

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

USGS Staff -- Published Research

US Geological Survey

---

2006

## The National Wildlife Refuge System

Robert P. Davison

*Wildlife Management Institute*

Alessandra Falcucci

*University of Idaho*

Luigi Maiorano

*University of Idaho*

J. Michael Scott

*U.S. Geological Survey*

Follow this and additional works at: <https://digitalcommons.unl.edu/usgsstaffpub>

---

Davison, Robert P.; Falcucci, Alessandra; Maiorano, Luigi; and Scott, J. Michael, "The National Wildlife Refuge System" (2006). *USGS Staff -- Published Research*. 705.

<https://digitalcommons.unl.edu/usgsstaffpub/705>

This Article is brought to you for free and open access by the US Geological Survey at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in USGS Staff -- Published Research by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Published in *The Endangered Species Act at Thirty, Volume 1: Renewing The Conservation Promise*, edited by Dale ) . Goble, J. Michael Scott, & Frank W. Davis (Washington: Island Press, 2006), pp. 90-100.

## The National Wildlife Refuge System

Robert P. Davison, Wildlife Management Institute  
Alessandra Falcucci, University of Idaho  
Luigi Maiorano, University of Idaho  
J. Michael Scott, U.S. Geological Survey

# 8 The National Wildlife Refuge System

*Robert P. Davison, Alessandra Falcucci, Luigi Maiorano,  
and J. Michael Scott*

The National Wildlife Refuge System (NWRS) has played a key role in conserving at-risk species from its beginnings in 1903 when President Theodore Roosevelt established a preserve to protect Pelican Island, in Florida, as a breeding ground for an imperiled population of brown pelicans (*Pelecanus occidentalis*) (Fischman 2003). Today, the Atlantic coast population of the brown pelican is no longer in need of protection under the Endangered Species Act (ESA), but Pelican Island National Wildlife Refuge provides protection for nine threatened and endangered species.

Management of the refuge system has changed significantly since the presidency of Teddy Roosevelt, evolving from the creation of “inviolable sanctuar[ies]” (Act of February 18, 1929, sec. 715d) through a period in which conservation of wildlife and natural communities was balanced with public uses, often to the detriment of conservation (Curtin 1993), to the current period in which the refuge system is to be managed to protect biological integrity, diversity, and environmental health, the management mandates enacted in the National Wildlife Refuge System Improvement Act of 1997 (Act of October 9, 1997; Gergely et al. 2000).

This chapter describes the role the National Wildlife Refuge System plays in conserving species listed under the ESA, identifies factors that limit the refuge system’s effectiveness in achieving that objective, and identifies opportunities to increase imperiled species conservation within the refuge system.

## The Role of Refuges in Species Conservation

The National Wildlife Refuge System consists of more than 37 million hectares (91.4 million acres) in 542 units that host more than seven hundred species of birds, eight hundred other vertebrate species, and many hundreds of species of plants and invertebrates (Butcher 2003).

Fifty-seven NWRS units have been established solely under authority of the ESA (table 8.1). These units were established to aid in the conservation of some of the best-known as well as some of the most obscure imperiled species. James River National Wildlife Refuge in Virginia, for example, provides habitat for the threatened bald eagle (*Haliaeetus leucocephalus*), while Ash Meadows National Wildlife Refuge in Nevada protects at least twenty-four plants and animals found nowhere else in the world, including twelve listed species. Many other units were established in part using the acquisition authority of the ESA. Blackwater National Wildlife Refuge in Maryland, for example, consists of lands and waters acquired under the authority not only of the ESA, but also of the Migratory Bird Conservation Act (Act of February 18, 1929), Land and Water Conservation Fund Act (Act of May 28, 1963), the Emergency Wetlands Resources Act (Act of November 10, 1986), the North American Wetlands Conservation Act (Act of December 13, 1989), and through the withdrawal of other public lands. In addition, some units—such as Pelican Island National Wildlife Refuge—initially established for other purposes, currently provide habitat for listed species. Indeed, more than 80 percent of the NWRS units provide habitat for one or more species listed under the ESA. This high rate of occurrence is misleading, however, since a few relatively common listed species, such as the bald eagle, account for it. Most endangered species that occur in the refuge system are found on fewer than three

