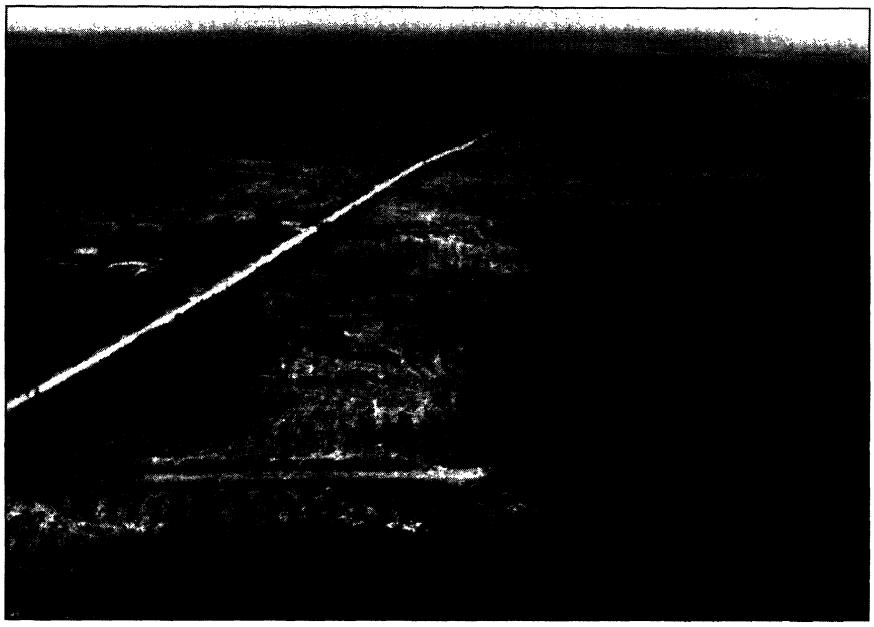
several thousand volunteers who venture out once each May or June to count birds along standard 25-mile rural roadside routes across the U.S. and Canada. An analysis of the Breeding Bird Survey data for the New England region shows that early-successional species have been declining more than mature forest species in the last two decades. This result runs counter to conventional conservation concern for forest-dwelling species that are negatively affected by forest-edge and forest fragmentation. However, southern New England has gradually lost early-successional habitat as agriculture moved out of the region earlier in this century (Irland 1982). Now old fields are reverting to forest, at the expense of early-successional species (Hagan 1993, Litvaitis 1993). The creation of early-successional habitats in the industrial forest is likely working to offset these declines. However, because there are very few Breeding Bird Survey routes in the remote, relatively uninhabited industrial forest, this offset is not revealed by Breeding Bird Survey dataset.

If southern New England is simply reverting to the mature forest of the past, should we be concerned about the declines in early-successional species? Or, should we be more concerned about the declines in mature forest habitats and associated species in the managed industrial forest? It is well known that there can be regional differences in population trends (James et al. 1992, Sauer and Droege 1992). In New England, we may have important subregional differences (industrial forest vs. southern New England) that make conservation efforts more complex. This observation begs the question of to what spatial scale do we apply our conservation concerns: the township (e.g., 10 x 10 km), the county, the state, a group of states, national, or even hemispheric?

I believe a reasonable (practical) spatial scale to apply these concerns, especially in the industrial forest, is at the township scale. That is, in each 10 x 10 km block, we should attempt to maintain proper habitat for both early- and late-successional species indigenous to that geographic area. In the space provided by a single township, some large



This clearcut in northern Maine, some 8 km long, was a response to an outbreak of the spruce budworm. Such large cuts, which may provide the best opportunity for maintaining large tracts of unfragmented forest in the future, are now illegal. Photo by John Hagan.

tracts (i.e., 100 - 200 ha) of mature forest could be maintained along with early-successional habitat resulting from timber harvesting. The forest products industry needs to focus on keeping its own lands in ecological order, while being mindful of larger region-wide, or nation-wide, conservation issues. It would be a mistake to diminish concern for interior-forest species in the industrial forest for the sake of enhancing early-successional species that are on the decline in southern New England. In fact, in the industrial forest, early-successional habitat is not the ecological commodity of concern. Maintaining large tracts of mature, closed-canopy forest represents the challenge to the forest managers.

But the importance of forest fragmentation and forest-edge habitat to landbird populations is not well understood in managed forest landscapes. Most of the research on bird populations and forest fragmentation has been done in agricultural or suburban landscapes where the geometry of the landscape remains relatively constant once created. The overwhelming conclusion has been that there are fewer forest-dwelling species, and fewer individuals of these species, in remnant forest fragments than in large forest tracts (e.g., Forman et al. 1976, Whitcomb et al. 1981, Ambuel and Temple 1983, Freemark and Merriam 1986, Robbins et al. 1989). Several small fragments equaling the area of a single large forest tract generally show lower densities of many species. The explanation for this pattern has been related to increased predation and parasitism near forest edges, and to difficulties some species may have in finding and colonizing small pockets of habitat.

