

Essay

Conservation Biology and Wildlife Management in America: A Historical Perspective

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“**A**ll through college I was trained to create edge, edge, and more edge. Now all I’m hearing is that edge is bad!” The words were those of a district-level wildlife manager in the U.S. Forest Service. He and two dozen colleagues were attending an agency-sponsored continuing education program designed to keep them up to date on innovations in habitat management. However, after several days of patient participation, the agency veteran could no longer contain his confusion. What he was hearing (this was the late 1980s) and what he had been told in college (perhaps 20 years before) simply did not jibe.

His exasperation revealed much, not only about recent changes in our view of edge effects but also about longer-term changes within (and surrounding) the field of wildlife management generally. The immediate source of his confusion could be guessed. Probably none of his college instructors had explained—perhaps they did not realize themselves—the origins and development of the edge-effect concept and its application in wildlife management. (For ecologists, an “edge effect” refers to the changes in environment conditions that occur at the boundary between two habitat types. These changes may include changes in the species present.) None cautioned that the creation of edge habitat was a management tool, and as with all tools, its appropriate and effective use depended on timing, location, and ecological context. None mentioned that, in the 1930s, maximization of edge habitat was a “progressive” technique in the then-new field of game management. (Wildlife managers used this approach to restore game populations in the Midwest. After decades of intensive agricultural development, this landscape retained little edge, little cover of any kind, and only insignificant remnants of its originally extensive living communities.) None of his instructors foresaw how the too-eager use of the “edge-habitat” tool, especially in forest settings, could have harmful effects on species that normally lived deep within forests.

The manager’s complaint revealed a still deeper frustration. Beyond concerns about the proper application of this or that technique, he was confronting the rapidly changing role and context of wildlife management as it entered the 1990s. At a time when human impact on the world’s ecosystems has increased, the reconsideration of edge effects has been only one outward sign of a more basic reappraisal of means and goals in the effort to conserve wild places and the plants and animals they contain. The emergence of conservation biology itself, with its special

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emphasis on protection and maintenance of biological diversity, has been another important indicator of this reappraisal.

Seen from one angle, conservation biology directly challenges many assumptions and priorities that have guided wildlife management for five decades. Wildlife management has heavily emphasized a narrow range of species, typically game animals or other animals (typically higher vertebrates) that are economically valuable, particularly attractive, or symbolic (like the bald eagle, a symbol of the United States). It has also usually focused on single species in research and management, thus underestimating the importance of broader, systemwide approaches. Education and training programs have stressed the development of technical skills while downplaying conceptual clarity and intellectual flexibility. Finally, wildlife management has had a relatively rigid disciplinary framework that carries over from the classroom to the agency department—and ultimately to the landscape. These tendencies are not unique to wildlife management. They also occur within agriculture, forestry, range management, fisheries management, and other resource-related professions.

The roots of conservation biology lie in many fields, within and beyond the natural sciences. Wildlife management is only one of these, but its contributions have been disproportionately important. It was the arena in which biological knowledge and ecological principles were first applied systematically to the conservation of organisms and their natural habitats. As such, it played a leading role in advancing conservation beyond the point where we measured success

solely in human economic terms (whether that measure was board-feet produced, deer “harvested,” fingerlings released, acre-feet retained, or tourists admitted). In this way, it helped initiate the process—still far from complete—that would redefine conservation as the effort to protect, manage, and restore healthy and diverse ecosystems. Seen from this perspective, conservation biology is not a radical departure from the past but instead a further stage in conservation’s continual evolutionary process.

Along the way, conservation biology has given “traditional” wildlife management the opportunity to return to its roots and to revise or reaffirm many of its founding (if sometimes neglected) principles.

When wildlife emerged as a distinct profession in the 1930s, it represented a significant departure from conservation’s status quo. As Aldo Leopold noted in his pioneering text *Game*

Courtesy of University of Wisconsin-Madison Archives



Aldo Leopold with his boat in the Rio Grande



Management (1933), “the thought was that restriction of hunting could ‘string out’ the remnants of the virgin supply [of game animal populations] and make them last a longer time. . . . Our game laws . . . were essentially a device for dividing up a dwindling treasure.” Leopold introduced the profound idea that we could best perpetuate populations of wild animals and plants through the active study, protection, and, where necessary, restoration of their habitats. He called on science, “to furnish biological facts” and “to build on them a new technique by which the altruistic idea of conservation can be made a practical reality.”

Summarizing several key developments can provide some sense of how this new approach transformed wildlife conservation in America in the crucial decade of the 1930s.

