Report to Congressional Requesters

September 1989

NATIONAL WILDLIFE REFUGES

Continuing Problems With Incompatible Uses Call for Bold Action

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The Honorable Mike Synar
Chairman, Subcommittee on Environment,
Energy, and Natural Resources
Committee on Government Operations
House of Representatives

The Honorable Gerry E. Studds
Chairman, Subcommittee on Fisheries
and Wildlife Conservation
and the Environment
Committee on Merchant Marine and Fisheries
House of Representatives

This report responds to your requests that we evaluate the management of national wildlife refuges. Specifically, it addresses whether the refuges are being managed for their established purposes and whether those purposes are being effectively met.

As agreed, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the Secretary of the Interior and other interested parties and make copies available to others upon request.

This work was performed under the direction of James Duffus III, Director, Natural Resources Management Issues, who may be reached at (202) 275-7756 if your staffs have any questions. Other major contributors are listed in appendix V.

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Executive Summary

Purpose

Declining populations of migratory waterfowl and other wildlife species have sounded an alarm over the health and sufficiency of the nation's wildlife habitat. Expressing concern about these population declines and certain wildlife refuge management practices affecting the refuges' performances in reversing them, the Chairman, Subcommittee on Environment, Energy, and Natural Resources, House Committee on Government Operations, asked GAO to determine whether national wildlife refuges are being managed for their established purposes—wildlife protection and enhancement—and whether those purposes are being effectively met. This request was later joined by the Chairman, Subcommittee on Fisheries and Wildlife Conservation and the Environment, House Committee on Merchant Marine and Fisheries, who expressed similar concerns about refuge management.

Background

National wildlife refuges are the only federal lands to be managed primarily for the benefit of wildlife. Since the first national wildlife refuge was created in 1903, the nation's wildlife refuges have grown into a loosely structured system of 452 refuges covering nearly 89 million acres. Because individual refuges have been created under many different authorities with a variety of funding sources, not all refuges have the same specific purpose or can be operated in the same way. However, the refuges' common function is providing habitat for many diverse and sometimes endangered species.

The attractive settings, high wildlife concentrations, and exploitable mineral resources associated with many refuges have also attracted people in large numbers. These visitors, coupled with other commercial and military activities, can threaten the ability of the refuges to protect and enhance wildlife and wildlife habitat. Managing and controlling these secondary uses has become a significant aspect of refuge management.

Responsibility for managing national wildlife refuges rests with the Department of the Interior's Fish and Wildlife Service (FWS). FWS' efforts to manage and control secondary uses are guided by each refuge's specific purposes as well as three broadly applicable laws—the Refuge Recreation Act of 1962, the National Wildlife Refuge System Administration Act of 1966, and the Endangered Species Act of 1973. The 1962 act required any recreational use of refuge lands to be compatible with the refuge's primary purposes. The 1966 act reinforced this compatibility standard and expanded its applicability to all secondary uses. The 1973 act directs FWS to give enhanced attention to protecting endangered and threatened species in its management of the refuges.

Results in Brief

National wildlife refuges are frequently not the pristine wildlife sanctuaries implied by their name. While the refuges serve their primary purpose by providing habitat and safe haven for wildlife, virtually all refuges also host many other nonwildlife-related uses. According to refuge managers, managing these secondary uses such as public recreation, mining, and grazing is increasingly diverting management attention from the professional wildlife management functions that refuge staff have been trained to perform. Moreover, despite the requirement that only compatible secondary activities be permitted, refuge managers report that activities they consider harmful to wildlife resources (such as power boating and off-road vehicles) are occurring on nearly 60 percent of the wildlife refuges.

Harmful secondary uses of refuges are occurring for two primary reasons. First, on many refuges FWS has allowed the uses in response to pressure from local public or economic interests. Second, on other refuges FWS has not been able to control the harmful uses because it does not have full ownership of, or control over, refuge lands. Because FWS does not identify the performance potential of each refuge in fulfilling its wildlife enhancement mission, a precise assessment of the overall impact of these harmful secondary uses cannot be made. However, on the basis of refuge manager responses to a GAO questionnaire and GAO's detailed scrutiny of 16 refuges, GAO believes that many of these uses are reducing the ability of refuges to serve their primary purpose.

Principal Findings

Secondary Uses Occurring Almost Universally

To collect information on the extent and nature of secondary uses on refuges, GAO sent questionnaires to the managers of each refuge. More than 90 percent of the 428 refuges for which GAO received questionnaire responses (out of 444 sent out) had at least one secondary use occurring. More than 70 percent of the responding refuges had at least 7 different secondary uses and more than 30 percent were experiencing at least 14 different uses. Managing this demand is increasingly diverting refuge management attention and scarce resources away from wildlife management—the refuge's primary purpose.

Many Secondary Uses Harming Wildlife Resources

Beyond distracting attention from wildlife management functions, many secondary uses are causing direct harm to wildlife resources despite the requirement that FWS allow secondary uses only if they do not materially detract from the refuges' ability to serve their primary purposes. Refuge managers reported that at least one harmful use was occurring on 59 percent of the refuges. Mining, off-road vehicle and airboat use, waterskiing, and military air exercises were most likely to be considered harmful. Refuge managers told us that these activities disturbed the wildlife habitat, disrupted breeding activities, or modified established animal behavior patterns.

FWS does not identify each refuge's wildlife enhancement potential so it is not possible to precisely measure the impact of harmful uses on the refuge's performance. While the total effect of the harmful uses on wildlife cannot be quantified, there is no doubt that the effect is negative. In this regard, GAO identified adverse impacts from secondary uses on wildlife in a number of individual refuges. In one case, for example, refuge managers believe the requirement to manage the refuge's water resources to provide waterskiing opportunities for area residents is substantially reducing the refuge's waterfowl production.

Causes of the Harmful Uses

Overall, refuge managers attributed the harmful uses of refuges to two primary factors—external pressures and limitations in FWS' jurisdiction over refuge resources. Refuge managers attributed about one-third of the ongoing harmful uses to each factor. The remaining one-third was attributed to miscellaneous other causes. With respect to the first primary factor, in spite of its compatibility mandate, FWS has allowed uses that refuge managers believed to be harmful to satisfy local public and economic interests that sought them. GAO believes this result can largely be attributed to FWS' consideration of nonbiological factors in making its compatibility decisions and its failure to periodically reevaluate ongoing secondary uses as prescribed by its Refuge Manual. It has also not compiled data on the cost of managing these uses.

With respect to the second primary factor, on many other refuges, refuge managers report that they are powerless to prohibit harmful uses because of various limitations in FWS' jurisdiction over refuge lands. These limitations include the lack of ownership of subsurface mineral rights, shared jurisdiction over navigable waterways within refuge boundaries, and the lack of control over military access to refuge lands and the airspace above them. On these refuges, such limitations effectively prevent managers from stopping a variety of uses such as mining,

commercial boat traffic, and low level military aircraft overflights that in many circumstances have proven to be harmful to wildlife resources.

Recommendations

For those refuge uses within FWS' discretion, GAO recommends that FWS ensure that compatibility decisions are based on biological criteria. GAO also recommends that FWS (1) compile financial data on the cost of managing secondary uses to determine their impact on refuges' limited resources, (2) comply with the requirement in its Refuge Manual to reevaluate ongoing secondary refuge uses on a periodic basis, and (3) eliminate all uses deemed, on biological grounds, to detract materially from the refuges' wildlife purpose(s). For those refuges where FWS cannot stop the harmful secondary uses because of ownership and control limitations, GAO recommends that FWS determine whether the refuges should be improved through the acquisition of needed property rights or other steps or be removed from the system, thus freeing limited resources for use at other wildlife refuges.

Agency Comments

GAO discussed the information in this report with FWS managers in the Office of the Assistant Director-Refuges and Wildlife. As requested, however, GAO did not obtain official FWS comments on this report.

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Abbreviations

FWS	U.S. Fish and Wildlife Service
GAO	U.S. General Accounting Office

Introduction

As migratory waterfowl and other wildlife populations have declined, national wildlife refuges have taken on new importance. While many federal lands, ranging from small plots of undeveloped land to vast stretches of untamed forest wilderness, provide habitat for wildlife, national wildlife refuges are the only federal lands to be managed primarily to preserve and enhance wildlife resources. These refuges represent only a small part of total wildlife habitat, even though they have expanded dramatically in both number and acreage since the first refuge was established at the turn of the century. As private wetlands and other critical wildlife habitat are lost to farming or other economic development, the importance of the refuges both to the wildlife they directly support and as models of wildlife protection and enhancement for other government agencies, state and local governments, and private initiatives, is expected to increase.

History of National Wildlife Refuges

Since 1900 the national wildlife refuge system has grown rapidly as a result of both presidential and legislative action. By Executive Order, dated March 14, 1903, President Theodore Roosevelt established the 3-acre Pelican Island refuge off Florida's central Atlantic coast as a preserve and breeding ground for native birds, such as brown pelicans, egrets, and great blue herons. Following this modest beginning at Pelican Island, President Roosevelt and a number of succeeding presidents dedicated many other islands and parcels of land and water for the protection of various species of colony-nesting birds killed for their plumes and feathers and other rapidly disappearing game animals. During the early 1900s, the Congress also responded to the conservation mood of the period by establishing the Wichita Mountain Forest and Game Preserve in 1905, the National Bison Range in 1908, and the National Elk Refuge in 1912.

The Congress has subsequently passed numerous pieces of legislation that have been crucial to the refuge system's expansion. A major stimulus for the refuge system came in 1934 with the passage of the Migratory Bird Hunting and Conservation Stamp Act (known as the Duck Stamp Act) (16 U.S.C. 718 et seq.). By requiring all waterfowl hunters to obtain a $1 duck stamp as a kind of federal permit, the act set up an ongoing way to fund refuge acquisitions and operations. The duck stamp, which provided $635,000 in its first year, currently costs $12.50 and has provided about $15 million a year since 1980. About 2 million acres of refuge lands have been purchased or leased with duck stamp revenues. Another major source of acquisition funds for the refuges is the Land and Water Conservation Fund established by act of the same

name (16 U.S.C. 460L-5 et seq.). As of October 1988, about 650,000 acres of refuge lands have been purchased through the fund.

The Refuge Recreation Act (16 U.S.C. 460k et seq.) was enacted in 1962 in reaction to growing public use of refuges. Visitor days had grown to 11 million in 1960, more than double the visits in 1954. To control this growing recreational use, the act required any such use to be compatible with the primary purpose(s) for which the refuge was established. The act further required the Secretary of the Interior to determine that sufficient funds were available to manage these recreational activities before they were allowed. Finally, the act authorized purchase of lands adjacent to or within refuges for recreation purposes.

The National Wildlife Refuge System Administration Act of 1966 as amended (16 U.S.C. 668dd et seq.) defines the refuge system as it is known today. It consolidated the various categories of lands administered by the Secretary of the Interior and other agencies for the conservation of fish and wildlife into a single National Wildlife Refuge System managed by Interior's Fish and Wildlife Service (FWS). The act clarified the Secretary's authority to accept donations of money for land acquisition, and placed restrictions on the transfer, exchange, or other disposal of lands within the system. The act also reinforced and extended the compatibility standard to all secondary uses,[1] not just recreation.

The Endangered Species Act of 1973 as amended (16 U.S.C. 1531 et seq.) directed FWS to emphasize endangered or threatened species, both in acquisition of refuges and in operation of all refuges. Under the act, the protection, enhancement, and recovery of endangered and threatened species are to receive priority consideration in the management of national wildlife refuges. Further, over 35 new refuges have been added to the refuge system under this authority.

Finally, the Alaska National Interest Lands Conservation Act of 1980 (16 U.S.C. 3120) authorized the designation of immense acreages of highly productive wildlife habitat as wildlife refuges in Alaska. The act added nine new refuges and expanded six of the seven existing refuges to add 53.7 million acres to the national wildlife refuge system, thereby tripling system acreage.

[1] In this report, secondary uses are those public, economic, and military uses on which FWS is required to make a compatibility determination before they can be permitted.

Management of the National Wildlife Refuges

As of September 1988, the federal national wildlife refuge system consisted of 452 refuges in 49 states (excluding West Virginia) and several U.S. territories.[2] Total refuge acreage was 88.6 million acres. Although termed a system, the refuges are typically not managed in any interdependent sense but instead can more accurately be viewed as independently managed entities sharing a common mission.

More than one-third of refuge acreage is wetlands. Although they are located throughout the nation, most refuges are concentrated in Alaska or in four major north-south waterfowl migration flyways. The refuges provide permanent homes or rest stops to more than 600 bird species as well as numerous species of mammals, reptiles, fish, and plants, some of which are endangered or threatened with extinction.

Over the past 5 years, appropriations for refuge operations and maintenance have averaged about $110 million a year. In fiscal year 1989, this budget supported a refuge staff of 2,150. During fiscal year 1989, FWS also expects to spend about $87 million to establish new refuges and add to existing ones, an amount that is generally above recent experience. The funds are made available primarily from duck stamp moneys and the Land and Water Conservation Fund.

As the agency responsible for the refuges, FWS has adopted a decentralized approach to refuge management. In this regard, it has vested in individual refuge managers responsibility for day-to-day refuge management. These managers often are responsible for more than one refuge, a grouping called a complex. Refuge managers report to refuge supervisors located in one of seven FWS regions. Overall direction is provided through the refuge division at FWS headquarters.

According to FWS' Refuge Manual, the mission of the refuge system is to provide, preserve, restore, and manage a national network of lands and waters sufficient in size, diversity, and location to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife is enhanced and made available. The broad goals designed to fulfill that mission are to

- perpetuate the migratory bird resource;

[2]The system also includes 161 waterfowl production areas covering 1.8 million acres. Because of their specific production function and lack of intensive management we have excluded these areas from the scope of our report.

- preserve a natural diversity and abundance of fauna and flora on refuge lands;
- preserve, restore, and enhance in their natural ecosystems[3] all species of animals and plants that are endangered or threatened with becoming endangered; and
- provide an understanding and appreciation of fish and wildlife ecology and humans' role in their environment and to provide refuge visitors with high-quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife, to the extent these activities are compatible with the purposes for which the refuge was established.

In addition to this overall mission, practically all refuges have individual purposes established by the legislation or executive order that created them. These specific purposes range from very narrow ones, such as preserving and managing the habitat for a single species (e.g., the Columbian white-tailed deer) to more generic ones, such as providing waterfowl habitat or fulfilling international migratory bird treaty obligations. The individual refuge purposes and broad refuge system mission statement provide the standard against which secondary uses are judged to determine whether they are compatible.

The Compatibility Mandate

Under the National Wildlife Refuge System Administration Act, FWS cannot approve secondary refuge uses unless they are compatible with the refuges' purposes of protecting and enhancing wildlife and their habitat. According to its Refuge Manual, FWS defines a compatible use as one that will not materially interfere with or detract from the purposes for which the refuge was established. The Refuge Manual requires that determination of compatibility be based upon a site-specific biological evaluation of the anticipated impacts of the proposed activity on wildlife populations and their habitat. Further the manual calls upon refuge managers to perform periodic reviews of ongoing secondary uses to ensure continued adherence to the compatibility standard.

FWS policy implements the Refuge Administration Act compatibility mandate. Both the 1976 environmental impact statement for the refuges and the current draft environmental impact statement, prepared to update the 1976 statement, emphasize that secondary uses are to be compatible with the primary purposes of the refuges under all alternatives. In addition, the Refuge Manual states that the current policy of FWS is to deemphasize nonwildlife-oriented recreation.

[3]Ecosystems are communities of organisms and their environment interacting as an ecological unit

FWS' compatibility requirement and determination process has been a source of concern for 2 decades. In 1969 the Leopold Committee[4] was established to discuss the future of refuge development and management. In its final report, the Committee noted that almost 14 million visitors had enjoyed the refuges in 1966, primarily for "general recreation." The Committee foresaw refuges near highly populated areas becoming so oriented to mass recreation that they might no longer serve their original function. The report noted that Crab Orchard National Wildlife Refuge in Illinois was in such a state with 1.5 million visitors in 1966. It further noted that once introduced, "forms of play which are only obliquely related to refuge purposes" are hard to eliminate. The Committee recommended that such use be closely controlled and that the refuges emphasize natural values. The Leopold Committee also addressed hunting on refuges, and concluded that hunting was appropriate on many refuges. However, it recommended that such activities, along with other public activities, be managed "to prevent undue disturbance of birds and mammals."