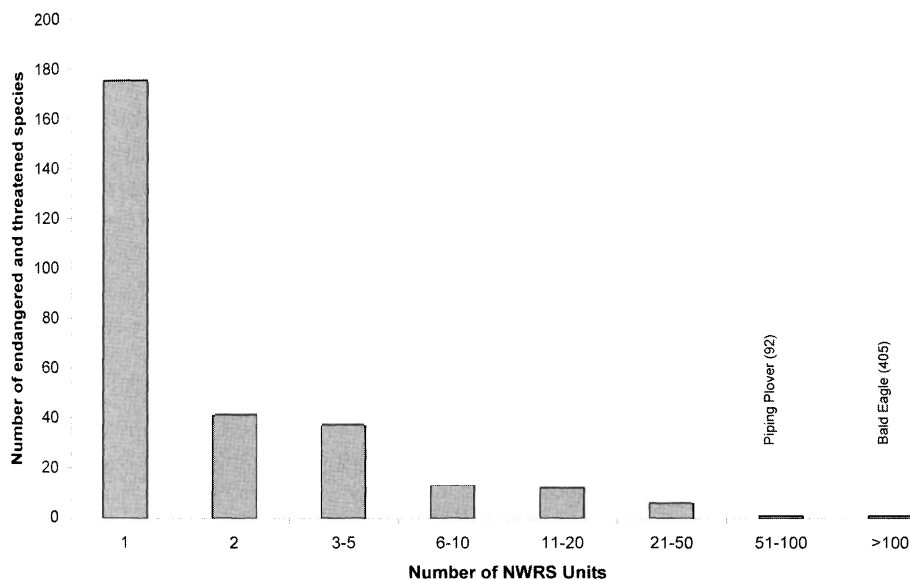


Figure 8.1. Number of occurrences of endangered and threatened species on units of the National Wildlife Refuge System.

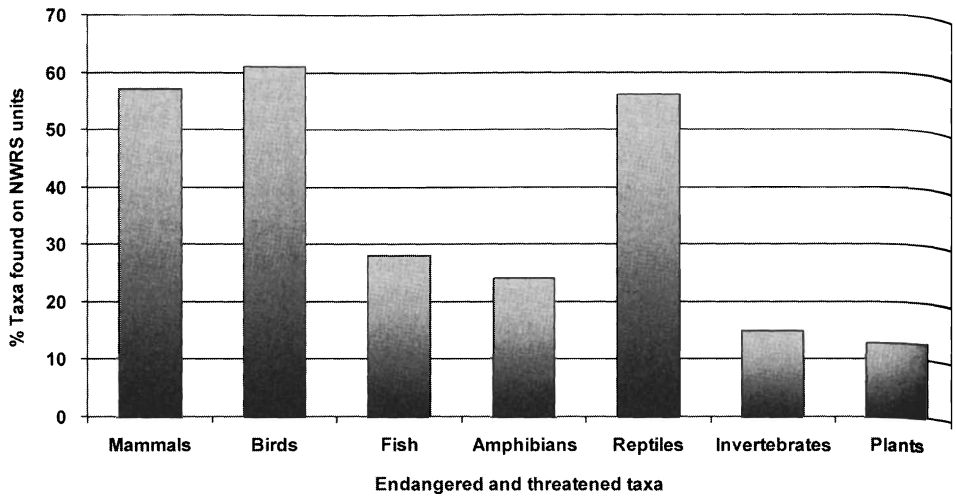


Figure 8.2. Percentage of endangered and threatened taxa found on National Wildlife Refuge System units.

refuges (fig. 8.1). Furthermore, most listed species are not found within the refuge system: approximately 75 percent of listed fish and amphibians and roughly 85 percent of listed plants and invertebrates are not present on NWRS units (fig. 8.2).

