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## THE ROLE OF ORNITHOLOGY IN CONSERVATION OF THE AMERICAN WEST<sup>1</sup>

CARL E. BOCK<sup>2</sup>

*Department of Environmental, Population, and Organismic Biology,  
University of Colorado, Boulder, CO 30309-0334,  
e-mail: carl.bock@colorado.edu*

**Abstract.** Joseph Grinnell, first Director of the Museum of Vertebrate Zoology at the University of California, Berkeley, was a dedicated and remarkably prescient conservationist, as well as a pioneer western ornithologist. He was one of the first to recognize that birds have particular value in conservation because of their charisma, familiarity, and sensitivity to environmental conditions. History has proven Grinnell right, as evidenced by the influence of birds and ornithology in efforts to protect species and their habitats. However, threats to natural landscapes in western North America continue on a scale even Grinnell might not have predicted. Ornithologically-based conservation efforts must be re-doubled, focused on subjects such as landscape and metapopulation models specifically for western habitats, the use of large-scale data sets, the genetic structure of species and populations, avian responses to environmental stressors and disease, and studies of birds in winter.

**Key words:** American West, conservation, Joseph Grinnell, ornithology.

### INTRODUCTION

Any consideration of the importance of ornithology to conservation in western North America must begin with one of The Cooper Society's deepest roots. Joseph Grinnell (see photograph, p. 6) was Director of the Museum of Vertebrate Zoology (MVZ) at Berkeley, from its founding in 1908 until his death in 1939. Grinnell also was very active in the Cooper Ornithological Society. He was a pioneer western ornithologist, ecologist, systematist, and my academic grandfather.

Reading Grinnell is rather like reading Darwin. With a modest amount of interpretation, he said almost everything important there is to say about anything important. For example, Grinnell was among the first biologists to understand such fundamentals as (1) the basis and importance of geographic variation in species, (2) the

biological species concept itself, (3) the ecological, biogeographic, and evolutionary significance of competition among species, (4) the importance of dispersal to metapopulation dynamics and landscape ecology (not that he used these terms), (5) the concept of the niche, and (6) the importance of macro- and geographical ecology in general (e.g., Grinnell 1904, 1917a, 1917b, 1922, 1924, 1928).

Joseph Grinnell also was a conservation biologist. In fact, we probably should remember him primarily as a conservationist, despite his extraordinary contributions to basic ornithology and vertebrate biology. The evidence from his own activities and writings strongly supports this conclusion, as illustrated by the following examples:

First, Grinnell was instrumental in shaping the philosophy and operation of our National Park System, to focus it on the protection of ecosystems in a nearly natural state, and to make sure that visitors were informed about each park's natural attributes (Runte 1990).

In 1925, 62 years before the first issue of *Conservation Biology*, Grinnell published a let

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ter in *Science* entitled "A Conservationist's Creed as to Wild-Life Administration." Among several parts of this creed were these remarkably prescient assertions:

—"I believe that that portion of our wild animal life known as 'game' belongs no more to the sportsman than to other classes of people who do not pursue it with shotgun or rifle."

—"I believe that it is wrong and even dangerous to introduce (that is, to turn loose in the wild) alien species of either game or non-game birds and mammals."

—"In the interests of game and wildlife conservation generally, I believe in the wisdom of doing away with grazing by domestic stock, more especially sheep, on the greater part of our national forest territory." [This is my personal favorite Grinnell quote.]

—"I believe that the administration of our game and wildlife resources should be kept as far as possible out of politics. The resources in question should be handled as a national asset, administered with the advice of scientifically trained experts."

—"I believe that the very best known way to 'conserve' animal life . . . is by the establishment and maintenance of numerous wildlife refuges, not only as comprised in private and public parks, but in national forests and elsewhere."

Two years after he and Annie Alexander established MVZ, Grinnell wrote an article in *Popular Science Monthly*, entitled "The Methods and Uses of a Research Museum" (Grinnell 1910). In that article, he wrote the following:

"At this point, I wish to emphasize what I believe will ultimately prove to be the greatest value of our museum.—And this is that the student of the future will have access to the original record of faunal conditions in California and the west wherever we now work.—Right now are probably beginning changes to be wrought in the next few years vastly more conspicuous than those that have occurred in ten times that length of time preceding."