Almost a decade later, another similar report was prepared by the National Wildlife Refuge Study Task Force in January 1978.[5] The task force made recommendations concerning recreation, grazing and logging, hunting, and oil and gas extraction. The thrust of these recommendations was that secondary uses should not be detrimental to the existence of the wildlife for which the refuges were established. FWS agreed, but believed that its then existing practices would produce the results that the task force was seeking.

In 1982, the Interior Department used a questionnaire to assess the extent of the problem with secondary uses on wildlife refuges. On the basis of this questionnaire, FWS produced a report entitled Field Station Threats and Conflicts, and Interior produced a second report entitled Fish and Wildlife Service Resource Problems. Each report revealed that problems with secondary uses were considered to be serious, widespread, and directly affecting the refuges' biological resources. For example, the FWS report indicated that waterfowl were considered threatened by secondary use problems of all kinds on 85 percent of the refuges, wetlands on 79 percent, and endangered species on 41 percent.

[4]The Leopold Committee, formally called the Advisory Committee on Wildlife Management, was established as an advisory committee to the Department of the Interior. It was chaired by Professor A. Starker Leopold, from whom it obtained its informal name.

[5]The National Wildlife Refuge Task Force was established as a Department of the Interior advisory group in 1977 in response to environmental group concerns over national wildlife refuge management practices.

The FWS report also noted that wildlife disturbance, vandalism, and littering were public use problems on more than 62 percent of the refuges. In response to these reports, FWS informed refuge managers of the reports' results but took no other action.

Since 1981 we have also issued several reports dealing with secondary uses on national wildlife refuges. These reports are listed in appendix I.

Compatibility Determination Process

FWS' compatibility determination process is highly decentralized. As currently structured, responsibility for determining whether secondary uses are compatible with primary refuge purposes rests essentially with individual refuge managers. The manager makes determinations on a case-by-case basis; regional office and FWS headquarters officials review the refuge managers' decisions when warranted. Prior to 1986, minimal formal guidance was provided to assist refuge managers in their determinations. In May 1986 FWS issued compatibility determination guidelines in its Refuge Manual. These guidelines outline the following steps for refuge managers to follow in reviewing proposed uses.

1. Identify the refuge purpose.

2. Describe the proposed use and where, when, how, and why the use would be conducted.

3. Assess the impact of the use on the refuge. Review master plans and other plans that may generally address the proposed use. Consider both the short-term and the long-term effects of the proposed use.

4. Determine whether a use that may appear incompatible as originally proposed can be made compatible through stipulations that avoid or minimize anticipated adverse impacts.

5. On the basis of the previous steps, determine whether the use is compatible and list any stipulations.

Refuge managers have considerable discretion in implementing these guidelines and in making approval decisions. Further, in many situations FWS does not require that the justification for compatibility decisions be documented. Refuge managers are also authorized to negotiate with proposers of secondary uses and to resolve conflicts.

Objectives, Scope, and Methodology

Concerned that FWS' management of secondary uses was damaging the national wildlife refuge system's effectiveness in protecting and enhancing wildlife resources, the Chairman, Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, asked us to study the management of the national wildlife refuges. Specifically, the Chairman asked whether (1) national wildlife refuges are being managed for the purposes for which they were established and (2) these purposes are being effectively met.

Subsequently, the Chairman, Subcommittee on Fisheries and Wildlife Conservation and the Environment, House Committee on Merchant Marine and Fisheries, joined the request. At that time, he echoed the earlier concerns and asked us to evaluate several related matters, including the circumstances surrounding compatibility issues that have been particularly difficult to resolve.

The answers to the questions from both subcommittees depend primarily on the status of wildlife refuge management nationwide. However, FWS' management of refuges is decentralized to its regional offices and wildlife refuges, and FWS had compiled little useful centralized information about either secondary uses or compatibility determinations. In addition, measurement standards to judge a refuge's wildlife enhancement potential are not available.

Consequently, to respond to the subcommittees' questions we found it necessary to develop a multifaceted approach to gathering the information. To this end we (1) sent a questionnaire (a copy is provided as app. II) to managers of the 444 refuges existing as of March 31, 1988, (2) visited and prepared in-depth case studies of 16 wildlife refuges, (3) held extensive discussions with FWS staff, particularly those in FWS' regional offices, and (4) reviewed FWS policies, procedures, and documentation concerning the national wildlife refuge system, with special attention to those related to compatibility and refuge purposes.

Our questionnaire, to which 96 percent of refuge managers responded, listed 37 categories of secondary uses and asked whether these uses occurred on their refuge. If so, it asked whether the use benefited, was neutral, or harmed the primary purpose(s) of the refuge. For those uses viewed as harmful by the refuge manager, we asked (1) why the use occurred on the refuge and (2) whether the use should be discontinued. We analyzed responses to the questionnaire to obtain a comprehensive view of the extent of secondary uses, their effects, and those uses refuge managers believed were harmful enough to be discontinued. As part of

the questionnaire, we also asked refuge managers to comment on the level of existing demand and change in demand for secondary uses.

To augment information from the questionnaire, we held extensive discussions with FWS regional staff and refuge managers concerning the way refuges are managed, particularly with regard to refuge purposes and compatibility determinations. We also obtained the views of major wildlife and humane organizations concerning the management and use of wildlife refuges. (These organizations are listed in app. III.)

With respect to our case studies, we selected 16 refuges, in consultation with the requesters' staffs, to examine how especially controversial compatibility issues arose and how FWS acted to resolve the problem. The cases, while not randomly selected, capture several geographical and ecological variations, as well as different known problems and wildlife uses. In preparing the case studies, we visited each refuge, held extensive discussions with refuge managers, and reviewed refuge files. To broaden the information gathered through the case studies, we reviewed agency documents and major publications concerning compatibility conflicts on national wildlife refuges, and interviewed agency officials. (Information on each refuge reviewed as a case study is provided in app. IV.)

We conducted our work between February 1988 and July 1989 in accordance with generally accepted government auditing standards. Our work was performed at FWS' Division of Refuges in Washington, D.C., the six regional offices in the contiguous 48 states, and 16 wildlife refuges across the country. We discussed the information we obtained with FWS managers in the Office of the Assistant Director-Refuges and Wildlife. However, as requested, we did not solicit official agency comments on this report.

Refuge Wildlife Enhancement Efforts Being Hampered by Secondary Uses

While refuges are generally being managed to serve a wildlife enhancement purpose, problems with secondary uses on refuges are substantially hampering their performance. Refuge managers reported that secondary uses are occurring on virtually every refuge and include all manner of public, economic, and military activities. Although FWS has approved many of these uses as meeting the established compatibility standard, refuge managers regard a large number as harmful to the achievement of their refuges' primary purposes. The type of activities viewed as harmful varied widely depending on specific refuge conditions, but the managers cited power boating, mining, military air exercises, and off-road vehicle and airboat use more frequently as being harmful to wildlife interests.

Secondary Uses Occurring Almost Universally

On the basis of our questionnaire results, at least one secondary use is occurring on 92 percent of all refuges. The uses are of all types, but public and economic uses occurred far more frequently than military uses. Table 2.1 shows the frequency of secondary uses across the refuge system.

Table 2.1: Secondary Uses on Wildlife Refuges

Use category	Refuges where occurring[a] Number	Percent
Public		
Wildlife-oriented recreation:		
Wildlife observation	356	83
Walking/hiking	330	77
Environmental education	311	73
Interpretive tours	283	66
Nonwildlife-oriented recreation:		
Nonmotorized boating	193	45
Picnicking	192	45
Horseback riding	115	27
Beach use/swimming	96	22
Camping	83	19
Hunting dog field trials	56	13
Hunting:		
Big game	164	38
Waterfowl	163	38
Small game	162	38
Motor boating:		
Small (low-horsepower) power boats	148	35
Large (high-horsepower) power boats	114	27
Waterskiing	53	13
Airboats	36	8
Recreational fishing	244	57
Recreational trapping	78	18
Off-road vehicles	37	9
Economic		
Agricultural:		
Grazing	151	35
Farming	150	35
Haying	132	31
Beekeeping	128	30
Rights-of-way	211	49
Logging	79	19
Commercial fishing	76	18
Commercial trapping	75	18
Mining	26	6
Military		
Air exercises	55	13
Ground exercises	29	7

[a]Total number of respondents equals 428.

For refuges experiencing such uses, managers reported some to very great demand for public uses on 87 percent of the refuges with such uses, likewise, for economic uses, 75 percent, and for military uses, 55 percent. Because demand for secondary uses is so heavy, more than 70 percent of refuges have at least 7 different categories of secondary uses occurring on them and more than 30 percent have at least 14 different uses occurring. A few refuges have more than 20 secondary uses. For example, the refuge manager for the Upper Mississippi River refuge spanning parts of Minnesota, Wisconsin, Illinois, and Iowa estimated 29 different secondary uses and close to 3 million visitors in fiscal year 1988.

Refuge managers responding to our questionnaire also reported to us that demand for secondary uses is growing. In the last year, 44 percent of the refuges with existing public uses reported an increase in that use. Likewise, demand for economic uses increased on 31 percent, and demand for military uses increased on 27 percent. Increased demand for public uses was highest in the southeast while demand for economic uses was growing fastest in the Rocky Mountain area.

Managing and controlling the extensive secondary uses can be time consuming and can divert management attention from wildlife and habitat management. For example, even relatively harmless activities such as picnicking and camping can require refuge staff to spend considerable time preparing and maintaining facilities, picking up trash, and ensuring visitor safety. For many other activities, negotiating and monitoring compliance with permit conditions can be even more burdensome. When relationships between refuge managers and those pursuing the secondary uses becomes contentious (as has occurred at several refuges) refuge managers said virtually all their time and energies can be consumed by efforts to resolve the conflict.

Many Secondary Uses Considered Harmful by Refuge Managers

In addition to diverting refuge management attention away from achieving the refuge's primary purpose, refuge managers told us that many uses are harmful to wildlife interests. Refuge managers reported that at least one harmful use was occurring on 59 percent of the refuges. Many refuges were experiencing more than one harmful use as shown in table 2.2.

Table 2.2: Number of Harmful Uses Per Refuge

Number of harmful uses	Number of refuges
1	88
2	40
3	29
4	22
5	14
6	21
7	11
8	8
9	5
10	4
More than 10	12
Total	**254**

Although individual refuge managers regarded many different activities as harmful to their specific refuges, certain types of uses were more likely than others to be considered harmful. For example, refuge managers viewed mining as harmful on 22 of the 26, or 85 percent, of the refuges where it occurs. Table 2.3 shows the frequency with which refuge managers regarded 23 secondary uses as harmful.

Table 2.3: Frequency of a Secondary Use Being Considered Harmful

Use	Number of refuges where use occurs	Viewed as harmful by refuge manager[a]	
		Number	Percent
Mining	26	22	85
Off-road vehicles	37	28	76
Airboats	36	25	69
Military air exercises	55	36	65
Waterskiing	53	31	58
Large power boats	114	59	52
Rights-of-way	211	101	48
Beach use/swimming	96	39	41
Small power boats	148	60	41
Grazing	151	55	36
Military ground exercises	29	10	34
Commercial fishing	76	26	34
Hunting dog field trials	56	18	32
Camping	83	22	27
Waterfowl hunting	163	41	25
Haying	132	30	23
Picnicking	192	38	20
Farming	150	26	17
Horseback riding	115	20	17
Logging	79	13	16
Recreational fishing	244	38	16
Nonmotorized boats	193	26	13
Small game hunting	162	18	11

[a]Specific uses that were viewed as harmful by 10 percent or less of refuge managers are not listed in this table.

Some uses in the top half of table 2.3 tend to disturb wildlife habitat through ground surface modification or agitation of water, such as mining, airboats, power boats, waterskiing, and rights-of-way use. Others can be characterized as immediate proximity uses that scare wildlife, such as off-road vehicle use, beach use/swimming, and military air exercises. Still others reduce the ground cover or compete for forage, such as grazing.

FWS' policy is to generally de-emphasize or phase-out nonwildlife-oriented recreational activities such as waterskiing, power boating, swimming, and off-road vehicle use. However, Table 2.3 shows that these uses are still continuing despite the fact that where they occur, the managers generally consider them harmful.

Refuge managers did not believe that all uses they regarded as harmful should be discontinued on their particular refuges. Managers we talked to said they were sometimes willing to accept the adverse effects of some harmful activities as the price of obtaining the good will of the local public or various economic interests. In about half of the instances, though, refuge managers reported that the price was too high and believed the harmful secondary uses should be discontinued. When viewed as harmful, military air and ground exercises, mining, logging, and waterfowl hunting were cited by the highest percentage of managers as meriting discontinuance. Table 2.4 shows how refuge managers viewed discontinuing certain uses.

Table 2.4: How Refuge Managers View Discontinuing Certain Uses Considered Harmful

	Refuges Where Manager		
	Viewed use as harmful	Believed harmful use should be discontinued[a]	
Use	Number	Number	Percent
Military air exercises	36	35	97
Mining	22	20	91
Military ground exercises	10	8	80
Logging	13	10	77
Waterfowl hunting	41	28	68
Waterskiing	31	20	65
Beach use/swimming	39	25	64
Farming	26	16	62
Grazing	55	33	60
Airboats	25	14	56
Camping	22	12	55
Haying	30	16	53
Small game hunting	18	9	50
Off-road vehicles	28	13	46
Large power boats	59	27	46
Horseback riding	20	9	45
Picnicking	38	17	45
Hunting dog field trials	18	7	39
Commercial fishing	26	10	38
Rights-of-way	101	34	34
Recreational fishing	38	10	26
Small power boats	60	15	25

[a]The table does not include specific uses with less than 10 harmful uses or where less than 25 percent of the refuge managers believed they should be discontinued.

Effect of Harmful Uses on Wildlife Refuges

FWS' compatibility standard requires that it allow no secondary use that materially interferes with or detracts from the refuge's primary purpose. Refuge managers believe this standard is often not being met, and as a result many harmful uses are occurring. It is not possible to precisely measure the effect of these uses on the refuges' performance because FWS does not identify each refuge's wildlife enhancement and production potential. While the effect cannot be quantified, as illustrated by our case studies there is no doubt that the consequences of harmful secondary uses are substantial. Several of these case studies are discussed below.

- On the Des Lacs refuge in North Dakota, FWS studies have disclosed that maintaining high water levels in refuge lakes to provide recreational boating opportunities for nearby residents has severely reduced the refuge manager's ability to manage the wetland habitat for migratory bird production, its primary purpose. In this regard, the power boating and waterskiing that have occurred have been found to directly disturb migratory bird nesting and the broods of newly hatched chicks. As a result, the refuge managers told us duck and other bird production is 50 percent less than it could be. Under direction from the FWS Director, waterskiing and power boating were allowed to continue at least until September 1989, pending completion of more extensive studies of their effects. FWS expects to complete a formal compatibility determination based on these studies in September 1989, at which time a decision on their continued approval will be made.
- At the Chincoteague refuge in Virginia, off-road vehicles and the thousands of visitors that use its beaches are threatening the breeding of piping plovers, an endangered bird, and reducing other migratory bird populations. Studies have shown that human disturbance significantly reduces piping plover production levels. Recognizing these effects, FWS has reduced the level of permitted off-road vehicle use and better controlled other visitor use. Even with this action, however, piping plover breeding remains far below that needed to maintain a stable population.
- At the Browns Park refuge in Colorado, permitted livestock grazing is hampering the refuge manager's efforts to improve goose and duck production. Grazing livestock disturb the nesting birds and eat the plant growth necessary to provide optimal nesting habitat. FWS has attempted to reduce authorized grazing levels in recent years but until 1989 had been unsuccessful in achieving any reductions because of resistance by the grazing permittee. Small reductions in grazing were made in 1989.
- At the Cabeza Prieta refuge in Arizona, military air exercises are believed to be adversely affecting the desert bighorn sheep and the

endangered Sonoran pronghorn antelope that live in the refuge's rugged, arid mountain habitat. While FWS has not documented the precise impact of military operations on refuge resources, the refuge manager is concerned that low-altitude aircraft and their intense sonic booms adversely affect the fawning/calving of the antelope and sheep. FWS has recommended an investigation of the effect of flights on population sizes and behavior of refuge wildlife but concedes that because the military is authorized to conduct the exercises, little can be done to reduce the overflight activity.