Czech (forthcoming) found that units of the National Wildlife Refuge System are able to support evolutionarily viable populations for 44 percent, demographically viable populations for 52 percent, and outbreeding viability for 58 percent of the threatened and endangered vertebrate species he studied. One would expect that larger percentages of viable populations would be found for invertebrates and plants because they have smaller area requirements. Nonetheless, the fifty-seven NWRS units established under the authority of the ESA are relatively small; median size is just 415 hectares (1,025 acres). Seventeen are smaller than 100 hectares (247 acres), and thirty-one are smaller than 500 hectares (1,236 acres). Only two are larger than 10,000 hectares (24,711 acres) (fig. 8.3). As a consequence, these units could be expected to support fewer viable populations of threatened and endangered species than reported by Czech (forthcoming) for all refuges.

Unit size is also relevant because the effectiveness of the refuge system in conserving endangered and threatened species is affected by activities that occur on adjacent properties. Although some of the NWRS units established for listed species are an integral component of larger conserved landscapes, oth-

TABLE 8.I. National Wildlife Refuge (NWR) System units established for one or more species under the authority of the Endangered Species Act

<i>State</i>	<i>Unit name</i>	<i>Unit size</i>	
		<i>Hectares</i>	<i>Acres</i>
Alabama	Blowing Wind Cave NWR	107	264
	Fern Cave NWR	81	199
	Key Cave NWR	429	1,060
	Watercress Darter NWR	3	7
Arkansas	Logan Cave NWR	50	124
Arizona	Buenos Aires NWR	47,217	116,585
	Leslie Canyon	1,120	2,765
	San Bernardino NWR	960	2,369
California	Antioch Dunes NWR	22	55
	Bitter Creek NWR	5,692	14,054
	Blue Ridge NWR	363	897
	Castle Rock NWR	6	14
	Coachella Valley NWR	1,455	3,592
	Don Edwards San Francisco Bay NWR	8,717	21,524
	Ellicott Slough NWR	56	139
	Hopper Mountain NWR	1,001	2,471
	Sacramento River NWR	3,193	7,884
	San Diego NWR	745	1,840
	San Joaquin River NWR	663	1,638
	Seal Beach NWR	369	911
	Sweetwater Marsh NWR	128	316
Tijuana Slough NWR	414	1,023	
Florida	Archie Carr NWR	12	29
	Crocodile Lake NWR	2,708	6,686
	Crystal River NWR	32	80
	Florida Panther NWR	9,469	23,379
	Hobe Sound NWR	397	980
	Lake Wales Ridge NWR	267	659
	National Key Deer Refuge	3,460	8,542
	St. Johns NWR	2,533	6,260
Hawaii	Hakalau Forest NWR	13,256	32,730
	Hanalei NWR	371	917
	Huleia NWR	98	241
	James C. Campbell NWR	66	164
	Kakahaia NWR	18	45
	Kealia Pond NWR	280	691
	Pearl Harbor NWR	25	61
Iowa	Driftless Area NWR	211	521

(continues)

TABLE 8.1. *Continued*

<i>State</i>	<i>Unit name</i>	<i>Unit size</i>	
		<i>Hectares</i>	<i>Acres</i>
Massachusetts	Massasoit NWR	75	184
Michigan	Kirtland's Warbler WMA	2,647	6,535
Mississippi	Mississippi Sandhill Crane NWR	7,984	19,713
Missouri	Ozark Cavefish NWR	17	42
	Pilot Knob NWR	37	90
Nebraska	Karl E. Mundt NWR	8	19
Nevada	Ash Meadows NWR	5,374	13,268
	Moapa Valley NWR	13	32
Oklahoma	Ozark Plateau NWR	894	2,208
Oregon	Bear Valley NWR	1,701	4,200
	Julia Butler Hansen Refuge for Columbian White-tail Deer	1,114	2,750
	Nestucca Bay NWR	185	457
South Dakota	Karl E. Mundt NWR	423	1,044
Texas	Attwater Prairie Chicken NWR	3,243	8,007
	Balcones Canyonlands NWR	5,728	14,144
Virgin Islands	Green Cay NWR	6	14
	Sandy Point NWR	132	327
Virginia	James River NWR	1,680	4,147
	Mason Neck NWR	922	2,276
Washington	Julia Butler Hansen Refuge for Columbian White-tail Deer	1,125	2,777
Wyoming	Mortenson Lake NWR	719	1,776

ers are isolated and poorly connected with other lands and waters managed for conservation purposes (Scott et al. 2004). The fact that NWRs units generally are far smaller than the areas over which large-scale ecological processes operate and too small to maintain viable populations of many species presents significant challenges for long-term maintenance and recovery of imperiled species (Gergely et al. 2000; Scott et al. 2001a, Scott et al. 2001b; Scott et al. 2004).