Grinnell perceived that western North American habitats were on the verge of massive changes related to an increased human population, and that the over-arching role of MVZ was to document the nature of California in particular before it was so-altered as to be scarcely recognizable. Data archived in the museum would be the yardstick against which we could measure changing environmental conditions, as well

as a blueprint for efforts at conservation and restoration.

One wonders if even Grinnell understood the magnitude of what was in store for his study area (Jehl and Johnson 1994, Scott 1994). Nevertheless, his advice and his example are timeless reminders of what we can and should do to conserve what is left of western North America, and of the role of ornithology in that endeavor. Below, I attempt to summarize the reasons why bird study has been important to conservation, and to suggest some directions for further work.

#### WHY BIRDS ARE IMPORTANT TO CONSERVATION EFFORTS

A friend in the publishing business once told me that the three topics most likely to result in a best-selling book are religion, sex, and birds, and that one should try to get all three subjects into the same volume. Most of our attempts to find the all-purpose title were unprintable. The point is that birds have extra-ordinary *charisma power*, capable of evoking passion for conservation not only of birds but also for their habitats, so that even the less glamorous organisms get a ride.

Birds also have great *indicator power*. The story of the miner's canary is certainly overworked, and not all that relevant. But there are attributes of birds that make them valuable, powerful, and sensitive indicators of environmental condition. Prominent among these are their mobility, conspicuousness, and familiarity.

Grinnell was reputed to have said something like "If I sit in my office looking out the window long enough, it is only a matter of time before every species of bird in North America flies by." Grinnell (1922) wrote about this dispersal power of birds, and about their resulting virtual ubiquity. In a practical sense, most bird species have been nearly everywhere. If they are missing from some place, it is not because they haven't found it. It is because they found it unlivable, and perhaps because we made it so.

Birds are very poor indicators of historical biogeography, except in the deepest evolutionary sense, because of their mobility. However, they are rapid and sensitive indicators of *current* environmental conditions (e.g., Lynch 1980). Also, because their natural histories are so well-known, we can interpret what birds'

comings and goings are telling us about the condition of the environment.

#### ORNITHOLOGICAL CONTRIBUTIONS TO CONSERVATION

Because of their charisma value and indicator power, birds have played a disproportionate role in conservation efforts. For example, nearly 30% of articles published in *Conservation Biology* in the past five years, among those with any taxonomic identity, were focused on birds.

Among research and conservation activities and organizations, birds and ornithologists have played especially important roles in the following:

#### THE ENDANGERED SPECIES ACT

For all its limitations (Carroll et al. 1996), this is an essential piece of environmental legislation, and it has very strong ties to birds. One need only think of the Peregrine Falcon (*Falco peregrinus*) and the Bald Eagle (*Haliaeetus leucocephalus*) to appreciate the value attached to birds by the public at large, and the consequent support for endangered species protection.

#### THE NATIONAL AUDUBON SOCIETY

This is our country's premier ornithologically-focused environmental organization, and a powerful voice for conservation. It is refreshing to learn of the society's renewed emphasis on science-based and bird-oriented strategies for conserving the American landscape (Flicker 1996).

#### ISLAND BIOGEOGRAPHY, LANDSCAPE ECOLOGY, AND METAPOPOPULATION DYNAMICS

Birds and ornithologists have figured prominently in the development of these approaches to geographical ecology (e.g., MacArthur and Wilson 1967, Pulliam 1988, Pulliam et al. 1992, Brown 1995), all of which have powerful implications for conservation efforts centered on landscape-level habitat management (Kareiva and Wennergren 1995), including gap analysis (Scott et al. 1993).

#### LARGE-SCALE DATA SOURCES

For all their limitations, efforts such as the Breeding Bird Survey (BBS; Price et al. 1995) and Christmas Bird Count (CBC; Root 1988) allow us to see how birds occupy space and time in ways that biologists can only guess about for other sorts of organisms.