- The D'Arbonne refuge in Louisiana is the home of several clans of red cockaded woodpeckers, an endangered species. Drilling for new gas wells and operating existing wells on the refuge destroys the habitat of the woodpeckers and other wildlife. A FWS biological opinion concluded that unmitigated gas operations would drive the endangered woodpeckers from the refuge. Nonetheless, because a district court judge ruled that FWS cannot enforce permit conditions in this case, the operations are continuing without FWS restrictions.

Harmful Uses Stem From Two Main Causes

To determine why harmful uses were occurring despite the clear compatibility mandate, we asked refuge managers to choose among four alternative reasons. Refuge managers reported that two reasons were primarily responsible for allowing harmful uses to occur. First, FWS has in many cases allowed the uses in response to political or community pressures. We believe this has occurred largely because FWS has permitted nonbiological factors to influence its management and control of secondary uses. In many other cases, FWS is powerless to prohibit the harmful uses because it does not have full ownership of, or control over, refuge land, water, or resources. Together these two causes account for two-thirds of all harmful uses on refuges. The remaining harmful uses are caused by miscellaneous other factors.

The pressure on FWS to allow secondary uses on refuges is often intense. As it assesses the compatibility of these uses, FWS needs to ensure that only biological factors are considered, especially when the use will materially diminish the refuge's ability to perform its intended purpose. Further, when less than full ownership of and control over necessary resources adversely affect a refuge's primary purpose(s), FWS must decide whether the refuge should be improved through the acquisition of needed property rights or other steps, or be removed from the system, thus freeing limited resources for use at other wildlife refuges.

External Pressures Heavily Influence FWS' Management of Secondary Uses

The National Wildlife Refuge System Administration Act and the FWS Refuge Manual state clearly that secondary uses of refuges should be allowed only if they are compatible with the refuges' primary purposes. The Refuge Manual further says that compatibility determinations must be based upon a site-specific biological analysis of anticipated impacts of the proposed use on the refuge's wildlife and habitat. Our review disclosed, however, that in response to various external pressures, refuge managers have, either on their own initiative or as directed by higher FWS management, continued to allow many secondary uses they nonetheless regard as harmful to wildlife resources. We believe this was able to occur because FWS allowed nonbiological factors to influence its management of secondary uses.

Many Harmful Uses Approved in Response to Political or Community Pressures

Our questionnaire asked refuge managers to choose among four reasons to explain why each harmful use on their refuge was occurring. Refuge managers reported that about one-third of all harmful uses occurred as a result of one of these reasons—political or community pressures. Table 3.1 displays the use categories most frequently occurring as a result of these pressures.

Table 3.1: Harmful Uses Caused by Political or Community Pressures

Use category	Number of times cited as harmful	Number of times allowed because of external pressure	Percent[a]
Public			
Walking/hiking	18	16	89
Waterfowl hunting	41	33	80
Recreational trapping	7	5	71
Big game hunting	9	6	67
Picnicking	38	24	63
Small game hunting	18	11	61
Wildlife observation	20	12	60
Beach use/swimming	39	20	51
Hunting dog field trials	18	9	50
Recreational fishing	38	17	45
Camping	22	9	41
Waterskiing	31	8	26
Horseback riding	20	5	25
Airboats	25	6	24
Large power boats	59	14	24
Small power boats	60	14	23
Off-road vehicles	28	6	21
Economic			
Commercial Fishing	26	10	38
Rights-of-way	101	35	35
Grazing	55	12	22
Military			
Military ground exercises	10	3	30

[a]Harmful uses that were cited by refuge managers as being allowed because of external pressures less than 20 percent of the time or where there were 5 or fewer harmful uses are not included in this table

Nonbiological Factors Play Major Role in Compatibility Decisions

FWS' susceptibility to external pressures has much to do with the way it has managed secondary uses. Specifically, FWS has (1) allowed nonbiological factors to be considered in its management and control of secondary uses and (2) not reevaluated ongoing uses on a periodic and

systematic basis. Also, since 1980 FWS has not collected and compiled financial information on the cost of managing secondary uses on refuges.

With respect to the consideration of nonbiological factors, refuge managers we visited identified several instances in which biological evidence of material interference with the refuge's primary purpose was overcome by economic and other public use considerations. The case of Des Lacs wildlife refuge in North Dakota exemplifies how this can occur. In this case, refuge managers have worked for several years to end power boating and waterskiing on the refuge and to more actively manage the refuge's water resources to improve its waterfowl habitat. The ongoing recreational activities and the maintenance of high water levels to facilitate them have, according to refuge managers, drastically reduced the refuge's ability to produce migratory waterfowl—its primary purpose. The refuge managers have devoted considerable efforts to developing biological evidence in support of their case. Likewise, local public officials told us they have worked to block the managers' efforts. In arguing their position, the local officials have cited factors such as (1) economic activity and revenues brought to the area by waterskiers on the refuge, (2) the local golf course's need for water, and (3) the aesthetic and property value effects of the refuge managers' proposed water management practices on nearby homesites. The FWS Director has allowed waterskiing activity to continue and blocked changes in the management of the refuge's water resources until more data on waterfowl disturbance are collected.

Based on our discussions with FWS officials, consideration of nonbiological factors has also played an important role in the approval of rights-of-way across refuges. As one FWS official told us, when rights-of-way applications are considered, the strongest biological reasons for disapproving the use can often be overcome by the weakest economic rationale. Relatedly, FWS approved an electric power transmission line route across the Kofa refuge in Arizona that it had earlier opposed on biological grounds. FWS officials said that they took this action because the preferred route was in one of Interior's Bureau of Land Management's wilderness study areas. FWS noted in its compatibility determination that the prohibition against transmission lines in such an area overrode its biological evidence that the transmission line across the refuge would disturb the refuge's bighorn sheep.

In addition, FWS refuge managers have not conducted the periodic reevaluation on ongoing secondary uses called for in the FWS Refuge

Manual to ensure that these uses are compatible with primary refuge purposes. They said this had not been done because FWS only recently formalized its compatibility requirements. Such a review would place the compatibility process on a more systematic agencywide basis thereby increasing the refuge manager's leverage with public and economic interest groups and making it more difficult for nonbiological factors to be considered in decision-making.

Finally, FWS does not maintain any financial data on how much it costs to manage secondary uses on the refuges. The Refuge Recreation Act requires FWS to determine that funds are available to manage recreational use of refuges and that these uses do not interfere with primary refuge purposes before they can be permitted. Since 1980 FWS has not collected the data necessary to make this determination or to identify for general management purposes its expenditures on these and other secondary uses. Instead, it merely asserts that sufficient funds are available. Although not quantified, a number of refuge managers told us these costs are high and draw a significant portion of limited refuge funding away from wildlife protection and enhancement activities. Data on the costs of managing recreational uses on refuges are needed to comply with the act's mandate. Moreover, if the costs to manage these and other secondary uses were fully disclosed, the pressure to continue them or to allow new uses may be diminished.

Lack of Ownership and Control Often Limits FWS' Authority Over Secondary Uses

While FWS can prohibit many harmful uses on refuges, others can continue either because FWS does not have fee simple title[1] to the refuge lands, waters, and resources or because it is required under law to share, or provide access to, the refuges' resources with others. Refuge managers reported that about one-third of all the harmful uses they identified occurred as a result of this lack of complete FWS jurisdiction over refuge resources. The limitations in ownership and control fell into four main categories.

Extent of Ownership and Control Problems

According to refuge managers, lack of complete FWS jurisdiction over refuge lands was a significant cause of numerous harmful uses on the refuges. Such limitations were an especially important factor with respect to harmful economic activities. Table 3.2 shows the percentage of various harmful uses occurring because of this limited FWS ownersnip and control.

[1] With fee simple title, the owner acquires all rights and interests associated with a property.

Table 3.2: Harmful Uses Caused by Limited Ownership and Control

Use category	Number of times cited as harmful	Number of times caused by limited control	
		Number	Percent[a]
Public			
Nonmotorized boating	26	17	65
Waterskiing	31	14	45
Small power boats	60	27	45
Camping	22	10	45
Large power boats	59	24	41
Hunting dog field trials	18	7	39
Airboats	25	9	36
Horseback riding	20	7	35
Beach use/swimming	39	12	31
Off-road vehicles	28	8	29
Recreational fishing	38	10	26
Picnicking	38	9	24
Economic			
Farming	26	21	81
Logging	13	10	77
Haying	30	22	73
Mining	22	13	59
Grazing	55	27	49
Commercial fishing	26	9	35
Military			
Ground exercises	10	3	30

[a]Specific harmful uses cited by refuge managers as being caused by limited control less than 20 percent of the time or when there were 5 or fewer harmful uses are not listed in this table

Categories of Ownership and Control Limitations

The ownership and control constraints on FWS management of secondary uses fell into four main categories. These categories and some of the harmful uses they are closely associated with are:

1. Lack of ownership of subsurface mineral rights.

- mining

2. Coexistent and sometimes dominant military rights to use of refuge lands.

- military air exercises
- military ground exercises

3. Shared jurisdiction over navigable waters within or adjoining refuge boundaries.

- power boating
- beach use/swimming

4. Refuge ownership of only easement privileges.

- farming
- haying
- grazing

These categories are discussed in the following sections.

Subsurface Mineral Rights

Our questionnaire results showed that of the 26 refuges where refuge managers reported ongoing mining activity, 22 believed the activity was harmful. These harmful uses cannot generally be eliminated, however, because FWS does not own the subsurface minerals underlying the refuge. According to Interior, holders of subsurface mineral rights cannot be precluded from exploring and developing those rights on refuge lands, subject to "reasonable" restrictions to protect surface resources.[2]

The FWS Refuge Manual requires that refuge managers be responsible for protecting their refuge against unnecessary or unreasonable damage resulting from development, extraction, and processing operations. To minimize damage to the habitat, FWS usually stipulates conditions for oil, gas, and mineral exploration and development through special use permits. However, in some instances, a private landowner will refuse to cooperate with FWS. For example, at the D'Arbonne refuge, FWS is engaged in an ongoing struggle to protect the refuge from environmental degradation resulting from gas drilling on the refuge because a gas operator that holds title to the subsurface mineral rights would not comply with special use permit conditions. The district court in Louisiana ruled in 1986 that FWS did not have the authority to require a special use permit since language allowing FWS to regulate subsurface activity was deleted in the condemnation process under which the refuge's land was acquired. FWS did not appeal this ruling.

[2]The Mineral Leasing Act of 1920 as amended (30 U.S.C. 181 et seq.) and the Mineral Leasing Act for Acquired Lands as amended (30 U.S.C. 351-359) are the basic legislative authorities for oil and gas leasing on national wildlife refuge system lands.

The Department of the Interior has taken the position that it must provide holders of subsurface mineral rights reasonable access to those rights. The prohibition of such rights, according to Interior, would constitute an illegal taking of an individual property. Interior believes, however, that it has adequate authority to protect its surface rights against unreasonable damage from mining operations.

Military Use

On refuges where harmful military uses occur, they are generally ongoing because the Department of Defense shares jurisdiction with FWS over the refuge lands. In some instances, the refuge was established on preexisting military training areas and in others, the military obtained training use rights on lands that were already designated as refuges. In either event, the military's right to use the lands has been firmly established.

In this regard, managers for 55 refuges reported that the military conducts air exercises over their refuges. On 65 percent of these refuges, managers responded that these exercises are harmful to wildlife. Conservationists and FWS refuge staff believe that dogfights and bombing exercises, weapons testing, and training, along with frequent sonic booms over refuges adversely affect waterfowl, shorebirds, and other wildlife.

Although they are anxious to eliminate these harmful uses, refuge managers told us that they could not be stopped. Instead, they try to minimize the adverse impact on wildlife by negotiating the terms of the use. Even when conditions are negotiated, however, the conditions are frequently violated because refuge managers have little capability to enforce them. For example, refuge managers said planes frequently fly below the negotiated minimum altitude requirements and some installations ignore clean-up requirements on bombing and gunnery ranges.

In 1987 one conservation group reported that military use of airspace over the Desert refuge in Nevada (providing habitat for the largest population of desert bighorn sheep as well as an endangered fish species) had intensified since an air combat maneuvering instrumentation range was installed at Nellis Air Force Range in Nevada in 1975. According to the group, sonic booms have been reported at the rate of 5,000 per year, and aircraft fly as low as 100 feet above the ground despite the minimum required altitude of 2,000 feet. The precise effect of these flight activities on wildlife is not known but refuge officials told us that they believe the flight activities especially affect an isolated population of the desert bighorn sheep.

Limited Jurisdiction Over Navigable Waterways

Similar jurisdictional problems are associated with navigable waters within or adjoining refuge boundaries. In these cases, because the U.S. Army Corps of Engineers is typically responsible for keeping waterways navigable and the Coast Guard is responsible for marine law enforcement, refuges have little, if any, authority or control over any harmful uses that may be associated with these waterways. For example, the Upper Mississippi refuge straddles the Mississippi River in a pattern that intermingles private and public land ownership. The portion of the river running through the refuge is the recreational focus for a great many boaters and also carries a tremendous load of commercial barge traffic that moves through Corps of Engineers' locks and dams. The refuge management has no direct control over the various boats and related operations. Navigational activities increase sedimentation and river bank erosion, cause water level fluctuation, and add to habitat damage from improper tow boat mooring. The resulting disturbance has reduced the refuge's effectiveness as a refuge and breeding place for wildlife, especially migrating waterfowl.

Relatedly, our work has showed that water availability problems and questions of water rights[3] are adversely affecting a number of refuges located in the arid west. A number of refuge managers in these locations told us that lack of water rights is crippling their refuge operations and ultimately threatening their usefulness as wildlife habitat. The Stillwater refuge in Nevada most clearly illustrates this problem.

The Stillwater refuge consists of marshes, wetlands, and lakes that contribute to waterfowl production and provide resting/feeding areas. As one of the few wet areas in the region, it provides vital habitat for many migratory waterfowl species. However, because of a lack of water rights, it receives only the return flows from irrigation in the Truckee-Carson Irrigation District and that water is often polluted. Because of intense competition for the available water, none is available to assign to the refuge. As a result, the marshes are drying up. If water rights are not obtained, much of the refuge and its valuable habitat may be lost.

Ownership of Only Easement Privileges

Harmful agricultural practices that were attributed to limited control or ownership by FWS often took place on so-called easement refuges. FWS has established a number of these refuges where, instead of purchasing fee simple title to refuge lands, FWS merely purchases or leases a limited

[3]In most of the western states the right to use water is separated from title to the lands. Water rights are granted to whoever puts the water to a beneficial use regardless of who owns the land. The earlier a beneficial use was established, the higher priority that user has to the water right.

number of management rights from a landowner. These rights are usually restrictions on hunting or public entry or on draining wetlands. We identified 53 easement refuges in the system, and FWS told us that about 80 percent were in North Dakota, with other groups in Montana and California. Any activity not prohibited by the easement agreement is allowed. We found, therefore, that on these refuges, a great many continuing agricultural practices—farming, haying, grazing—were viewed as harmful by the refuge managers, although they recognized that the uses could not be curtailed under current arrangements.

Conclusions

National wildlife refuges are the only federal lands to be managed primarily for the benefit of wildlife. Even here, however, wildlife interests are often not paramount; secondary uses harmful to wildlife resources are occurring on a widespread basis. Our analysis of harmful uses occurring on national wildlife refuges shows that they are caused by two principal factors (1) FWS' inability to successfully resist external pressures in its management of secondary uses and (2) incomplete FWS ownership of, or control over, the refuges' land, water, or subsurface mineral rights. While the first factor can be mitigated to a great extent through more assertive management, FWS faces some difficult choices, within existing resources and authority, relating to refuges experiencing harmful uses outside FWS' control.

We found that FWS considers factors other than biological impact in managing and controlling secondary uses. When this occurs, nonwildlife interests have often been given precedence over the wildlife resources the refuges were established to preserve and enhance. As a result, uses that materially interfere with the refuges' primary purposes have been allowed.

Moreover, FWS lacks the data essential to make informed decisions concerning the impact of secondary uses on the limited resources available for refuge management and does not periodically reevaluate existing secondary uses as required by FWS policy. As a result, secondary uses subsequently found to be harmful to a refuge's primary purpose(s) are sometimes permitted to continue unabated, requiring refuge managers to devote a large share of the limited resources available to mitigate their adverse effect.