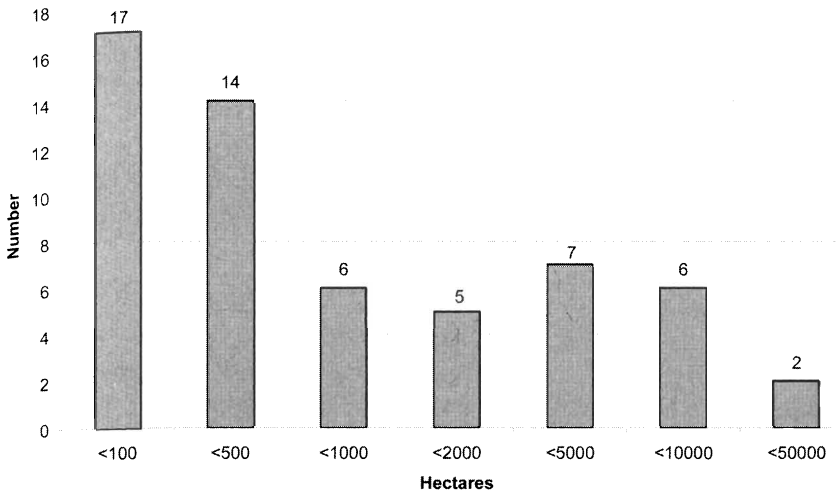


Figure 8.3. Sizes of National Wildlife Refuge System units established under Endangered Species Act authority.

### *The Role of Refuges in Species Recovery*

A key objective for those NWRS units established pursuant to the ESA is to assist in achieving the act's recovery goal. As might be expected, recovery plans generally identify management or research actions on ESA-established units. Of the ninety listed species for which NWRS units have been established under ESA authority, two-thirds (sixty) have recovery plans that specifically cite all of the NWRS units established for those species (table 8.2). Twenty-three percent (twenty-one) of the species have recovery plans that cite only the general area in which the NWRS unit is found or fail to cite one or more of the NWRS units established for the species. For example, although the recovery plan for the Hawaiian hoary bat (*Lasiurus cinereus semotus*) (USFWS 1998c) mentions refuges in general, it does not mention Hakalau Forest National Wildlife Refuge, where it is commonly found (Kepler and Scott 1990).

Although recovery plans usually cite those NWRS units that were established for the species in question, the link with recovery planning may be more tenuous to NWRS units that report occurrences of listed species but that were not established solely for ESA purposes. The recovery plan for the endangered least tern (*Sterna antillarum*), for example, addresses limited management and monitoring actions on four NWRS units but does not mention any of the other thirty-three NWRS units on which the species occurs (USFWS 1990b).



TABLE 8.2. Citation of National Wildlife Refuge (NWR) System units in Endangered Species Act recovery plans

	<i>NWR cited</i>	<i>General area cited</i>	<i>One or more NWR not cited</i>	<i>Unknown</i>	<i>Total</i>
Mammals	5	0	1	2	8
Birds	10	4	7	4	25
Reptiles	6	2	1	2	11
Amphibians	0	1	0	0	1
Fish	9	1	2	0	12
Invertebrates	4	2	0	0	6
Plants	26	0	0	1	27
<i>Total</i>	60	10	11	9	90

Similarly, the recovery plan for the threatened Atlantic coast population of the piping plover (*Charadrius melodus*) mentions only six of the twenty-one NWRS units within the population's breeding range on which the species is found (USFWS 1996a). None of the approximately twenty-four NWRS units within the species' wintering range are mentioned. Such examples could be multiplied, particularly for lesser-known species such as the endangered American burying beetle (*Nicrophorus americanus*) (USFWS 1991a).