However, landscapes managed for forestry are far more dynamic than agricultural or suburban landscapes. Habitat is constantly being lost to harvesting, and forest is constantly regrowing. Suitable habitat for a species, whether early- or late-successional, is constantly shifting within the landscape. Also, forest edge is abruptly formed, but gradually dissolves as the forest regrows. Small & Hunter (1988) found a higher nest predation rate on artificial ground nests in smaller forest fragments in Maine, but no effect of nest distance to forest/clearcut edge. However, Rundnicky & Hunter (1993) did find a distance-to-edge effect for artificial shrub-level nests in a similar landscape. Thus, the importance of edges in managed forests remains equivocal.

In my studies in northern Maine with Matt Vander Haegen of the U.S.D.A. Forest Service, we found higher densities of interior forest spe-

cies, such as the Ovenbird and Red-eyed Vireo, in forest fragments than in large forest tracts (Hagan et al. in press), a result that contrasts with dozens of studies of birds and fragmentation. However, none of the studies were done in an industrial forest, where fragmentation is an active, ongoing process. We believe forest birds are being displaced by harvesting. Though many of these species migrate to Central or South America, they typically return to within meters of their previous breeding site. What happens when forest birds return to breeding sites that are now occupied by a clearcut? We believe they may occupy the nearest available, suitable, habitat. The result is a "packing" of individuals in the remaining forest remnants, or fragments. We studied reproductive success of the Ovenbird in detail, and found that although fragments contained more singing males per unit area, they were less likely to be paired with a mate than Ovenbirds in large tracts (200 ha+) of forest. It would have been a mistake to conclude that the higher densities of Ovenbirds in the fragments indicated higher habitat quality. Possibly, higher densities as a result of displaced birds packing into remaining habitat may lead to a breakdown in ability to maintain a territory and attract a mate. Over time, as edge or isolation effects begin to operate on the fragment, densities may decline to levels below the non-fragmentation level (Darveau et al. 1995).

The Challenge

From a broad ecological perspective, not just a bird perspective, there are three challenges to long-term retention of the ecological integrity of the industrial forest. First, current harvest rates will make it difficult to keep 80, 90, or 100 year-old closed-canopy forest a part of the landscape. Desired rotation lengths, depending on the stand type, are closer to 60 years. If we consider a simplistic model where 2% of the forest is being cut each year through clearcutting, all the forest will be cut in 50 years, and no forest over 50 years old will be present. We know that standing dead snags and downed woody debris are important components of older forests. While we know of no species that is obligate to older-growth forests in Maine, we do know that many species clearly prefer such forest.

Second, the rate of cutting, whether as clearcutting or selection cutting, makes it difficult to retain unfragmented tracts of mature closed-canopy forest in the landscape. As the absolute amount of mature forest habitat in the industrial forest decreases, the spatial configuration of remaining mature forest becomes increasingly critical. At a fairly low harvest rate of 1% per year it would be difficult to fragment older-aged forest (e.g., 70+ years old). In the Northeast, forests do not get as old as those of the Pacific Northwest. Most tree species in the Acadian forest simply die and fall over after no more than 150 to 250 years. While such dynamics may have been important in the past, 200+ year-old forest is gone in the Northeast, with very few exceptions. With harvest rates of 1.5 to 2.0% per year (current rates), it will be difficult to retain not only older growth (70+ years old), but large tracts of unfragmented habitat of the mature age class.

Both clearcutting and selection cutting are used in Maine's industrial forest. Clearcutting has been a much maligned harvesting method. However, it does offer some ecological benefits, other than to those early-successional species mentioned above. Clearcutting is a method of concentrating harvesting activity in as limited an area as possible. In fact, larger tracts of unfragmented forest are more easily accommodated by a harvesting strategy that involves fewer, but larger clearcuts as opposed to many, but smaller, spread out clearcuts (Franklin and Forman 1987, Li et al. 1993). Of course, there are many site conditions where large clearcuts would be ill-advised, and the aesthetic result is generally unappealing to the public.

Selection cutting is an important harvesting strategy as well. Some selection cutting techniques especially can enhance vertical structural diversity in the forest. However, to harvest the same volume of wood in the form of a 50% selection cut will require twice the forest area as compared to the clearcut method. A larger area will be criss-crossed by skidder trails and haul roads. A 25% selection cut will require 4 times the area of a clearcut. Selection cutting generally involves entries into the forest every 10 to 20 years, such that a mature, closed-canopy structure is never achieved. Clearcuts result in a more even-aged stand, but with closed-canopy qualities, and selection cuts have more structural diversity, but often lack closed-canopy features. From an ecological perspective, complete reliance on either clearcutting or selection cutting prob-

Clearcut operation in progress. Note the buffer strips between stands, which are required by the Maine Forest Practices Act. Photo by John Hagan.

ably would be unwise across large, multiple-township ownerships.