Ensuring that compatibility decisions are based on biological input and are periodically reevaluated will help control many harmful secondary uses. However, it will not help FWS deal with harmful secondary uses

resulting from the lack of clear ownership or control of the land, water, or subsurface mineral rights. For these uses, FWS must decide whether it makes more sense to (1) attempt to acquire these property rights with Land and Water Conservation Fund moneys or other sources, (2) attempt to continue to manage the refuges within existing resources while recognizing that some secondary uses will continue to adversely affect certain refuges' primary purposes, or (3) remove the refuges from the system when the adverse effect of the secondary uses is so imposing that the refuges no longer serve a substantive wildlife resource purpose. Removing a refuge from the system should be the alternative of last resort and should be made only after a thorough review of the evidence on which the decision is made.

Recommendations to the Secretary of the Interior

To ensure that secondary uses of national wildlife refuges are compatible with the primary purposes for which the refuges were established, we recommend that the Secretary of the Interior direct the Director, FWS, to (1) base compatibility decisions on biological criteria to prevent nonbiological considerations from influencing such decisions, (2) compile financial data on the cost of managing secondary uses to determine their impact on refuges' limited resources, (3) comply with the requirement in its Refuge Manual to reevaluate the compatibility of ongoing secondary uses on a periodic basis, and (4) eliminate all uses deemed, on biological grounds, to detract materially from the refuges' primary purposes.

To ensure that available resources are used effectively, we recommend that the Secretary direct the FWS Director to (1) identify refuges where less than full ownership and control of necessary resources adversely affect the refuges' primary purposes, (2) establish guidance for determining whether refuges can effectively accomplish their primary wildlife resource purposes, and (3) determine whether these refuges should be improved through the acquisition of needed property rights or other steps, or be removed from the system on the basis of the above guidance, thus freeing limited resources for use at other wildlife refuges.

Previous GAO Reports Addressing Secondary Uses on Wildlife Refuges

Our report entitled National Direction Required for Effective Management of America's Fish and Wildlife (GAO/RCED-81-107, Aug. 24, 1981) reviewed, in part, FWS' management of wildlife refuges. The report noted that FWS permits some land uses that conflict with wildlife values. In reply, Interior commented that there are seldom absolute rights and wrongs in the task of achieving compatibility, but that actual conflicts between secondary uses and wildlife values were the exception, in its view.

Another report, Economic Uses of the National Wildlife Refuge System Unlikely to Increase Significantly (GAO/RCED-84-108, June 15, 1984), recommended that Interior verify the extent of oil and gas exploration and production activities and evaluate their impacts on refuge lands. The evidence developed to support this recommendation included responses to a questionnaire which showed that oil and gas exploration and production was considered a threat to the refuges by over 90 percent of the refuge managers who were responsible for refuges with such activity or with the potential for oil and gas drilling.

Other reports that deal with compatibility problems on national wildlife refuges include Parks and Recreation: Access Permits to Back Bay National Wildlife Refuge Improperly Granted (GAO/RCED-87-69, Dec. 29, 1986) and Wildlife Management: National Refuge Contamination is Difficult to Confirm and Clean Up (GAO/RCED-87-128, July 17, 1987).

Questionnaire Sent to Refuge Managers

U.S. GENERAL ACCOUNTING OFFICE
SURVEY OF U.S. FISH AND WILDLIFE SERVICE
WILDLIFE REFUGE PROJECT LEADERS

The U.S. General Accounting Office (GAO), an independent agency that assists Congress, is conducting a review of management of the National Wildlife Refuge System. Two committees of the House of Representatives--Government Operations and Merchant Marine and Fisheries--have requested that GAO examine the issue of whether national wildlife refuges are being managed to achieve their primary purposes. We are asking all project leaders to assist us in our review by completing a short questionnaire on activities on their refuge. It is vital that we supply Congress with accurate information about activities on the refuges. We can only do so with your cooperation.

INSTRUCTIONS

* If you are responsible for more than one refuge, you may receive more than one questionnaire. Please complete each questionnaire **separately** so that conditions on each refuge will be represented in our results.

* If you receive a questionnaire for a refuge which you are no longer responsible for, please return the questionnaire to us with the name and address of the person who should receive the questionnaire.

* Your responses to the questionnaire will be kept **confidential**. All information will be reported in summary form only.

* Please complete and return the enclosed questionnaire **within 10 days of receipt**. It should only take about **15 minutes to complete** the questionnaire.

* If you have any questions, please call Geoffrey Johnson or Lamar White on (202) 634-6387 or FTS 8-634-6387.

* In the event that the envelope is misplaced, the return address is:

Mr. Lamar White
U.S. General Accounting Office
441 G Street, N.W.
Room 4476
Washington, D.C. 20548

Thank you for your cooperation.

ID (1-3)
CARD01(4-5)

1. For each of the following activities please indicate by checking 'yes' or 'no' whether or not the activity is currently allowed on your refuge. Then for each activity that is allowed on your refuge please indicate whether **overall**, in your opinion, the activity is: 1) beneficial in regard to the purpose of the refuge; 2) neutral in regard to the purpose of the refuge; or 3) is harmful in regard to the purpose of the refuge.

FOR EACH ACTIVITY WHERE YOU CHECK YES PLEASE INDICATE WHETHER YOU CONSIDER THE ACTIVITY BENEFICIAL, NEUTRAL, OR HARMFUL TO THE REFUGE

IS ACTIVITY: (6-43)

PUBLIC USES	IS ACTIVITY ALLOWED? NO (1)	YES (2)		1. Very Beneficial	2. More Beneficial Than Harmful	3. Neither Beneficial Nor Harmful	4. More Harmful Than Beneficial	5. Very Harmful	6. Can't Decide
Wildlife Observation									
Walking/Hiking									
Interpretive Tours									
Camping									
Beach Use/Swimming									
Picnicking									
Big Game Hunting									
Small Game Hunting									
Waterfowl Hunting									
Recreational Trapping									
Off-Road Vehicles (including snowmobiles)									
Airboats									
Power Boating under 35 H.P.									
Power Boating 35 H.P. and over									
Boating (Non-motorized)									
Water Skiing									
Fishing									
Environmental Education									
Horseback Riding									

(CONTINUED)

(CONTINUED)

FOR EACH ACTIVITY WHERE YOU CHECK YES PLEASE INDICATE WHETHER YOU CONSIDER THE ACTIVITY BENEFICIAL, NEUTRAL, OR HARMFUL TO THE REFUGE

(44-79)

	IS ACTIVITY ALLOWED?		IS ACTIVITY:					
	NO (1)	YES (2)	1. Very Beneficial	2. More Beneficial Than Harmful	3. Neither Beneficial Nor Harmful	4. More Harmful Than Beneficial	5. Very Harmful	6. Can't Decide
Field Trials								
Other Consumptive Uses, e.g. fruit picking. etc.								
Other Public Uses (please specify):								
ECONOMIC USES								
Commercial Fishing								
Commercial Trapping								
Grazing								
Farming								
Timber Harvesting								
Mining								
Sale of Animals								
Haying								
Bee Keeping								
Rental of Government Facilities (e.g. cabins)								
Rights of Way								
Other Economic Uses (please specify):								
MILITARY USES								
Ground Exercises								
Air Exercises								
Other Military Uses (please specify):								

2. Consider only the activities that you indicated in Question 1 are more harmful than beneficial **or** very harmful to your refuge. For each of these activities, please check the **one reason** that you believe **best describes** why the activity is allowed on your refuge.

FOR EACH ACTIVITY IN QUESTION 1 THAT IS MORE HARMFUL THAN BENEFICIAL OR VERY HARMFUL TO YOUR REFUGE, PLEASE **CHECK THE ONE REASON** THAT BEST DESCRIBES WHY THE ACTIVITY IS ALLOWED ON YOUR REFUGE

(80-98)

PUBLIC USES	1. Shared Jurisdiction	2. Legislative Mandate	3. Political/Community Pressure	4. Other	5. Don't Know
Wildlife Observation					
Walking/Hiking					
Interpretive Tours					
Camping					
Beach Use/Swimming					
Picnicking					
Big Game Hunting					
Small Game Hunting					
Waterfowl Hunting					
Recreational Trapping					
Off-Road Vehicles (including snowmobiles)					
Airboats					
Power Boating under 35 H.P.					
Power Boating 35 H.P. and over					
Boating (Non-motorized)					
Water Skiing					
Fishing					
Environmental Education					
Horseback Riding					

(CONTINUED)

(CONTINUED)

FOR EACH ACTIVITY IN QUESTION 1 THAT IS MORE HARMFUL THAN BENEFICIAL OR VERY HARMFUL TO YOUR REFUGE, PLEASE **CHECK THE ONE REASON** THAT BEST DESCRIBES WHY THE ACTIVITY IS ALLOWED ON YOUR REFUGE

(99-116)

	1. Shared Jurisdiction	2. Legislative Mandate	3. Political/Community Pressure	4. Other	5. Don't Know
Field Trials					
Other Consumptive Uses, e.g. fruit picking, etc.					
Other Public Uses (please specify):					
ECONOMIC USES					
Commercial Fishing					
Commercial Trapping					
Grazing					
Farming					
Timber Harvesting					
Mining					
Sale of Animals					
Haying					
Bee Keeping					
Rental of Government Facilities (e.g. cabins)					
Rights of Way					
Other Economic Uses (please specify):					
MILITARY USES					
Ground Exercises					
Air Exercises					
Other Military Uses (please specify):					

PUBLIC USES

3. Overall, how much of a problem, if any, have **public uses** caused in your ability to meet the purpose of your refuge in the last year? (Check one) (117)

   1. [ ] NO PUBLIC USES ON REFUGE
   2. [ ] No problem
   3. [ ] Minor problem
   4. [ ] Moderate problem
   5. [ ] Major problem
   6. [ ] DON'T KNOW

4. Overall, in the last two years, how much demand has there been for **public uses** on your refuge? (Check one) (118)

   1. [ ] NO PUBLIC USES ON REFUGE
   2. [ ] Little or no demand
   3. [ ] Some demand
   4. [ ] Moderate demand
   5. [ ] Great demand
   6. [ ] Very great demand
   7. [ ] DON'T KNOW

5. In your opinion, in the last year, did the overall demand for **public uses** on your refuge increase, decrease, or stay about the same? (Check one) (119)

   1. [ ] NO PUBLIC USES ON REFUGE
   2. [ ] Increased greatly
   3. [ ] Increased somewhat
   4. [ ] Stayed about the same
   5. [ ] Decreased somewhat
   6. [ ] Decreased greatly
   7. [ ] DON'T KNOW

ECONOMIC USES

6. Overall, how much of a problem, if any, have **economic uses** caused in your ability to meet the purpose of your refuge in the last year? (Check one) (120)

   1. [ ] NO ECONOMIC USES ON REFUGE
   2. [ ] No problem
   3. [ ] Minor problem
   4. [ ] Moderate problem
   5. [ ] Major problem
   6. [ ] DON'T KNOW

7. Overall, in the last two years, how much demand has there been for **economic uses** on your refuge? (Check one) (121)

   1. [ ] NO ECONOMIC USES ON REFUGE
   2. [ ] Little or no demand
   3. [ ] Some demand
   4. [ ] Moderate demand
   5. [ ] Great demand
   6. [ ] Very great demand
   7. [ ] DON'T KNOW

8. In your opinion, in the last year, did the overall demand for **economic uses** on your refuge increase, decrease, or stay about the same? (Check one) (122)

   1. [ ] NO ECONOMIC USES ON REFUGE
   2. [ ] Increased greatly
   3. [ ] Increased somewhat
   4. [ ] Stayed about the same
   5. [ ] Decreased somewhat
   6. [ ] Decreased greatly
   7. [ ] DON'T KNOW

MILITARY USES

9. Overall, how much of a problem, if any, have **military uses** caused in your ability to meet the purpose of your refuge in the last year? (Check one) (123)

   1. [ ] NO MILITARY USES ON REFUGE
   2. [ ] No problem
   3. [ ] Minor problem
   4. [ ] Moderate problem
   5. [ ] Major problem
   6. [ ] DON'T KNOW

10. Overall, in the last two years, how much demand has there been for **military uses** on your refuge? (Check one) (124)

   1. [ ] NO MILITARY USES ON REFUGE
   2. [ ] Little or no demand
   3. [ ] Some demand
   4. [ ] Moderate demand
   5. [ ] Great demand
   6. [ ] Very great demand
   7. [ ] DON'T KNOW

11. In your opinion, in the last year, did the overall demand for **military uses** on your refuge increase, decrease, or stay about the same? (Check one) (125)

   1. [ ] NO MILITARY USES ON REFUGE
   2. [ ] Increased greatly
   3. [ ] Increased somewhat
   4. [ ] Stayed about the same
   5. [ ] Decreased somewhat
   6. [ ] Decreased greatly
   7. [ ] DON'T KNOW

12. Consider each activity that you indicated in Question 1 is currently allowed on your refuge. Please indicate whether, in your opinion, it should be **discontinued** by checking 'yes' or 'no' in the chart below. Then for each activity that you believe should be discontinued, please give your best estimate of how much, if any, of the refuges resources were used on that activity in **fiscal year 1987**. We would like you to estimate costs in the following three categories:

I. **NON-PERSONNEL COSTS:** Any expenditure related to an activity for materials, maintenace, etc. that does not include personnel costs.

II. **SALARY COSTS:** The amount of refuge staff salary spent on a particular activity. For example, if an activity required about 1/2 of 1 staff person's time in fiscal year 1987, 1/2 of their yearly salary should be entered under Salary Costs.

III. **FTE COSTS:** The total number of **full time equivalent** staff positions (staff years) spent on a particular activity. For example, if one staff person spent 1/2 time on an activity and another staff person spent 1/4 time on the same activity, the total FTE's for that activity would be 3/4.

(CARDS 2-38)

FOR EACH ACTIVITY YOU CHECK SHOULD BE DISCONTINUED PLEASE INDICATE THE APPROXIMATE COST OF THAT ACTIVITY IN FISCAL YEAR 1987

	DISCONTINUE ACTIVITY?		APPROXIMATE COST OF ACTIVITY IN FISCAL YEAR 1987		
PUBLIC USES	NO (1)	YES (2)	NON-PERSONNEL COSTS	SALARY COSTS	TOTAL FTE'S
Wildlife Observation			$	$	
Walking/Hiking					
Interpretive Tours					
Camping					
Beach Use/Swimming					
Picnicking					
Big Game Hunting					
Small Game Hunting					
Waterfowl Hunting					
Recreational Trapping					
Off-Road Vehicles (including snowmobiles)					
Airboats					
Power Boating under 35 H.P.					
Power Boating 35 H.P. and over					
Boating (Non-motorized)					
Water Skiing					

(CONTINUED)

FOR EACH ACTIVITY YOU CHECK SHOULD BE DISCONTINUED PLEASE INDICATE THE APPROXIMATE COST OF THAT ACTIVITY IN FISCAL YEAR 1987

	DISCONTINUE ACTIVITY?		APPROXIMATE COST OF ACTIVITY IN FISCAL YEAR 1987		
	NO (1)	YES (2)	NON-PERSONNEL COSTS	SALARY COSTS	TOTAL FTE'S
Fishing			$	$	
Environmental Education					
Horseback Riding					
Field Trials					
Other Consumptive Uses, e.g. fruit picking, etc.					
Other Public Uses (please specify):					
ECONOMIC USES					
Commercial Fishing					
Commercial Trapping					
Grazing					
Farming					
Timber Harvesting					
Mining					
Sale of Animals					
Haying					
Bee Keeping					
Rental of Government Facilities (e.g. cabins)					
Rights of Way					
Other Economic Uses (please specify):					
MILITARY USES					
Ground Exercises					
Air Exercises					
Other Military Uses (please specify):					

BACKGROUND SECTION

13. What is the principal use of this refuge as stated in the establishing order? (Check one) ID(1-3) CARD39(4-5) (6)

    1. [ ] Migratory Bird Habitat
    2. [ ] General Wildlife
    3. [ ] Endangered Species
    4. [ ] Other (Please specify)

    _____

14. Does the Fish and Wildlife Service share jurisdiction with another public agency on this refuge? (Check one) (7)

    1. [ ] No
    2. [ ] Yes--->Please explain below:

    _____
    _____
    _____
    _____
    _____
    _____
    _____

15. How long have your worked for the Fish & Wildlife Service? (Please round your answer to the nearest year) (Check one) (8)

    1. [ ] 1-5 years
    2. [ ] 6-10 years
    3. [ ] 11-15 years
    4. [ ] 16 years or more

16. How many total years of experience do you have as a project leader? (Please round your answer to the nearest year) (Check one) (9)

    1. [ ] Less than 1 year
    2. [ ] 1-5 years
    3. [ ] 6-10 years
    4. [ ] 11-15 years
    5. [ ] 16 years or more

17. How long have you served as the project leader for the refuge this questionnaire was completed for? (Please round your answer to the nearest year) (Check one) (10)

    1. [ ] Less than 1 year
    2. [ ] 1-2 years
    3. [ ] 3-4 years
    4. [ ] 5-6 years
    5. [ ] 7 years or more

18. How many stations in the refuge system have you served on as a Fish and Wildlife Service employee? (11-12)

    Enter number of stations:_____

19. If there are any other comments you would like to make regarding public, economic and/or military uses on your refuge, please write them below. (Please attach additional sheets, if necessary). (13)

Wildlife-Related Organizations Contacted

The Humane Society
The Wildlife Society
The Wilderness Society
Defenders of Wildlife
Ducks Unlimited, Inc.
Environmental Defense Fund
National Wildlife Federation
National Audubon Society

Sixteen Case Studies

The case studies that follow were selected to demonstrate the various types of secondary use problems that are occurring on national wildlife refuges. Though not randomly selected, they represent a broad spectrum of geographic locations and compatibility issues. In preparing these case studies, we visited each refuge and held extensive discussions with refuge and FWS regional office staff.