### *Refuge Acquisition and Funding*

Although the National Wildlife Refuge System is being expanded at an increasing rate, clearly there are also limits on how much land can be set aside for species conservation. In the twenty-one years from fiscal year 1982 through fiscal year 2002, 5,147,319 acres were added to the refuge system. Over the first seven years of this period the annual average number of acres added was 104,205; over the next seven years the yearly average was 235,931; and over the last seven years, NWRS additions averaged 395,196 acres annually.

Of the lands added since 1982, relatively little (229,738 acres, or 4.5 percent) has been for ESA purposes. More revealing is the fact that only 13 percent of the 1.75 million acres that were purchased were acquired under the authority of the ESA. In addition, unlike the overall rate of acquisition, the rate at which ESA additions were made did not increase from fiscal year 1982 through fiscal year 2002. In the same period, the number of threatened and endangered species increased from 243 to 1,261 (USFWS 1982b, 2002b). These facts probably understate the benefits to listed species. In all likelihood,

much of the more than 4.9 million acres added to the refuge system since fiscal year 1981 is providing benefits for listed species.

Funding limitations constrain not only acquisition but also management of NWRS units. The General Accounting Office (GAO 1994a) found that available funding was insufficient to meet established objectives for refuges because the level of funding had not kept pace with the increasing costs of managing new or existing refuges. The GAO found that at fourteen of the fifteen locations visited, refuge managers and staff said that funding limited their ability to enhance habitat and to facilitate the recovery of listed species.

### Expanding the Role of Refuges in Species Conservation and Recovery

Although NWRS units play an important role in species conservation, this role could be expanded. In fact, it may be that the affirmative duty imposed by section 7(a)(1) of the ESA to take actions to conserve species actually requires priority to be given to refuge projects that would recover a listed species or prevent its extinction.

As noted, although many recovery plans use NWRS units to perform recovery objectives, it is not clear how frequently a recovery plan fails to mention NWRS units utilized by (rather than established specifically for) the species. Similarly, it is not known how commonly recovery plan strategies fail to incorporate management actions on these non-ESA units that are used by listed species. The failure of recovery plans to integrate NWRS units into their conservation strategies may mean that refuges are not engaged in any specific activities to conserve the species addressed in the recovery plan, or that those preparing the recovery plans are not aware of opportunities on the refuges. In any case, there is an opportunity for some—perhaps many—NWRS units to play a greater role in the recovery of listed species.

Overall, federal lands support at least one example of nearly three-fifths (59 percent) of species listed under the ESA and about one-third of the populations for both listed and at-risk species (Groves et al. 2000). Lands within the National Wildlife Refuge System, however, provide shelter for just 6 percent of federally listed species populations and 13 percent of listed species—fewer ESA-listed species populations and species than the lands of any other federal land management agency (Groves et al. 2000). The role of the refuge system in endangered and threatened species conservation could be enhanced by increasing the relatively infrequent use of ESA authority in acquiring NWRS lands and by allocating a greater proportion of NWRS acquisition funding to that purpose. In particular, highest priority could be given to land acquisition projects that score 200 in the Land Acquisition Priority System (LAPS) endangered

and threatened species category because they either would recover a species or prevent its extinction. Opportunities also exist to increase funding to meet costs of enhancing habitat and to facilitate the recovery of listed species.

Given that private lands support at least one population of more than half of the species listed under the ESA, conservation of these lands is essential to recovering listed species. Limited resources and opposition to further acquisition of private lands by the federal government (particularly in the West) constrain acquisition of private lands for addition to the refuge system and prevent the system from becoming a functioning network of fee title lands that meet the needs of at-risk species. Acquisition of fee title to specific parcels may not, however, be necessary to achieve conservation objectives. Thus, there is value in determining precisely the objective of the land conservation effort. In at least some cases, the objectives for listed species can be met as effectively, or perhaps more effectively, by other means, such as keeping the land in ranching or forestry (Thompson, this volume). A broad, long-term view may well argue against efforts to exert absolute control over the landscape and in favor of alternative approaches such as conservation easements (Parkhurst and Shogren, this volume). This fact has not gone unrecognized by the USFWS. On average over the past two decades, approximately 40,000 acres have been added to the National Wildlife Refuge System through leases or easements (USFWS, unpublished data).