#### THE REVOLUTION IN MOLECULAR SYSTEMATICS

Birds are playing a prominent role in more fully understanding the genetic structure of populations, patterns of geographic variation, and relationships among species that help to craft meaningful and relevant conservation strategies (e.g., Zink and Dittmann 1991, Johnson 1995).

#### FUTURE EFFORTS

Natural landscapes of western North America remain threatened by human population growth, and by our seemingly insatiable need for more of the region's natural resources. Ornithologically-based conservation efforts must continue, because of the ways that information about birds can rally public opinion, as well as inform us about environmental conditions. Among the many issues requiring attention, the following may be particularly important:

#### HOW VALUABLE ARE THE CBC AND BBS?

These data appear to give us powerful insights into species' abundance patterns in space, but much more problematic glimpses of variations in species abundances across time (Maurer and Villard 1996). More work is needed to determine both the strengths and limitations of these unique data sources.

#### LANDSCAPE ECOLOGY AND METAPOPOPULATION MODELS

There are two aspects of these endeavors that need much further research. First, these are areas of inquiry rather long on theory and short on data. We need to find ways to test the models, to refine them, and then to try more actual applications to real world conservation problems. All of these models depend on understanding three essential population processes, and how they operate in real space. These are natality, dispersal, and adult survivorship. Ornithologists have an abundance of recruitment data. Dispersal and survival data are harder to obtain, and we need more of them (but see recent review of survival data in Martin 1995).

Second, some of the models apparently make sense for remnant patches of midwestern and northeastern habitats (e.g., Thompson 1993, Vickery et al. 1994), but they may have much less to do with avian metapopulation survival in western landscapes. These habitats usually are more naturally fragmented, so that

western birds may be operating under different evolutionarily-imposed rules than their mid-western and northeastern counterparts. There is need for a new western approach to landscape ecology, although it is not yet clear just what this will turn out to be.

#### AVIAN ECOPHYSIOLOGY

There seems to be something rather mysterious and alarming going on among vertebrate groups other than birds, involving population declines or extinctions among amphibians, fishes, and perhaps mammals, where the implied culprits are physical environmental stressors, epidemic diseases, and their possible interactions. Specific examples are the startling declines in many amphibians (Wake 1991, Blaustein et al. 1994), and outbreaks of whirling disease in salmonid fishes (Hoffman 1990). Might such things be happening to birds? The impact of malaria on native Hawaiian species shows that diseases can have these effects (e.g., van Riper et al. 1986). Are habitat loss, cowbirds, and domestic/com-mensal predators the only factors causing declines in the avifauna of western North America?

#### BASIC HABITAT INFORMATION

Although it may no longer get you a degree or a job, the fact is that for many species of western birds we lack the necessary habitat information to make the simplest sorts of conservation decisions (Patten et al. 1995, Shuford et al. 1995). Ways must be found to enhance and legitimize collection and curation of this basic habitat information. The *Birds of North America* series, currently being published by the Philadelphia Academy of Sciences and the American Ornithologists' Union, is a powerful tool and a brilliant idea, not only to summarize what is known, but to make clearer what is not known. In its rebirth as an organization dedicated to the conservation of birds, the National Audubon Society ought to take a central role in the collection, integration, and dissemination of this sort of essential information.

#### WINTER

It is an old debate whether bird populations are limited on their winter or breeding grounds (e.g., Fretwell 1972, Sherry and Holmes 1995). Whatever the answer, and it will not be the same for all species, we need to know much more about what birds require and do in this critical

and neglected season. This applies to birds that winter in North America, as well as those that migrate to the tropics.

#### MIND SET

Lest the reader think that I have an aberrant and unrealistically rosy view about birds, conservation, and life in general, let me finish by sharing my personal take on the dark side of all of this, and how I manage to rise above it, at least most of the time.