Bosque Del Apache

Description

Bosque del Apache National Wildlife Refuge lies along 9 miles of the Rio Grande River in the desert of south central New Mexico. Located in Socorro County, the refuge covers 57,191 acres. On the refuge, the high desert includes foothills and mesas, while the lowlands include artificially created marshes that replaced natural wetlands lost to development in the Middle Rio Grande Valley. Three wilderness areas totaling about 30,850 acres and five research natural areas totaling 18,500 acres are also located on the refuge.

More than 84,000 people visit the refuge each year and approximately 98 percent of these visitors come for wildlife observation and photography. A 15-mile tour route is maintained to support wildlife observation. Public uses occurring on the refuge include hunting, fishing, wildlife observation, wildlife interpretation, retriever trials, environmental education, and camping. There are no economic or military uses.

Purpose and Objectives

Executive Order 8289, dated November 22, 1939, established Bosque del Apache National Wildlife Refuge as "a refuge and breeding ground for migratory birds and other wildlife." Wildlife management at Bosque has emphasized the recovery and survival of the endangered whooping crane. In 1975 the refuge began providing wintering habitat for a special flock of whooping cranes with hopes of creating a second flock of the birds. Bosque sandhill cranes were selected as foster parents to the whoopers with hopes that the young whoopers would learn their foster-parents' migration route between Gray's Lake National Wildlife Refuge in Idaho and Bosque del Apache refuge. According to the refuge's 1986 Annual Narrative Report, the program has been successful. Refuge personnel reported 23 whooping cranes confirmed wintering in the Middle Rio Grande Valley with 13 spending time on the refuge. All lands on

Bosque with an elevation below 4,600 feet are legally designated whooping crane critical habitat.

Compatibility Issue

According to FWS officials in both the regional office and at the refuge level, Bosque del Apache does not have a compatibility problem per se. Rather, they are concerned for Bosque's water rights, primarily because of future adjudication scheduled for the state of New Mexico.[1] The refuge does not have measuring devices for determining the amount of water, a potential problem in any future adjudication process, as water usage must be established.

Current Status/Outlook

FWS officials are seeking personnel with expertise in water rights to help develop the refuge's position when the adjudication process occurs. They do not have in the region any personnel knowledgeable of water rights, even though the FWS guidance calls for such a position. At the time of our visit, the refuge had not completed its required water management plan. While this issue is not yet causing water shortages, FWS' success in taking all reasonable and prudent steps to secure its right to adequate water is crucial to continuing Bosque's success.

Browns Park

Description

Lying astraddle the Green River in extreme northwestern Colorado, the Browns Park National Wildlife Refuge provides nesting habitat and feeding areas for migratory waterfowl using the Pacific and Central flyways. In addition, resident wildlife such as antelope and sage grouse inhabit the refuge. Browns Park consists of uplands, such as benches and rocky slopes, and bottomlands and water. Wetlands and meadows along the river were historically inundated by annual floods, yielding exceptional waterfowl habitat. Completion of Flaming Gorge dam in Utah/Wyoming in 1963 eliminated this yearly cycle of high waters. To continue to provide these waterfowl habitats with the necessary water, the refuge uses pumps to flood the various bottomlands.

[1] Adjudication of water rights is a judicial or administrative process for resolving conflicts over the use of water from a particular source (such as groundwater, stream, river, or any tributary). In this process it may be necessary to establish the priority, point of diversion, place, and nature of use, and the quantity of water used among various claimants. Sometimes a complete adjudication of all rights to use water in a particular stream or watershed is necessary.

Purposes and Objectives

Browns Park was approved in 1963 by the Migratory Bird Conservation Committee, and the first tract was acquired on July 13, 1965. About 40 percent of the refuge's 13,455 acres was purchased from private landholders under the authority of the Migratory Bird Conservation Act (16 U.S.C. 715 et seq.), with the rest primarily coming from public domain withdrawals and leasing from the state. The refuge purpose, taken from a clause in the act, is ". . . for use as an inviolate sanctuary, or any other management purpose, for migratory birds." In 1988 the refuge was host to Canada geese and both dabbling and diving ducks. The refuge's surveys for spring 1988 indicated that duck production was 2,475, a reduction for the second year in a row, and gosling production was an estimated 336. Great blue herons also nest on the refuge, and produced about 30 young in 1988. Other herons, white-faced ibis, and sandhill cranes, as well as numerous other shorebirds, raptors, including the bald eagle, and terns use the refuge during their yearly migrations.

The refuge is quite isolated, so even though public uses are allowed, there are few recreational pressures on the refuge. Waterfowl and other types of hunting are allowed during their seasons. There is no military use of the refuge, but some economic use occurs. For example, cattle grazing accounted for 2,383 animal unit months[2] of use in 1987-1988.

Compatibility Issue

Browns Park refuge is sheltered and has productive meadows along the river; therefore, grazing there during the severe winters is very useful to ranchers with young or otherwise less adaptable cattle. The refuge manager can allow grazing on a refuge provided that it is compatible with the purpose for which the area was established, with the permittee charged a market-based price. Prior to the 1985-86 grazing season, cattle were scattered throughout the refuge with 2,300 animal unit months authorized. Actual use ranged from a low of no grazing in 1969 to a high of 2,600 animal unit months for two permittees in 1972 and 1973.

FWS personnel have been trying to reduce the grazing on the refuge for the past 4 years because livestock grazing was disturbing refuge wildlife and intensive grazing was not providing optimal waterfowl nesting habitat. Grazing was desired on the refuge they said, but only as a wildlife management tool. The current permittee disagreed with the need for a change in the amount of grazing allowed, and also objected to the extra handling of his cattle that would be required under a less intensive grazing system.

[2]An animal unit month describes the amount of forage consumed by a cow in one month.

Conflict Resolution

During 1985, refuge and regional staff decided that changes were needed in the grazing program to improve conditions for wildlife. A draft plan was discussed with the permittee in May 1986, and FWS records indicate that the planned reduction in grazing was contested by the permittee. A revised plan was quickly proposed and accepted for implementation whereby grazing was not reduced, but half the bottomlands would be rested each year. In May 1988 FWS personnel and permittee representatives met again to discuss the grazing program at the refuge. FWS proposed to reduce the animal unit months from 2,300 to 1,600 over 3 years and to continue to rest bottomlands every other year. The permittee expressed concerns with both parts of the proposal.

The permittee communicated these concerns to members of Congress and regional FWS management in August 1988. As a result, the FWS Director formed a study team charged with reviewing the situation and recommending a course of action. The team, made up of three range management specialists and one general wildlife specialist, completed its work in December 1988. Its recommendations centered on interseeding pastures with exotic species to allow continued grazing at historical levels and included several less significant suggestions.

The Browns Park refuge manager told us that he planned to implement all of the team's recommendations except the one about seeding pastures. He had already reduced the authorized level for the 1988-1989 season as planned, but because FWS policy prohibits introduction of nonnative species into native grasslands, he does not intend to take that step. The refuge manager intends to carry out the refuge's plan for reduced grazing unless ordered to deviate by higher management.

Cabeza Prieta

Description

Located in southwestern Arizona, Cabeza Prieta National Wildlife Refuge is an area of about 860,000 acres. It extends 60 miles from east to west, and about 15 to 35 miles from north to south, lying along the Mexican border southeast of Yuma. Cabeza Prieta, Spanish for "Black Head," refers to a lava-topped, granite peak on the refuge, whose numerous mountains are extremely rugged, very arid, and provide habitat for bighorn sheep, Sonoran pronghorn antelope and other Sonoran Desert wildlife.

Public use is quite limited. The remoteness, large size of the refuge, extremely high summer temperatures, primitive roads, and lengthy periods when entry is prohibited due to air-to-air gunnery training combine to restrict travel on the refuge. Of those that do visit, many travel the main access road through the refuge, "El Camino del Diablo," a historic route that runs through the air-to-air gunnery range.

Purpose and Objectives

The refuge was established from public domain in 1939 by Executive Order 8038 for the conservation and development of natural wildlife resources, and for the protection and improvement of public grazing lands. In 1942 Luke Air Force Range was created as an overlay on substantially all refuge lands. In 1986 Public Law 99-606 reaffirmed the withdrawal of this land for military purposes, which include training for aerial gunnery, rocketry, electronic warfare, and tactical maneuvering and air support.

Wildlife management on the refuge is primarily for the benefit of bighorn sheep. The refuge also harbors a population of Sonoran pronghorn antelope, an endangered species. Cabeza Prieta lies in a portion of the Sonoran Desert where restricted water resources have supported only a limited human population. Farming and livestock grazing operations in the area have been marginal at best and refuge grazing was phased out in 1982. Habitat management primarily involves maintaining water supplies, including hauling thousands of gallons of water when catchments are nearly dry.

Compatibility Issue

The Barry M. Goldwater Air Force Range (formerly Luke Air Force Range) overlies 825,440 of 860,000 acres, or 95 percent of refuge lands. This range, which extends north beyond the refuge, is one of the largest military aircraft pilot training ranges in the United States. Military use includes air-to-air gunnery missile firing, and a low level flight corridor. The refuge manager has expressed concern for potential adverse effects of low-altitude aircraft over fawning/calving grounds of the endangered Sonoran pronghorn antelope and disturbance to desert bighorn sheep.

Refuge management is also criticized by environmental and animal rights groups because of the seeming incongruity of "allowing" the military to fly over and shoot up the refuge. Further, most of the people who visit the refuge want to travel the El Camino del Diablo which runs through the air-to-air gunnery range. This requires a significant amount of staff time to schedule visits according to military activities.

Nature of the Conflict

The military controls the scheduling of aircraft operations on the gunnery range. The refuge manager uses a permit system to schedule public use that will not conflict with military operations. In managing for wildlife, he attempts to minimize the effect of aircraft presence and noise by negotiating for flight corridors away from areas most used by bighorns and pronghorns.

The refuge manager has reported that intense sonic booms cause bighorn sheep to alert and startle, Sonoron pronghorn antelope to run and jump, and doves and quail to frequently flush. Although he noted that some species get used to some of the repetitive low-level aircraft flight, he recommended that the effect of flights on population sizes and behavior changes of refuge wildlife should be investigated.

Current Status/Outlook

According to the refuge manager, interagency agreements with the involved military departments provide a reasonable framework for managing day-to-day activities and resolving occasional conflicts over use. Concerning wildlife management, the refuge manager pointed out that the problem at Cabeza Prieta is not one of determining compatibility but of reconciling the use of the refuge between two organizations with very diverse purposes. In his view, compatibility was established for using the refuge for military operations when the Congress also designated the land for military uses.

In the absence of useful data on the effect of military activities on the desert bighorn and the Sonoran pronghorn, it is very difficult to prescribe and obtain the best management within the context of military use. FWS has, however, made some progress in a general sense regarding military use of refuges. In June 1988 they published a report of the effect of aircraft noise on wildlife. From this survey, FWS was able to recommend that "formal field research on the effects of low-altitude aircraft operations on fish and wildlife . . . should be conducted." The manager at Cabeza Prieta refuge continues his interaction with the military and awaits the results of research recommended in the study.

Chincoteague

Description

Chincoteague National Wildlife Refuge is well known for its abundant wildlife, sandy beaches, and Chincoteague ponies. The refuge is located

on the southern end of Assateague Island in Virginia and contains 9,932 acres encompassing several types of habitat including beach, marshes, forest, dunes, and salt meadows. This area is one of the top shorebird migration staging areas in the United States and supports several species of waterfowl, including mallard, pintail, black duck, Canada geese, and the blue winged teal. Chincoteague also hosts breeding populations of the endangered Delmarva fox squirrel, piping plover, and peregrine falcon.

Purpose and Objectives

The refuge was established in 1943 under the authority of the Migratory Bird Conservation Act to provide migration and wintering habitat for greater snow geese. Refuge objectives now include (1) the preservation and enhancement of endangered species, (2) the protection and enhancement of habitat for many migratory and non-migratory waterfowl, (3) the provision of a variety of habitat types conducive to the perpetuation and maintenance of indigenous species, and (4) opportunities for wildlife-oriented public use.

On September 21, 1965, President Johnson signed the Assateague Island National Seashore Act. This act stated that the lands and waters in the Chincoteague refuge which are part of the Seashore should be administered for refuge purposes under laws and regulations applicable to the National Wildlife Refuge System.

Compatibility Issue

Public use at Chincoteague has grown from an estimated 100,000 visits in 1963 to more than 1.5 million visits in 1986. Public visitation has contributed to declining migratory bird use and endangered species production at the refuge. A conflict recently addressed by FWS involved protecting the endangered piping plover from off-road vehicles and visitors during its nesting season. However, still unresolved are pressures placed on wildlife and habitat from the growing levels of refuge visitation.

Nature of the Conflict

Chincoteague's visitation level now ranks third among refuges nationwide. Approximately half of the visits at Chincoteague are for beach use at least part of the time, while the other half use the refuge primarily for wildlife-related activities such as bird watching. Peak visitation occurs during the summer months with beach activities far outnumbering wildlife-related uses during this period. Avid bird watchers from all parts of the world come to observe the diverse species of shorebirds

that stop to rest and feed during spring and late summer migration periods.

A 1979 Memorandum of Understanding between FWS and the National Park Service assigned management responsibility for public use on the Toms Cove Hook portion of the refuge to the Park Service. They act as an agent of FWS on Toms Cove Hook. However, the growing demand for public recreational uses has conflicted with wildlife management.

In recent years, local business and tourist interests from the town of Chincoteague began to pressure refuge management to expand refuge facilities to accommodate increased public demand. Their requests included enlarging the parking lot, replacing frequently washed out roads, and eliminating nudist activity. Such pressures led the Wilderness Society to list the Chincoteague refuge as one of its "Ten Most Endangered National Wildlife Refuges."

Conflict Resolution

As part of its individual planning approach to specific problems, FWS has restricted off-road vehicle and public use on Toms Cove Hook during nesting season (Mar. 15 to Aug. 31) because of low production of the endangered piping plover.[3] To accommodate off-road vehicles during piping plover nesting season, FWS allowed use of a 1.5-mile stretch of beach north of the Hook. If future piping plover habitat also includes this limited part of the beach, refuge management has vowed to take the necessary actions to protect this endangered species.

FWS must still implement an activity plan that will deal with growing visitation on the refuge. The refuge manager believes that local development interests want to turn Chincoteague refuge into a commercial beach resort. To date, refuge management is working with the town of Chincoteague to solve many public use problems. An ongoing topic of discussion involves the merits of a shuttle bus system to reduce the number of cars on the refuge. However, the more basic question is how to strike a balance between managing Chincoteague as a wildlife refuge and providing a quality wildlife-oriented recreational area.