Even less direct control may be necessary in order to achieve more ambitious objectives such as conserving watersheds, habitat types, or ecosystems. Maintaining biological diversity at the landscape level requires the participation of many people and a broad array of interests. The Silvio O. Conte National Wildlife Refuge in New England is a good example of such an approach. The refuge seeks to conserve the natural resources of the 7.2-million-acre Connecticut River watershed largely by involving the public—especially landowners and land managers—in environmental education programs and cooperative management projects. Fostering partnerships among public agencies, conservation organizations, and private landowners continues to be one of the most successful models for encouraging private lands conservation, as evidenced by the North American Waterfowl Management Plan and the USFWS's Partners for Fish and Wildlife Program.

To achieve the land conservation necessary to recover listed species, the use of all available conservation programs must be integrated and focused on those habitats upon which at-risk species depend. This means that research, monitoring, and management of NWRS units must be integrated with ESA recovery planning. It suggests that the LAPS could be a highly effective tool to promote protection of threatened and endangered species' habitat through the National Wildlife Refuge System.

It is unlikely that there ever will be a single comprehensive program to conserve biological diversity. Congress and the executive branch think in terms of specific programs for particular constituencies. The result is programs to establish NWRS units to recover endangered and threatened species, to conserve North American wetlands and migratory birds, to promote conservation practices on agricultural lands, and to acquire and manage national forests, public lands, and national parks. These programs are neither comprehensive nor integrated. Indeed, they often conflict because of the manner in which congressional committees and executive agencies are organized and operate. Whether in Congress or in the executive branch, it often is easier and more highly rewarded to create a new program than it is to integrate new objectives into an existing program.

The reality of independently created programs makes habitat conservation more challenging. It means that habitats for species conservation need to be identified and prioritized. It suggests that all available programs to achieve that conservation must be identified. Identifying government programs that could benefit listed species and informing landowners and land managers of these resources can complement habitat conservation efforts in the refuge system. The North American Waterfowl Plan and Joint Ventures efforts provide possible models for such multiparty partnerships.

Given greater resources, there would be more opportunities for the National Wildlife Refuge System to play a central role not only in identifying and prioritizing lands for acquisition and managing those lands for conservation purposes but also in serving as a resource for other landowners. Additionally, the refuge system, through the example of its management practices, plays a significant role as a catalyst for improved management on other lands. Finally, greater integration of the refuge system's activities with those of other federal and nonfederal landowners and with regional land conservation efforts would further enhance recovery efforts. These actions could substantially elevate the already important role the refuge system plays in the conservation of endangered and threatened species.

## Conclusion and Recommendations

The relationship between recovery planning and management of NWRS units requires more thorough investigation. For example, the citation of NWRS units in recovery plans may indicate that those units are involved in the recovery of listed species, but more research is needed to determine the implications of such citations: are the plans used to establish land acquisition priorities, to determine management actions on the unit, or to guide other actions? Moreover, monitoring is needed to verify how often the conservation actions

included in the recovery plans have been implemented on NWRS units. If these units are not cited in recovery plans, further investigation can ascertain why and assess their potential for protecting listed species.

The low priority given to LAPS projects essential to listed species should also be investigated to determine whether the scoring is valid or if administrative or other hurdles give insufficient priority to land acquisition projects that could recover a species or prevent its extinction. Examining projects that receive maximum scores in the endangered species portion of LAPS would help to determine how many would aid recovery or prevent extinction.

An important but perhaps more difficult issue is the relationship between NWRS acquisition funding and ESA-related grants to states for endangered species habitat acquisition under approved habitat conservation plans. Investigations are needed to assess whether the two are inversely related—as land acquisition grants to states under section 6 of the ESA increase, NWRS land acquisition funding decrease (Robert Davison, unpublished data). Investigation is needed to explore the relative efficacy and costs of these two means of acquiring habitat for ESA-listed species.