Sometimes at night I am visited by the ghosts of Edward Abbey and George Hayduke, and they accuse me of not being serious about conservation. They claim that most scientists, including those of us who study birds, are more interested in our next grants or publications than we are in doing something sufficiently radical to make a difference. Then they suggest that we should all go out and blow something up. This idea has a certain visceral appeal. Yet the logic of radical environmentalism is fatally flawed, because one sort of anarchy does nothing better than to spawn it in other less desirable forms. We have clear signs of anarchy already in the western United States, and they have ominously little to do with conservation. I believe we have no choice but to work with our fellow humans, to be patient and constructive and tolerant, but also to be brave and truthful, and to hope that we all come to our reproductive senses before it is too late.

I have a friend who is something of a futurist. His take on environmental issues consists of these predictions:

- (1) We will in time find a clean, inexpensive, and virtually infinite energy source.
- (2) We will in time learn how to grow food without agricultural ecosystems as we know them.

(3) Therefore, the conservation efforts of the 20th Century will be judged in retrospect as quaint, pointless, and relictual nostalgia for something that was doomed in the first place, and that ultimately won't be missed more than any other aspect of human history—perhaps deserving of archiving in museums, but of little other interest or value.

I have two radically different takes on my friend's scenario, both based on the assumption that we and the earth survive:

- (1) The 20th and 21st Centuries will be regarded as that period in human history when we

had the last chance to save what was left of the natural world, something that it turns out we needed for our spiritual survival and for other reasons, and we failed;

or,

(2) The 20th and 21st Centuries will be regarded as that period in human history when a sufficient mass of key, motivated groups and individuals got organized, devoted their best minds and their best science to the problems at hand, and ended up preserving at least a part of nature.

I prefer the second scenario. It may not come to pass, but I would prefer that history judge me as having made the effort in any event.

Many people are asking for our help, because they sense the terrible flaws inherent in my futurist friend's world view. Ornithologists in particular are being asked by these people to bring all that science can bring to bear (see Senner and Drennan 1995). Of equal importance, we are being asked to become advocates, not only for birds but for their habitats and for all the diversity of life. Then perhaps our descendants will say this about our cause and about our time: that we fought the mother of all battles for the conservation of nature, and that, at least to some degree, we won.

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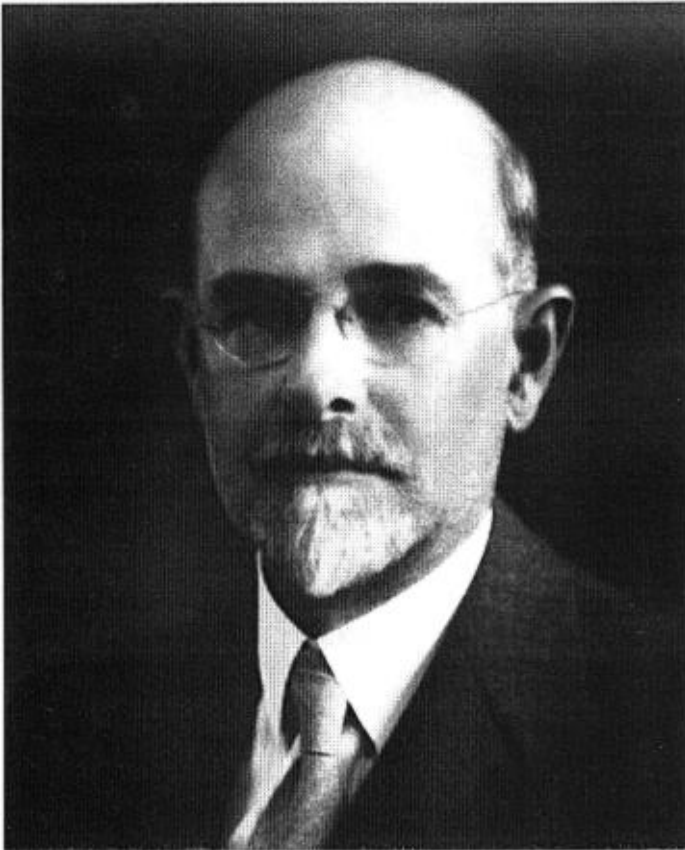
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Joseph Grinnell, pioneer western ornithologist and early conservation biologist. Photograph taken in 1932; courtesy of the Museum of Vertebrate Zoology, University of California, Berkeley.