- In 1930, nearly all those involved in the management (as distinguished from the study or protection) of wild animal populations focused on game species. In 1936, the one-word term *wildlife* came into common usage, signaling the broadened concern of the field. By 1940, “wildlife” was standard terminology; for many people, wildlife included not just “nongame” vertebrates but invertebrates and plants as well.
- Before 1930, “management,” such as it was, entailed mainly captive breeding programs; the killing or removal of species that preyed on farm, ranch, or game animals; tighter legal restrictions on hunting; and the unsystematic creation of refuges and sanctuaries to protect specific species in specific locations. By 1940, the basic shift in approach was complete, and primary emphasis was now placed on the provision of suitable habitats.
- In 1930, only a small group of people, mainly in academia, understood the science of ecology. By 1940, ecology was the cornerstone of wildlife management.
- In 1930, there were no textbooks, journals, or professional organizations devoted exclusively to the emerging field of wildlife management. By 1940, this field had its text (Leopold’s *Game Management*), its journal (the *Journal of Wildlife Management*), and its professional society (the Wildlife Society).
- In 1930, one could count on the fingers of one hand the number of research projects set up specifically “to furnish biological facts” relevant to the conservation of wildlife. By 1940, a national system of financial and institutional support for wildlife research (the Cooperative Wildlife Research Unit program) had been established.
- In 1930, opportunities to study wildlife management were virtually nonexistent, confined (at best) to an occasional lecture in a forestry or agriculture class. By 1940, courses and whole departments devoted to wildlife management were in place in dozens of universities (particularly the nation’s land-grant universities, which were built, at least in part, on land “granted” to them by the government).
- And perhaps most significant, in 1930, few people appreciated the connections among wildlife ecology and management, other basic and applied sciences, and economics, philosophy, and other fields. By 1940, spurred on considerably by the new generation of “wildlifers,” people were beginning to grasp the broad implications of conservation.



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Even as wildlife management was securing these professional footholds, its conceptual foundation continued to broaden. During these years of ferment, the focus had expanded well beyond Leopold's original aim of "making land produce sustained annual crops of game for recreational use." The shift toward the more inclusive term *wildlife* reflected not just an interest in a wider spectrum of species but also a deeper realization of the widespread importance of the science of ecology. Leopold himself saw this clearly. In a 1939 address to a joint meeting of the Society of American Foresters and the Ecological Society of America, he described ecology as "a new fusion point for all the natural sciences." He noted that ecology challenged traditional notions of placing a value on particular species, even as it highlighted the basic importance of biological diversity. "No species," he proposed, "can be 'rated' without the tongue in the cheek. The old categories of 'useful' and 'harmful' have validity only as conditioned by time, place, and circumstance. The only sure conclusion is that the biota as a whole is useful, and biota includes not only plants and animals, but soils and waters as well."

Leopold was hardly alone in this realization. In every field of natural resource management, there were "dissenters" (to use Leopold's term) who reached the same conclusion: Understanding of natural phenomena and human environmental impacts came not simply through the division of reality into smaller and smaller bits—the method of reductionist science—but through greater attention to the connections and relationships in nature at various scales of time and space. For the conservation professions, this had important practical implications. One could not simply manage soils, timber trees, game animals, or any other "resource" as separate entities; one also had to treat the ecological processes that kept the system as a whole healthy. This meant that, despite departmental and disciplinary labels, integration was essential to all conservation work.

This line of thinking would endure even the tumult of World War II. As an inherently integrative undertaking, wildlife management was partially immune to the postwar trend toward extreme specialization. Through the 1950s, there was close, active, and regular interaction among academic ecologists, other biologists, and the applied wildlife management programs in the universities and the state and federal governments.

By the end of the 1950s, however, even wildlife management began to suffer from "hardening of the categories." As noted in 1989 by Fred Wagner, new directions in the underlying sciences "would send academic ecology and applied wildlife management down somewhat different paths and dissolve the close association of previous decades." In the following decades, these widening gaps—between theoretical and applied scientists, between scientists and managers, between departments in the agencies and universities—would make consensus ever more difficult. Simultaneously, threats to the biota, at all geographic scales, intensified. In short, the "glue" that first allowed wildlife management to come together and stick together—an expanding appreciation of biological diversity and ecosystem processes, broad training in the natural sciences, collaborative research projects, and integrated approaches to resource management—was allowed to break down. For a generation, fragmentation would become increasingly evident, not only in the modern landscape but also in the modern mindscape.

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The quickening pace of environmental degradation and biological impoverishment in the 1960s and 1970s would outstrip the ability of the various conservation-related sciences, acting in isolation, to respond. In a world beset by complex, large-scale, interrelated environmental concerns—including deforestation, air and water pollution, global climate change, human population growth, and misguided international development projects—wildlife management as generally practiced seemed less and less relevant or responsive.

The newly energized environmental movement sought to confront these trends through ambitious conferences, management programs, and legislative initiatives at the national and international levels. Yet these measures alone could not reverse the trends. Ultimately, we could attain conservation goals only through understanding and changing the entrenched patterns of resource use that threatened plant and animal populations, degraded their habitats, and disrupted the functioning of ecosystems. This was, in many ways, the proper domain of wildlife management. However, to respond, the profession has had to rethink its priorities, broaden its mission, and reintegrate itself with the other resource management professions. For many in wildlife management, that process has in fact gone on under the name of conservation biology.

The rise of conservation biology has all but inevitably provoked defensiveness by some in the “traditional” conservation fields. However, it has also allowed many—from the agency head to the district-level wildlife manager—to step beyond, and return to, their respective areas of expertise with a deeper sense of their professional roots, their shared goals, and the special contribution they can make to the common cause. Conservation biology treats the world not as a collection of separate specialties but as an interconnected whole to which each specialty can bring emphasis, insight, and perspective. In this, it is not primarily a challenge to wildlife management. Rather it is a fulfillment of the conservation vision to which wildlife management has always given so much. As wildlife management redefines its own future role accordingly, it can take justifiable pride in its historic efforts to promote what Leopold called “that new social concept toward which conservation is groping.”