Finally, the last, and perhaps greatest threat to the ecological integrity of the Northern Forest is a poor definition of society's goals for the forest. The environmental community has been outspoken in its criticism of clearcutting, herbicide spraying, and plantations. But it has not articulated its end point, or its goals for the forest. It is difficult for the forest products industry to work to meet environmental goals when no clear goals have been stated. At the same time, industry has not articulated to the public its long-term plans for their timberlands. How will the forest age-structure and composition change over the coming decades as industry meets their economic goals, and society's appetite for lumber and paper? We need to set specific, well-defined economic and ecological goals for the Northern Forest region, and then assemble our technical expertise in forestry, forest economics, landscape ecology, population viability analysis, etc., and move to meet those goals.

Society is asking much of the Northern Forest. We must define a level of resource use that meets both economic and ecological goals. Shutting down the industry would be narrow-minded and, in all likelihood, ineffective in the conservation of Neotropical migrants. The wood and fiber resource burden would simply be shifted north to Canada, or perhaps to Central America where many of Maine's migrants winter. As an example, recent restrictions on harvesting in the Pacific Northwest had a sudden and tangible affect on sawtimber production in Maine. Society must act responsibly, and identify the level of resource use that preserves the diversity of values people place on the Northern Forest. Both industry and environmentalists should work to forge a common plan that accommodates these diverse values. But until society sets specific goals, we are squandering valuable time to prevent the creation of one endangered species after another as the next century unfolds.

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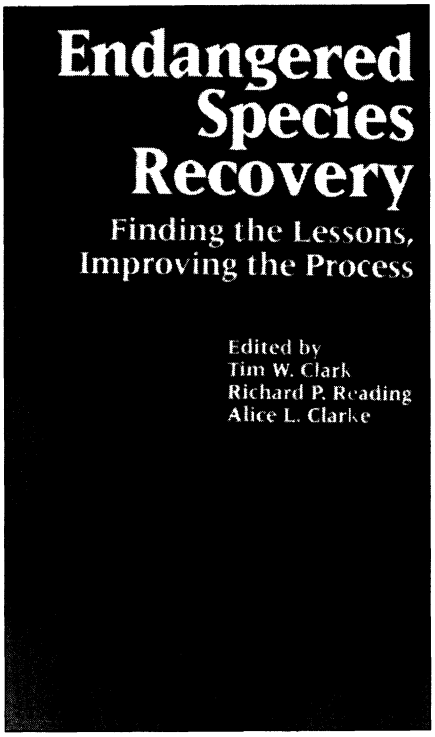
Dr. John Hagan is Director of the Forest Ecology Program and Chair of Conservation Programs at Manomet Observatory. He organized the 1989 Woods Hole Symposium on ecology and conservation of Neotropical migrant landbirds, which provided a springboard for the international Partners in Flight Program. His ongoing research is directed at finding new ways to integrate economic and ecological goals in tropical and temperate forestry.

Book Review

Endangered Species Recovery: Finding the Lessons, Improving the Process

By Tim W. Clark, Richard P. Reading, and Alice L. Clark, Editors. 1994. Island Press. Washington, D.C. $48 Hardcover, $25 Paperback. 450 pp.

Reviewed by Steven J. Bissell



This ambitious anthology lays claim to new territory: "an integrated, interdisciplinary approach to endangered species conservation—an approach incorporating biologists, policy experts, sociologists, psychologists, organizational consultants, conflict managers, and others." This daunting task grew out of a conference on endangered species in 1993 at the University of Michigan and the result, to my mind, is surprisingly successful.

The Endangered Species Act (ESA) has been roundly criticized by opponents as public policy which goes "too far." The recent spate of proposed legislation at both the state and federal levels over the issue of "takings" has been, at least in part, directed at rolling back the ESA. On the other hand, advocates of endangered species management have criticized the ESA as either weak or ineffective. This seeming contradiction is understandable if the ESA is viewed from a perspective broader than the traditional biological analysis.

This book does take that sort of well-rounded approach, largely using a policy cycle format to address ESA issues from the initial stages through implementation. The book gives considerably more attention to ESA implementation than it does to other elements, but this is due to the point made by Alan Clark that implementation, not biology, is at the core of ESA problems. Clark's review of the ESA forms the first part of the book.