[3]Productivity on the Hook for the 1987 piping plover nesting season was only 0.19 young per pair, far below levels necessary to maintain a stable population.

D'arbonne

Description

D'Arbonne National Wildlife Refuge is located in northeast Louisiana, near Monroe, approximately 23 miles south of the Arkansas border. The refuge covers about 17,400 acres and lies in an area where the Mississippi River and several tributaries form a flood plain. Over thousands of years, the shifting river channels have deposited fertile soil over the flood plain creating sluggish side channels, natural levees, swamps, and oxbow lakes. The diverse land mixture provides excellent habitat for a multitude of migratory birds and resident wildlife.

The D'Arbonne refuge provides breeding habitat for 145 species of birds, most of which are migratory. The refuge also provides habitat for 41 species of mammals, 53 species of reptiles, and 23 species of amphibians. The endangered bald eagle uses D'Arbonne as winter habitat. Several clans of the endangered red-cockaded woodpecker can also be found on the refuge.

Purpose and Objectives

In the early 1970s, the U.S. Army Corps of Engineers built a navigation project on the Ouachita River north of Monroe, Louisiana. To mitigate the effects of attendant environmental damages, the Corps bought 17,000 acres from private parties that eventually became the D'Arbonne refuge. The federal government opted not to purchase the mineral estate during condemnation procedures, despite realization that some of these lands overlie the once highly productive Monroe gas field.

The refuge was officially established on May 19, 1975, under the Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 661 et seq.). The mission statement of the refuge is "to protect, enhance, and perpetuate bottom-land hardwood habitats, and manage associated shallow impoundments for the benefit of wintering migratory waterfowl." Current refuge objectives include providing habitat to support indigenous wildlife species and protect endangered species. D'Arbonne also offers various wildlife-oriented recreational activities including sport fishing, hunting, interpretive tours, and wildlife observation.

Compatibility Issue

FWS has limited capability to control secondary uses or manage the habitat for wildlife enhancement at D'Arbonne refuge because it did not purchase the subsurface estate. This situation is critical because salt-

water contamination from gas production continues to erode the habitat's capability to support wildlife. For example, local clans of the endangered red-cockaded woodpeckers reside in limited, specific habitats near ongoing gas production and exploration activities. The aggressive efforts of independent gas operators have resulted in court proceedings and a systemwide reevaluation of FWS authority to manage habitat for wildlife when the subsurface estate is privately owned.

Nature of the Conflict

During the late 1970s, two oil companies that own the mineral estate on the D'Arbonne refuge began leasing drilling rights to independent gas operators. By the mid-1980s leasing operations resulted in 30 small operators maintaining 165 gas wells on the refuge. This volume of activity on the wildlife refuge had negative repercussions. Natural gas production destroyed wildlife habitat through soil and water contamination by brine.

The refuge manager who took charge of D'Arbonne in 1984 was uncomfortable with gas operators having unrestricted access to the refuge which is usually regulated through special use permits. This situation became critical in 1984 when a local operator proposed drilling 58 new gas wells on approximately 500 acres of the refuge. This proposal would result in one gas well per 8 acres of land and require that for each well, a full acre of land be stripped of all trees and vegetation. In a biological opinion under Section 7 of the Endangered Species Act, FWS concluded that gas operations would destroy foraging habitat and drive the endangered red-cockaded woodpecker from the refuge unless mitigating actions were taken by the local operator.

To help protect the habitat from new development, FWS prepared a special use permit to monitor access and drilling conditions on the refuge. The permit conditions included (1) posting a performance bond to pay for maintenance or clean-up, (2) using access roads or planking to reduce habitat damage, (3) building culverts to bridge flood waters, (4) clustering drilling to minimize surface disturbance, and (5) encouraging operators to use directional or slant drilling when possible.

The local gas operator protested FWS' proposed permit conditions. It was the operator's opinion that unrestricted drilling rights had already been acquired through the lease agreement with the owner of the subsurface estate. Therefore, the operator felt no obligation to abide by FWS' special drilling conditions. This disagreement was litigated in district court. The presiding judge ruled based on the unique facts of the case that FWS

could not enforce special use permit requirements on the gas operator since the operator possessed title to the subsurface mineral estate. The decision noted, however, that under governing Louisiana state law a "reasonableness" standard applied to the operator's activities.

Current Status/Outlook

FWS did not seek an appeal of the judge's 1986 decision because language allowing FWS to regulate subsurface activity was deleted by federal government officials prior to the refuge's creation during condemnation proceedings. On August 1, 1986, the Director, FWS, wrote to the gas operator and stated that although he would not appeal the permit requirement decision, the Department of the Interior fully intended to protect its surface property rights against "unreasonable" mineral activity. The refuge manager believes that it is possible to prove that the operator has acted in an unreasonable manner and caused irreparable damage to the refuge. For instance, he said that the operator (1) improperly installed surface and underground pipe and gas lines, (2) provided inadequate monetary compensation for habitat destruction caused by unauthorized travel routes, (3) and destroyed the future viability of D'Arbonne through unabated salt-water contamination at numerous well sites.

Despite this continued destruction of habitat, FWS must complete documenting specific instances of damage to the refuge as it shoulders the burden of proving "unreasonable" surface activity. The refuge manager has already initiated certain actions. For example, FWS has taken aerial photographs of damage incurred to the refuge from local gas production activities. Time frames for completing assembly of the documents have not been formalized, pending Interior's Solicitor's Office and Justice Department review of suitability of evidence.

Des Lacs

Description

The Des Lacs National Wildlife Refuge is located in the northwestern part of North Dakota and is administered as a unit of the Des Lacs refuge complex. The refuge extends from the Canadian border to a point 6 miles south of the town of Kenmare, North Dakota, covering a distance of approximately 28 miles. The refuge is situated in the Des Lacs River Basin. A series of dikes, spillways, and other structures were built to control area wetlands. These structures encompass eight water impoundment units that contain three natural lakes.

Water in the Des Lacs River fluctuates, subject to snowpack and summer rains. As a result, wetlands within the refuge also fluctuate and sometimes dry out almost completely. These fluctuations are necessary to enhance soil fertility for optimal waterfowl maintenance and production. Managers of the Des Lacs refuge, as well as other refuges in North Dakota, often try to duplicate the natural wetland cycles found in the prairie pothole states.

Purpose and Objectives

On August 22, 1935, President Franklin D. Roosevelt established the Des Lacs Migratory Waterfowl Refuge "as a refuge and breeding ground for migratory birds and other wildlife." Birdwatching, photography, and picnicking are popular recreational activities. In addition, power boating and waterskiing are allowed from Memorial Day to Labor Day. The refuge also permits deer hunting, which coincides with the state's general hunting season.

Compatibility Problem

In 1983 a newly established water control structure built in association with a highway project made it possible to more effectively manipulate water levels throughout the refuge. A controversy soon developed between the city of Kenmare and FWS concerning plans to manipulate water levels to improve waterfowl production. Implementation of such a plan would require periodic lowering of the water units which since 1963 supported power boating and waterskiing.

Several studies disclosed that recreational boating activities, as permitted at Des Lacs, disturbed waterfowl and were therefore inconsistent with the refuge's primary purpose. In addition, maintaining high water levels for recreational activities interfered with the refuge's ability to optimally manage its wetland habitats for migratory birds. Despite this biological support for the water management plan, town opposition delayed implementation pending further review by FWS.

Nature of the Conflict

During the early 1940s up through the early 1960s, Kenmare residents urged refuge management to allow recreational boating on the Des Lacs refuge. These requests were denied because refuge managers opposed power boating in an area established for migratory waterfowl breeding. The FWS regional office reinforced this sentiment, deeming such requests, "inconsistent with the use of the area by wildlife." However, in 1963, a U.S. Senator intervened on behalf of Kenmare residents, and FWS' predecessor agency issued a special use permit for recreational

water privileges on the Des Lacs refuge. The permit evolved into a 5-year agreement between the city of Kenmare and FWS with virtually automatic renewal.

In 1983 new management at the refuge decided to use the newly constructed water control structure to create a dynamic habitat that would benefit waterfowl production. Refuge officials began implementing water manipulation procedures and subsequently announced that the permit agreement, which sanctioned power boating and waterskiing, would not be renewed. On October 24, 1985, a letter forwarded from the FWS regional office to the city of Kenmare stated:

"Power-boating and waterskiing directly disturb migratory birds nesting over water or in nearby trees and upland cover; disturb broods of newly hatched birds that use the river for feeding and protection; and disturb other wildlife which use the river and adjacent areas for feeding and protection. Incompatibility also lies in management of high water levels. Holding the water at high levels to maintain a safe water depth for power-boating and waterskiing precludes development and maintenance of riverine marshes for a variety of fish and wildlife. Therefore it is our decision that the present special use permit, which expires in April 1987 cannot be renewed."

To protest FWS' water management proposal, individuals from Kenmare formed a group called the "Save the Lakes Committee." This committee met with refuge officials and presented their concerns, which included fears (1) that lowering the lake would depress property values, (2) that sewage previously dumped into the refuge by the town of Kenmare would be exposed and contribute to disease and odor, and (3) that shallower water would result in cattail/bullrush growth which would attract more blackbirds. The committee's concerns were determined to have no adverse impact on the city of Kenmare by local FWS refuge management.

However, in 1986 the "Save the Lakes Committee" enlisted congressional support. The Secretary of the Interior was contacted and water management plans were subsequently reversed. Des Lacs refuge management was informed that all plans would be suspended until a more extensive review could be performed. In the meantime, recreational boating activities were allowed to continue on the refuge for another 3 years through continuation of an FWS special use permit.

Current Status/Outlook

Several surveys of power boating and waterskiing performed at Des Lacs refuge have demonstrated that recreational boating is inconsistent with the refuge's primary purpose and precludes managing the habitat

for migratory waterfowl. In addition, a similar water management strategy employed at nearby refuges resulted in a 50-percent increase in duck and snow goose populations. Des Lacs refuge management had anticipated duplicating this success ratio.

However, the FWS Director stated that "Although waterskiing may disturb waterfowl, existing information does not indicate conclusively that a net loss occurs. When planning is complete, the effects of waterskiing will be reassessed." In the meantime, the Des Lacs refuge management is unable to manage the refuge according to its mission or affect any wildlife enhancement.

The water management plan has been drafted and is awaiting signature by the regional director. In addition, a formal compatibility determination is expected to be completed by September 1989. Because additional biological surveys and studies have confirmed earlier observations, refuge and regional officials expect to find that waterskiing is not compatible.

Desoto

Background

DeSoto National Wildlife Refuge was established under the Migratory Bird Conservation Act to provide habitat for migratory waterfowl. Located 30 miles northeast of the Omaha, Nebraska-Council Bluffs, Iowa, metro area, the refuge's 7,823 acres sit astride the Missouri River with 4,324 acres in Nebraska and 3,499 in Iowa. Located within the Missouri River floodplain, the refuge includes the river, marshes, croplands, woodlands, and brushlands. A 750-acre oxbow lake was created in 1960 when the Corps of Engineers constructed a new navigable channel across a bend of the Missouri River.

Discovery in 1968 of the hull and cargo of the steamboat Bertrand, sunk in 1865, added a major historic emphasis to the refuge program. The excavated cargo provides a time capsule of Civil War-era artifacts. A visitors center, opened in 1981, houses exhibits of the Bertrand.

Purpose and Objectives

Because of concerns about seriously reduced waterfowl habitat along the Missouri River, the DeSoto Bend National Wildlife Refuge and Recreation Area was proposed in 1957 to provide a nesting and feeding area

for all species of waterfowl and to permit a more natural fall migration of the eastern prairie flock of Canada geese. In a September 1957 public hearing, it was proposed that public recreation would not be a coequal purpose, but would be permitted and encouraged so long as it did not interfere with the primary purpose of the refuge. Subsequently on March 11, 1958, the DeSoto National Wildlife Refuge was established.

Compatibility Issue

As with many refuges near urban centers, pressures were exerted on the new DeSoto refuge for recreational development. Particularly significant was a widespread public attitude, based on the September 1957 public hearings, that the refuge was committed to various recreational uses. Since water recreation facilities were very limited in western Iowa and eastern Nebraska, the refuge immediately became a popular recreation area with boat ramps, picnic areas, 180 picnic tables, 20 pit toilets, 10 miles of asphalt roads, supervised beach, fishing access, and concessions. For over two decades, the DeSoto refuge hosted droves of picnickers associated with average annual visits of 25,000 swimmers and 41,000 waterskiers and power boaters. The intensity of recreational use, particularly power boating, took its toll on sport fishing and waterfowl protection. Power boat-created turbidity contributed to loss of aquatic vegetation, which fish and waterfowl require for food and cover. By the early 1980s, use had dropped from over 300,000 angler hours per year in the 1970s to 30,000 angler hours per year, due largely to loss of game fish species.

Nature of the Conflict

To quote the refuge manager, "You can't expect to close a refuge to high-speed power boating and waterskiing after a quarter of a century of traditional use without a controversy. We knew that." Starting on this note, FWS management actions involving the DeSoto refuge during the 1980s illustrate that major compatibility problems can be dealt with successfully, notwithstanding intense community and political pressure both before and after incompatible uses were discontinued.

Conflict Resolution

For over two decades, FWS and both the Iowa and Nebraska conservation commissions had recognized the need to improve waterfowl habitat and sport fishing at DeSoto Lake. In 1983, after years of surveys and planning, a comprehensive fishery management plan was developed to support a sustained sport fishery on the lake. The plan stated that non-

wildlife oriented recreation, i.e., high-speed pleasure boating and waterskiing, conflict with fishery management goals for DeSoto Lake. Turbulence and wave action created by large pleasure boats interferes with fishing, destroys waterfowl habitat, and disturbs and jeopardizes the safety of anglers. The proliferation of boaters limits habitat enhancement measures such as the placement of trees and brush piles because they would not allow obstacle-free navigation.

Prior to revitalizing the fishery program in 1987, several other actions were taken to improve wildlife habitat and produce more wildlife-related activities. These included closing concessionaire facilities in 1983 and closing DeSoto Lake to all high-speed power boating and waterskiing in conjunction with the fishery program renovation in 1985. This was accomplished by establishing a 5-mile-per-hour, no-wake speed limit.

Despite public meetings to explain the reasons for this action, local opposition was strong. The Midlands Boat Club was organized early in the summer of 1985 to protest the restriction on power boating and elimination of waterskiing. The group held several meetings, distributed posters, initiated a petition drive, wrote letters, and sponsored a boater's rally on the lake. Their theme, "Keep DeSoto for the People," was widely heard throughout the summer in local communities and covered by the press. As a result, Iowa congressional members introduced bills in the U.S. Senate and House of Representatives that would have reversed the environmental decisions for protecting DeSoto Lake, reverting to essentially the swimming, power boating, and waterskiing activities of the past. The proposed legislation was tabled in subcommittees.

Meanwhile, the lake environment has responded to improved water clarity and quality with an explosion of aquatic life. Ecological monitoring studies show a tremendous rebirth of invertebrate species as the lake revegetates. Record waterfowl and water bird use has been documented since renovation. Fish growth rates have exceeded expectations. To quote a FWS briefing statement on the recreational controversy, "It is not the same environment which existed when swimming and skiing prevailed. In fact, today the extensive weed beds would significantly impede such forms of recreation."

When asked why FWS had prevailed in the face of strong community and political influence to continue uses determined to be biologically incompatible with wildlife, the refuge manager cited unusually strong support at all levels of FWS management, particularly at the regional office. He

also cited support of various environmental organizations, state conservation commissions, as well as key media support. Based on our study of documents, news articles, and interviews with regional office managers, the refuge manager's strong personal commitment and tireless involvement also contributed significantly to successfully eliminating noncompatible uses.

Great Swamp

Description

The Great Swamp National Wildlife Refuge is located within Morris County in north central New Jersey. Morristown is 7 miles to the north and New York City is 25 miles to the east. Great Swamp is located in the headwaters of the Passaic River basin and drains 29.2 square miles of watershed above Millington Gorge. The refuge contains 6,936 acres and is composed of swamp woodland, hardwood ridges, cattail marsh, and grassland. Plant species of both the northern and southern botanical zones are present. Great Swamp has low ridges or knolls rising from 5 to 15 feet above the surrounding swamp. In several places, the swamp opens into small marshes.

Purpose and Objectives

The Great Swamp refuge was established in 1960 as a result of a major public effort to save the Great Swamp from becoming a jetport. Concerned citizens raised more than $1 million to acquire almost 3,000 acres, which were then donated to the government. This gift comprises the nucleus of the present 6,936 acre refuge. FWS uses all applicable statutes, such as the Migratory Bird Treaty Act of 1918 and the Migratory Bird Conservation Act of 1929, to administer Great Swamp. These acts provide for federal protection, management, and land acquisition for migratory birds.

The refuge supports over 223 species of birds, 39 species of reptiles and amphibians, and 24 species of fish and various mammals. Predominant groups and species are migratory waterfowl, wading birds, raptors, white-tailed deer, muskrat, and raccoons. Federally endangered bald eagles and peregrine falcons are sighted occasionally. There is substantial wildlife-oriented recreation, but no economic or military use.

Compatibility Issue

Deer hunting at Great Swamp became a compatibility issue in 1970 when the refuge proposed that a deer hunt be held. The refuge's rationale was that much of Great Swamp refuge has not been hunted since the refuge was established, the refuge is ideal deer habitat, and the natural predators have been extirpated. The deer were causing depredation of local gardens and shrubs, as well as being involved in an increasing number of car accidents. However, a group of citizens was able to gain public and legal support to halt the hunt for 4 years, primarily on humane grounds. Since then, deer hunts have been held yearly.

Conflict Resolution

According to the refuge manager, Great Swamp continues to have groups annually protesting the hunts. He said that the protesters come and stay a couple of hours on the first day of the hunt and go home. He expects the hunts to go on because they are a needed management tool, and he also expects the yearly protest to continue.

Malheur

Description

Located in the Great Basin region of southeastern Oregon, the Malheur National Wildlife Refuge encompasses 184,000 acres of lakes, shallow marsh, small ponds, irrigated meadows, and grass/sagebrush uplands. Since prehistoric time, the Malheur-Harney Lakes Basin has been one of the most important nesting and migration areas in the Pacific flyway. Malheur Lake is the largest freshwater marsh in western North America and is especially important for diving ducks, colonial nesting birds, and marsh and shore birds. The refuge is also an important nesting area for greater sandhill cranes, considered by FWS to be a "sensitive" species in the region. These rich wildlife resources have given Malheur a national reputation as a "birding hotspot" and as a flagship of the National Wildlife Refuge System.

Purposes and Objectives

The refuge was established in 1908 by Executive Order 929, which reserved 81,786 acres on Malheur, Mud, and Harney Lakes as a refuge and breeding ground for migratory birds and other wildlife. Subsequent public domain withdrawals and acquisitions also established that Malheur was to be managed for the benefit of migratory birds. The refuge produces thousands of major nesting ducks and hundreds of colonial

nesting waterbirds annually. During spring and fall migrations, waterfowl populations swell, particularly gadwalls, cinnamon teal, mallards, and Canada geese. In recent years, record high water on Malheur Lake and adjacent areas has adversely affected waterfowl use on the refuge.

The refuge is open to public use, but access to large portions of the area is seasonally restricted to minimize disturbance of breeding wildlife. Since Malheur is located in a remote area, most visitors to the refuge come to observe wildlife. Other recreational activities include photography, hiking, fishing, and hunting. Some economic uses occur, such as grazing and haying.

Compatibility Issue

Two activities on Malheur, livestock grazing and predator control, illustrate the debate that can arise over secondary uses and management practices. Grazing can be used by a refuge as a management tool that controls grass and shrub growth to better propagate certain species of birds. In a like vein, predators of birds' eggs and fledglings can be controlled to ensure better nesting success. Wildlife organizations saw the use of these management tools at Malheur as excessive and agitated for their reduction, or in the case of predator killing, its elimination.

Nature of the Conflict

By the mid-1970s, visitors to Malheur began to complain about the number of cattle, the overgrazed habitat, and the greatly reduced bird counts. In this regard, Malheur accounted for about 28 percent of all grazing in the entire wildlife refuge system in 1975. Throughout the late 1960s and early 1970s, virtually every available acre was hayed and grazed. Trampling from intensive cattle grazing destroyed, and fences divided, many nesting territories, feeding grounds, and roosting sites. Additionally, early haying directly threatened nests of both waterfowl and sandhill cranes.

The nesting population of greater sandhill cranes had declined from 236 pair in 1971 to 181 pair in 1986. FWS nesting studies conducted from 1966 to 1987 repeatedly demonstrated that the primary limiting factor for cranes nesting on the refuge was predation of eggs by ravens, raccoons, and coyotes, and the predations on prefledged chicks by coyotes. An environmental assessment was prepared to study the initiation of a predator control program to offset crane losses. FWS then proposed a program targeted primarily against coyotes, raccoons, and ravens that would involve aerial gunnery, trapping and denning of coyotes, and

injections of toxicant into chicken eggs placed in areas to resemble crane nests.

Environmental groups contested both the reasons for crane decline and the proposed predator control program. They pointed to unusual climatic conditions causing heavy flooding on the refuge that not only destroyed some crane nesting areas but also prompted the granting of emergency grazing and haying permits for nonflooded areas to neighboring ranchers whose lands were flooded. In addition, they cited a decline in water quality because of sedimentation and pesticide use from upstream logging operations. They criticized the environmental assessment's lack of provisions to reduce grazing and haying which the critics believe cannot be justified on a refuge where the possibility still exists that they might contribute to the reduction in crane nesting success. Finally, they criticized the intended methods of predator control, arguing that the methods could affect endangered and threatened wildlife on the refuge, including the American peregrine falcon and the northern bald eagle.

Conflict Resolution

In response to problems created by extensive grazing, FWS reduced haying and grazing to provide better nesting and brooding conditions for nesting cranes, waterfowl, and other ground nesting birds. Haying dates were set back to minimize a significant conflict with nesting birds, and delayed an additional 10 days in fields where young sandhill cranes were known to exist in order to avoid mortality from haying equipment.

The refuge now supports about 50,000 animal unit months of haying and grazing use annually. This is a 50-percent reduction from the peak-use years of the late 1960s and early 1970s. The master plan and environmental assessment for Malheur provides for maintaining this level of haying and grazing while habitat management plans are developed for each unit. If these efforts result in a need to increase or decrease such use more than 10 percent, environmental assessments will be prepared and subjected to public comment and involvement. The plan also provides for continued use of livestock grazing, haying, prescribed burning, and other management tools as FWS believes necessary to the needs of habitat and animal population management programs. The refuge manager believes these tools are essential for restoring and developing Malheur to ensure the best possible environmental conditions for waterfowl production.

FWS initiated a predator control program in January 1986 aimed at coyotes, ravens, and raccoons. In its first year, the program removed 166 coyotes, 11 raccoons, and an estimated 11 ravens. In that year sandhill crane production was its highest since 1970. In its second year, 460 coyotes, 16 raccoons, and an estimated 137 ravens were removed. Recent studies comparing managed versus unmanaged areas show that the program increased nesting success about threefold for sandhill cranes, Canada geese, and dabbling ducks, and about twofold for diving ducks. Given this success, the refuge manager expects to continue the program, with environmental and wildlife groups expected to continue to voice their opposition.

Minnesota Valley

Description

The Minnesota Valley National Wildlife Refuge is composed of 12,200 acres of mostly floodplain lands located along the Minnesota River within the metropolitan region of Twin Cities, Minnesota. The refuge is one component of a larger 72-mile-long open-space system known as the Minnesota Valley National Wildlife Refuge, Recreation Area and State Trail. This combination of federal, state, and local lands have been comprehensively planned for wildlife and people. The refuge portion is located along the lower 36-mile segment near the heart of Minneapolis-St. Paul. During migration, tens of thousands of waterfowl use this stretch of the Minnesota River floodplain. Principal species include geese, ducks, swans, coots, teal, mallards, and wood ducks. Recreational interests are numerous and varied throughout the valley. Trails and facilities for hiking, cross-country skiing, horseback riding, and snowmobiling are maintained on those parcels of land owned by the state.

Purpose and Objectives

Traditionally, refuge lands have been acquired and managed for the benefit of wildlife resources, with primary emphasis on waterfowl. However, the mandate establishing the Minnesota Valley refuge also placed emphasis on public use, directing the development of this refuge to provide compatible opportunities for wildlife observation, wildlife-oriented recreation, and environmental education. The refuge was established by Public Law 94-466 on October 8, 1976, for the conservation and management of wildlife and natural resources, the development of

wildlife recreational opportunities, wildlife interpretation, and environmental education. The act also provided for the construction and operation of a wildlife interpretation and education center to promote environmental education and to provide an opportunity for the study and enjoyment of wildlife in the natural habitat.

Compatibility Issue

An ongoing debate concerning mosquito control practices on the Minnesota Valley refuge illustrates the kind of compatibility issue that can arise where a refuge exists in an urban community. In 1985 lawsuits were brought by environmental groups to stop chemical control of mosquitoes on the refuge. Mosquito control was carried out under a special use permit by the Metropolitan Mosquito Control District. The suits argued that not only mosquitoes were being killed but also other important foods for wildlife. The environmental groups feared that this broad loss of nontarget species would disrupt the refuge food chain.

Nature of the Conflict

Before the Minnesota Valley refuge was first staffed in 1979, the Metropolitan Mosquito Control District was chemically treating lands within the designated refuge boundaries. Beginning in March 1981, pesticide use proposals for the chemicals being used on the refuge were submitted for approval by the District to the FWS regional office staff. In March 1982 the refuge issued the first special use permit allowing the District to work on the refuge. The District's application for mosquito control on the refuge, including pesticides to be used, is reviewed annually by FWS.

On July 31, 1985, the Defenders of Wildlife and other environmental groups filed litigation against the refuge claiming that FWS had not properly assessed the impact of mosquito control on the refuge prior to allowing the control activity by the District. Specifically, the group charged that FWS had not prepared environmental impact statements as required by federal law and FWS' refuge manual. The same group also sued the District.

Conflict Resolution

Both suits were settled before trial. According to Interior officials, the plaintiffs agreed to dismiss the federal suit if FWS would use information obtained from a supplemental environmental impact statement prepared by the District to do an environmental assessment, and make a compatibility determination before issuing any permit allowing mosquito control treatment on the refuge. No permits were issued for fiscal year 1986

through fiscal year 1988. Based on its July 1988 environmental assessment, a finding of no significant impact was approved on August 4, 1988. This finding allowed FWS to issue the Metropolitan Mosquito Control District a special use permit to monitor mosquito populations and to apply a specific chemical on the refuge in public health emergencies.

Sand Lake

Description

The Sand Lake National Wildlife Refuge, located in northeastern South Dakota, is an important link in the chain of federal refuges secured and developed for the conservation and management of the nation's waterfowl resource. The refuge contains 21,498 acres and lies in the rich, rolling lowlands of the James River valley. Sand Lake is an important stopping place for thousands of ducks and geese as they move along the eastern border of the Central flyway in spring and fall from vast nesting areas in Canada and Alaska, southward to the Gulf of Mexico. Each year large numbers of people from all parts of the country visit Sand Lake to observe, photograph, or hunt the abundant wildlife the refuge provides.

Purpose and Objectives

Sand Lake refuge was established by Executive Orders 6728 and 7169, dated May 28, 1934, and September 4, 1935, respectively, to preserve wildlife habitat for nesting and migrating waterfowl. The primary objectives of the refuge are to provide (1) habitat needed for increased production of ducks, Canada geese, and other wildlife species, (2) resting area for the spring and fall migration of various types of geese (e.g., snow, blue, and Canada) and all species of duck, and (3) wildlife-oriented recreation, including both consumptive and nonconsumptive activities.

Compatibility Problem

Since 1970, when a national magazine article brought public attention to excessive hunting at the Sand Lake refuge, refuge management has striven to provide habitat that will benefit nesting and migratory waterfowl, as well as provide for recreational activities. While attempting to attain an optimum mixture of nesting and feeding habitat (increasing nesting habitat for ducks decreases feeding habitat for migrating geese), refuge management has been criticized for reducing local grazing and goose hunting opportunities. In particular, the popularity of the goose

hunt has resulted in constant calls for reevaluation of refuge management practices.

Nature of the Conflict

Prior to the early 1970s, no waterfowl hunting or retrieval was permitted within the boundaries of the Sand Lake refuge. However, hunting was available at different points near the refuge. For example, the South Dakota Department of Game, Fish, and Parks owned certain lands adjacent to the refuge on which waterfowl hunting was permitted, and private landowners established hunting club areas for this popular recreational activity. In the fall of 1969, a noted biologist spent some time at the Sand Lake refuge and later published an emotional article in the National Audubon Society magazine entitled "Carnage at Sand Lake." The article described the gore associated with crippling of large numbers of geese along "fireline" boundaries of the refuge. The federal predecessor of the FWS (Bureau of Sport Fisheries and Wildlife) concluded that the inordinate number of maimings and killings were attributed to surplus amounts of geese attracting too many hunters to the refuge. To reduce crippling losses from firelines, it was suggested at a public hearing on the goose hunt that a portion of the refuge would be opened to public waterfowl hunting.

Reduction in Snow Goose Numbers

During the late 1960s, FWS management at Sand Lake received a great deal of pressure from southern state delegations of the Central flyway regarding the "short-stopping" or holding of geese. In response, FWS decided to change management practices and reduce the peak number of migratory snow geese on the refuge to 100,000. Since snow geese are the preferred hunting resource at Sand Lake, local hunters soon became annoyed with declining snow goose levels at the refuge. In response, FWS attributed falling snow geese populations to changing weather conditions in the prairie pothole states and increased hunter participation throughout the Central flyway. Regardless, community pressure intensified throughout the decade and continued into the 1980s. By 1983 the South Dakota Division of Game, Fish, and Parks also began to express more interest in increasing the snow goose harvest at the Sand Lake refuge.

Increase in Dense Nesting Cover

In 1970, FWS curtailed grazing and farming activities on the refuge and replaced the area with dense nesting and grass cover. This type of growth provided excellent nesting habitat for waterfowl and winter cover for resident wildlife species. The principle types of dense nesting cover planted include tall and intermediate wheat grasses, sweetclover, brome, and alfalfa. With fewer numbers of snow geese at the refuge,

hunting opportunities also decreased, and area hunters complained that refuge management let weed growth interfere with the mandated or primary purpose of the refuge. In addition to reducing crops, the dense nesting cover apparently robbed geese of natural resting and feeding areas. The snow geese reportedly either took very brief stops on refuge waters or were discouraged to the point of finding another resting area altogether.

Dense nesting cover is also thought to have contributed to the dramatic increase in the local deer population which caused off-refuge crop depradation problems. FWS recognizes that recent mild winters in northeastern South Dakota have enabled the white-tailed deer herd to expand. One local resident estimated that the crop damage caused by deer on a local farm was over $12,000 in 1986. He further stated that if the refuge is indeed a "deer sanctuary," FWS should fence deer in rather than to allow destruction of neighboring crops. FWS officials acknowledge that dense nesting cover is utilized by deer; however, they counter that dense nesting cover has tremendous value as nesting habitat for waterfowl and that deer are in excess throughout the state of South Dakota.

Conflict Resolution

In defense of past policies, Sand Lake refuge officials state that several thousand acres of reduced crops, and dense nesting cover being allowed to flourish were not by themselves reason for too few geese and too many deer. FWS' version of why migratory waterfowl levels have declined hinges upon half-day hunting in North Dakota and weather conditions.

Since area residents believe that changes in refuge land use were the chief cause for reductions in peak snow goose populations at Sand Lake, a return to former policies was thought to be the prescription for higher numbers of geese. The refuge manager stated that in 1987 FWS also agreed to work with the South Dakota Division of Game, Fish, and Parks to increase opportunities for the annual deer hunting season.

According to the refuge manager, in 1988 snow goose population visits tripled 1987 levels. While determining specific causal factors may not be possible, the refuge manager attributes the increases to the geese flying closer to the James River and dry conditions in the area. In addition, the 1988 deer harvest was reported to be one of the best in many years. Barring new complaints of short-stopping, or nationwide reevaluation of

migratory waterfowl hunting, a majority of the local community now appears to be happy with refuge management.