Part II consists of nine case studies on endangered species recovery programs, each by different authors. These case studies address species from the familiar to the obscure and offer varying examples of specific policy problems with the ESA. Each of these articles cover varying levels of policy issues ranging from biological assessment to organizational failure. This ecumenical approach follows the intent of the book well and makes for fascinating, if at times disheartening, reading. Nearly all of the authors, while being advocates of endangered species management, give examples of policy failure.

Steven Yaffee's report on the Northern Spotted Owl is a sample of his recent book length analysis of that most visible of endangered species controversies. Among the other well known species recovery programs analyzed are the grizzly bear, red-cockaded woodpecker, and Florida panther. Lesser known, but perhaps as important in terms of the lessons taught, are candidate species programs in Idaho and the eastern barred bandicoot recovery program in Australia. Each case study draws a different, usually critical, point and each draws lessons from the different problems.

Part III addresses the theoretical side of endangered species management. These six essays address the underlying reasons for the policy failures raised in the preceding section. As such, they are the most interesting portion of the book. From a piercing critique of academic ecology to a broad sociological model of the endangered species policy process, this is the best discussion of a specific environmental policy I have seen in a long time. I found myself seeing issues with which I have struggled in recent years made clearer in nearly every article. I was especially impressed with the essay by Steven Minta and Peter Kareiva on conservation science and Ron Westrum's organizational analysis of recovery teams. These are only two examples of the fine thinking which went into this book and show why it should be used by anyone involved with implementation, evaluation or even teaching of endangered species policy or any other aspect of environmental policy.

The final section is a single essay by the editors of this fine collection. It avoids tiresome summations and the interjection of new material, but goes to the heart of the issue and derives eight "meta-lessons" for the improvement of endangered species policy. These are distillations of the points raised in the first two sections and provided a concise, usable conclusion.

At this writing the fate of the ESA remains uncertain. I hope that *Endangered Species Recovery* provides some of the information necessary to demonstrate to all parties that policies for the protection of endangered species may be difficult, but they are not impossible, nor are they inherently a threat to personal liberties and property rights. The ESA, as with any issue of public policy, reflects conflicting values, and this book shows the way to reconcile some of those conflicts.

Steven J. Bissell is Chief of Education at the Colorado Division of Wildlife. He is also an adjunct faculty member at the University of Denver, Colorado State University, and The Union Institute. He specializes in environmental policy and environmental ethics.

Bulletin Board

Idaho's Salmon Scene

Idaho's Salmon Scene, which began as Idaho's Sockeye Scene in 1994, is now entering its second year of providing quality technical information on issues related to salmon in Idaho to the over 1000 subscribers on their mailing list. They are currently looking to increase the number of subscribers, and are also seeking contributors to help defray printing and distribution costs. For more information, please write to: Idaho's Salmon Scene, P.O. Box 2031, McCall, ID 83638; phone (208) 634-3909.

Canadian Rare Plants Project Publication

The Canadian Museum of Nature is pleased to announce the publication of *Rare Vascular Plants in the Northwest Territories*. This latest publication of the Canadian Rare Plants Project looks at 206 rare vascular plant taxa, including their phytogeography, habitat, and status in other parts of Canada; also included in the book are a summary of plant protection in the Northwest Territories, criteria for assessing rare status, future research requirements, and more. The book is available from: Direct Mail, Canadian Museum of Nature, P. O. Box 3443, Station D, Ottawa, Ontario, K1P 6P4, Canada; phone 1-800-263-4433.

Russian Conservation News

The Biodiversity Conservation Center of the Socio-Ecological Union, an independent, non-profit organization, has initiated a new English-language publication on current issues in conservation in the former Soviet Union. This publication, published quarterly, contains articles written by experts—primarily Russian—in conservation biology, ecosystem restoration, endangered species recovery, protected areas management, and conservation law. Issues covered include news on protected areas, background information on such issues as conservation legislation, general problems and organizations working to solve them, endangered species, and more.

To subscribe, send a check or money order payable to PEEC/RCN to the following address: PEEC/RCN, R.R. 2, Box 1010, Dingman's Ferry, PA 18328. Subscription rates are $10 for individuals and $25 for organizations. For more information, contact Mikhail Blinnikov at 216 West 16th Ave., Eugene, OR 97402; (503) 686-2288; e-mail <blinn@oregon.uoregon.edu>.

New Endangered Species UPDATE Schedule

Readers may notice that this January/February issue comes directly after the October 1994 issue, skipping the months of November and December. We made this minor change so that future volumes will correspond with the calendar year; now the first issue of a new volume will be dated January instead of November, as was the case previously. We have at the same time changed our subscription renewal dates so that each subscription was given an extra two months; this was done in order to make up for the two months that would otherwise be lost. We hope this change does not cause any problems, and instead eliminates some of the past confusion.

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

Endangered Species UPDATE

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