Stillwater Wildlife Management Area

Description

The 200,000 acre Stillwater Wildlife Management Area is near Fallon, Nevada, and consists mostly of public lands withdrawn by Interior's Bureau of Reclamation for its 1902 Newlands Irrigation Project. In an area called the Stillwater Marsh, the Stillwater Wildlife Management Area includes the Stillwater National Wildlife Refuge, a sanctuary 24,000 acres in size, and about 40,000 acres of private land. The marsh ebbs and floods at the mouth of Carson River, a stream that flows from the Sierra Nevada mountains into the Lahontan Valley. An oasis in the eastern part of the Pacific flyway, the wetlands and marshes have long been recognized as an integral part of the migratory and breeding patterns of many waterfowl. Its importance is heightened as 85 percent of the wetlands in western Nevada have been destroyed.

Purposes and Objectives

The Stillwater Wildlife Management Area and the refuge were established by Secretary Notice No. 6449, dated November 26, 1948. The stated purpose was waterfowl nesting habitat and migration rest stops. The FWS refuge staff has management objectives for the refuge that include production of migratory waterfowl, and resting and feeding grounds for waterfowl that are passing through. Since the refuge proper is managed as a sanctuary, hunting is not allowed. The larger wildlife area is managed for similar wildlife objectives. However, the 1948 tripartite agreement between the state of Nevada, the irrigation district, and FWS calls for hunting and trapping as a high priority use and allows almost unlimited livestock grazing which limits the effectiveness of this area for wildlife management. In addition, the nearby Fallon Naval Air Station launches aircraft destined for a nearby bombing range that frequently disturb the area's wildlife.

Compatibility Issue

The energies of the FWS staff at Stillwater are not focused on solving compatibility problems such as grazing and airspace violations. Rather they are focused on the very life of the marsh, on water. Without water,

the marshes, wetlands, and lakes necessary for waterfowl production and resting/feeding areas will not exist.

Reduced Amount of Water

Water flows into the Stillwater Wildlife Management Area are roughly proportional to the amount of water released from the Lahontan Reservoir, a Bureau of Reclamation structure upstream from the marshes used to store water from both the Carson and Truckee Rivers. The amount of water that flows into the Stillwater marshes has generally decreased since 1967 because of decisions regarding the operation of the Bureau of Reclamation's Newlands Project. As a result, Stillwater's wetland acres have fallen from 23,000 in 1968 to 4,000 in 1988. In addition, FWS does not have any rights to water from the Carson River, and can claim only 30,000 acre feet of return flows from irrigation in the Newlands Project.

Prior to 1967, the operation of hydroelectric facilities and overflows from Lahontan Reservoir provided the Stillwater area with fairly adequate amounts of fresh water. This fresh water is essential to the biological integrity of the marshes and, along with the irrigation return flows, provided enough water for Stillwater and the neighboring Fallon National Wildlife Refuge. FWS officials told us that in 1967, the Truckee-Carson Irrigation District stopped producing hydroelectric power in the winter, resulting in the Stillwater marshes losing about 40,000 acre feet of fresh water in an average year. As a result, the Fallon refuge has basically dried up and only has water in extremely high water years, such as in 1983-1986. Subsequent improvements in the operation of the Newlands Project, undertaken to minimize use of Truckee River water to protect the endangered cui-ui fish, also served to reduce the amount of return flows from irrigation. The current Newlands Project Operating Criteria and Procedures, approved in April 1988, propose to further improve the operation of the project to account for the future loss of about 90,000 acre feet of Truckee River water. According to an FWS official, such a loss could well spell the end of about half the wetlands in Stillwater, with the remaining half of much lower quality.

Existing Water Is Polluted

The Stillwater area was identified by FWS as one of the refuges nationwide needing action to solve the agriculture drainwater pollution problem. A FWS official noted that Stillwater and its adjacent wetlands produced only 2,000 ducks in 1988, while an estimated 20,000 died from botulism, a disease associated with poor water quality. A study of the toxicity of return flows from irrigation into the wildlife management area was begun in 1986. Return flows from water put on fertilized fields are often highly saline and deep drains collect natural elements in the

soil that are carried to the marsh in toxic concentrations. Continuing examination of several irrigation drains by FWS experts revealed in 1988 that water from 5 of 7 locations tested would kill aquatic organisms. Water from one drain killed all organisms even when diluted with 50 percent fresh water. The experts found that arsenic, boron, lithium, and molybdenum were associated with the higher mortality levels.

Current Status/Outlook

The problem of small allocations of water, some of it polluted, at Stillwater has not been solved to date. In Public Law 100-446, the Congress provided for a reprogramming of $1.2 million to the refuge for the purchase of water rights from willing buyers in the irrigation district. The details of this action are still being worked out. In addition, there is a concerted effort between environmental groups and the Nevada Congressional delegation to appropriate money to buy more of the water rights that Stillwater needs to survive. Estimates of final costs range as high as $50 million. The state of Nevada has recently acted to make several million dollars available specifically to purchase water rights at Stillwater for wildlife.

Intermediate water quality solutions, such as closing two of the most toxic irrigation drains, have not been pursued beyond FWS because of the difficulties in negotiating between the Bureau of Reclamation, the Bureau of Indian Affairs, the irrigation district, and FWS. The new Operating Criteria and Procedures, a plan under which the Bureau of Reclamation sets conditions for the operation of the Newlands Project, received input from FWS regarding the pollution, but the primary concern has been how to adjust to the lesser amount of water that will be available because of the decision to leave more water in the Truckee River for the endangered cui-ui fish.

St. Marks

Description

The St. Marks National Wildlife Refuge lies along the Gulf of Mexico in northwestern Florida. The refuge is located in Wakulla, Jefferson, and Taylor counties and is 25 miles south of Tallahassee, Florida. St. Marks encompasses 64,869 acres, plus 31,500 acres of open water in Apalachee Bay. The uplands include 32,082 acres of forested lands, with five dominant types: longleaf pine, longleaf pine/scrub oak, slash pine, loblolly pine/mixed hardwoods, and mixed hardwoods. The refuge includes a

17,350-acre wilderness area designated by Public Law 93-632, January 3, 1975. The refuge also includes several research natural areas.

The St. Marks refuge attracts over 200,000 visitors each year to birdwatch, photograph, hike, fish, and picnic. An additional attraction for the refuge is the historic St. Marks Lighthouse, which is still in operation. In addition to the public use, there is some economic use, such as logging.

Purpose and Objectives

Executive Order 5740, dated October 31, 1931, established the St. Marks Migratory Bird Refuge "as a refuge and breeding ground for wild animals and birds, subject to existing valid rights. The land involved was withdrawn for lighthouse reservation purposes and is primarily under the jurisdiction of the Department of Commerce, and its reservation as a wild-life refuge is subject to the use thereof by said department for lighthouse purposes at all times . . ."

The refuge objectives include perpetuating endangered species, migratory birds, and other wildlife species native to the north Florida gulf coast while providing for high levels of public uses, both consumptive and nonconsumptive. The refuge supports an abundance of wildlife species, including 459 vertebrate species excluding fish. Endangered or threatened species include the manatee; bald eagle; Arctic peregrine falcon; woodstork; red-cockaded woodpecker; Ridley, loggerhead, green, and leatherback sea turtles; and the indigo snake.

Compatibility Issue

In the mid 1970s, the St. Marks refuge began a review of its forest management program, which had been in effect since the early 1960s. Some groups quickly elevated this effort from the original review to a highly publicized national level issue when they insisted that commercial harvest of timber on the refuge be permanently suspended and that St. Marks be managed as a defacto wilderness. As a result, the Interior Department declared a moratorium on logging. After nearly 3 years of debate, FWS developed a new forest management plan. It was approved in 1980 and subsequently implemented. It is predicated on a 100-year planning period, with reviews planned every 10 years.

In a March 15, 1985, letter to the Interior Department, a local citizen active in the last debate complained about the St. Marks refuge manager's efforts to manage timber harvesting on the refuge. Besides the letter, the citizen also enlisted congressional assistance in his efforts to stop logging at St. Marks.

In an April 24, 1985, response to the congressional inquiry, FWS stated that:

"This thinning is being done as called for in the . . . forest management plan and involves some 30 to 40 acres . . . Thinning of forestlands for wildlife habitat improvement is a standard and approved management practice on national wildlife refuges."

Conflict Resolution

Since 1985 the St. Marks refuge has not experienced major complaints concerning the logging issue. The revised forest management plan was reviewed by interested parties and will be implemented in the latter part of 1989. FWS officials stated that all reviewers, including previous opponents, were favorably impressed with the first update of the plan.

Trustom Pond

Description

Trustom Pond National Wildlife Refuge is located on the south coast of Rhode Island. The refuge is bordered on the south by Block Island Sound and includes an expanse of sand approximately 120 feet wide and more than 7,000 feet long, known as Moonstone Beach. The refuge is primarily upland habitat, including grassland, cropland, and coastal deciduous hardwood forest. The refuge includes the 160 acre Trustom Pond, the only remaining coastal salt pond in Rhode Island with an undeveloped shoreline. Marshes, dunes, and sandy beach occur on the coastal barrier between Trustom Pond and the sound.

More than 280 species of birds, including the endangered bald eagle, peregrine falcon, piping plover, and least tern have been seen at Trustom Pond. Approximately 60 species have nested on the refuge. The beach is preferred nesting habitat for least terns and piping plovers. Forty-one species of mammals, including white-tailed deer and coyotes, are found on the refuge.

The refuge received an estimated 116,000 visits in 1987 and about 90 percent of these visits were nonwildlife-oriented. The Moonstone Beach portion of the refuge attracts many people who sunbathe, swim, observe wildlife, take pictures, surf fish, and attend naturalist-led programs. A high percentage of the beach use at Moonstone occurs in a clothing-optional section located at the eastern end of the beach.

Purpose and Objectives

The Trustom Pond refuge was established on August 15, 1974, through a private donation of 365 acres from Mrs. Anne Kenyon Morse. In 1982 an additional 63 acres were purchased and the Audubon Society of Rhode Island donated its 151-acre Moonstone waterfowl refuge that same year. Land purchases and donations in 1985 and 1986 added another 62 acres, bringing the refuge to a current total of 641 acres. Implementation of approved plans to protect about 359 acres adjacent to the present refuge would increase the refuge size to about 1,000 acres.

FWS uses a variety of authorities, including the Migratory Bird Treaty Act of 1918, the Migratory Bird Conservation Act of 1929, and the National Wildlife Refuge Administration Act of 1966, to administer Trustom Pond. Accordingly, FWS established the primary objective of the refuge as preserving the resting, feeding, nesting, and wintering habitat of migratory birds, especially waterfowl and shorebirds. A secondary objective provides for outdoor recreation activities for the public when these activities are compatible with the primary objective of the refuge. Deed restrictions are other factors that must be considered in managing the refuge. The Rhode Island Audubon Society's 1982 donation of 151 acres was accompanied by a deed restriction, which stipulates:

"That the property be maintained in its natural state, except for haying or occasional cultivation of open lands, and with no hunting, as an inviolate sanctuary for migratory birds and a refuge for wildlife."

Compatibility Issue

According to the Trustom Pond assistant manager, public beach use is, at times, not compatible with refuge objectives. The draft environmental assessment (May 1987) and the master plan for Trustom Pond refuge state that

"Demand for use of the refuge beach by both sunbathers and wildlife is an especially poignant case of conflicting demand for use of the same area. The beach, which is an extremely popular sunbathing area, is prime nesting habitat for the

least tern and the piping plover. Many researchers have documented the adverse effect of human disturbance on nesting piping plovers and least terns . . . Since 1983, part of the refuge beach has been fenced to exclude people during the piping plover and least tern nesting season, while recreational use has been permitted on the balance of the area."

Nature of the Conflict

According to FWS officials, public beach use became a major controversy in 1986 with the designation of the piping plover as a threatened species under the Endangered Species Act and the resulting FWS action to protect the plover—extending the beach fence. The public overwhelmingly opposed FWS' efforts. FWS received letters from Rhode Island officials, congressional representatives, members of a nudist association, and local citizens expressing opposition to fencing off major portions of the beach for the piping plover.

In April 1988 FWS erected a fence excluding the public from an area extending the entire length of the beach, ranging from 57 feet to 83 feet above the mean high-water line. The public was still free to use the beach between the fence and the high-water line, which constitutes nearly one-half of the beach area, as well as the state-controlled intertidal zone. However, it was this action that caused a nudist association, known as the "New England Naturist Association, Inc." to request a preliminary injunction that would require FWS to dismantle the fence and prohibit FWS from taking any other actions that would bar the nudist association members from going on the beach.

Current Status/Outlook

In a July 29, 1988, decision, the United States District Court for the District of Rhode Island denied the Naturist Association's request for a preliminary injunction. In its discussion of the case, the Court held that

"It is . . . difficult to assess the extent to which the public interest would be adversely affected by the granting of an injunction because there are two conflicting public interests that would be affected in opposite ways. On the one hand, an injunction would have a salutary effect on public interest in preserving public access to the coasts for recreational purposes . . . On the other hand, the injunction sought would adversely affect the public interest in protecting wildlife and their habitats, in general, and threatened species, in particular . . ."

At the end of the nesting season in August 1988, FWS removed the fence to allow full use of the beach again. According to FWS officials, the Naturist Association has a suit pending regarding FWS' management

efforts for the piping plover and despite losing the preliminary injunction, the association does not plan to withdraw its suit.

FWS officials plan to erect the fence each year during the piping plover's nesting season (April to August). The officials believe their efforts have helped the plovers. According to the assistant manager, three pair of plovers nesting resulted in six baby plovers in 1988. He believes that four of the chicks did not survive due to inclement weather. He believes two birds left the refuge with their parents at the end of the nesting season. An update from refuge officials in mid-July 1989 indicated that 4 pair of nesting plovers produced 7 chicks, of which 3 had already fledged.

Upper Mississippi

Description

The Upper Mississippi River National Wildlife and Fish Refuge extends 261 miles along the Mississippi River in four states—Minnesota, Wisconsin, Iowa, and Illinois—southward from Wabaska, Minnesota, nearly to Rock Island, Illinois. Its 194,000 acres lie in parts of 19 counties and touch several municipalities. Eleven dams and locks within refuge boundaries form a series of pools that vary from 10 to 30 miles long, creating a maze of channels, sloughs, marshlands, and open lakes over the bottomlands. The refuge provides habitat for a large percentage of migratory birds in the Mississippi flyway.

Thousands of tundra swans stop during the spring flight and large numbers of canvasbacks use the refuge, especially during fall migration. Some 270 species of birds, 57 species of mammals, 45 species of amphibians and reptiles, and 113 species of fish are found on the refuge. Other waterfowl include ringnecks, redheads, buffleheads, mallards, wigeon, gadwall, teal, herons, egrets, and wood ducks. Furbearers include muskrat, mink, beaver, otter, and fox. The bald eagle winters in numbers on the refuge and several other threatened or endangered species find habitat on or near the refuge. These include the peregrine falcon, Higgins-eye pearly mussel, Indiana bat, Iowa pleistocene snail, Minnesota trout lily, and prairie bush-clover.

Purpose and Objectives

The refuge was established on June 7, 1924, by the Upper Mississippi River Wild Life and Fish Refuge Act (16 U.S.C. 721) as (1) a refuge and

breeding place for migratory birds and other wild birds, game animals, fur-bearing animals and (2) a conservation area for wild flowers, aquatic plants, and fish and other aquatic animal life. Original acreage was acquired through purchase and donation, and by withdrawal from the public domain. Some of the land in the refuge was acquired by the U.S. Army Corps of Engineers (Corps) under authority of the Upper Mississippi River Nine-foot Channel Navigation Project, which has as its primary purpose the continued maintenance of commercial navigation on the upper Mississippi River. While this land is within the refuge's boundaries, the Corps, not FWS, retains primary jurisdiction over it.

An environmental impact statement and master plan dated July 1987 describes a proposed direction for refuge management and development over a 20-year period. The document lists more than 30 objectives for dealing with myriad activities on the refuge. These include reducing adverse effects of water quality degradation, improving habitat of migratory waterfowl, and providing recreational opportunities oriented toward wildlife.

Compatibility Issue

The upper Mississippi River is a major commercial and recreational resource, and a variety of public uses such as boating, waterskiing, camping, picnicking, hunting, and trapping occur on the river. Commercial barge fleeting areas, where barges are assembled into tows or tied up, and other navigational activities also have large impacts on the refuge. Over 3 million user days occur annually on the refuge, the largest amount of public use in the National Wildlife Refuge System. Approximately 280 recreational boating accesses are located along the 261 miles of river the refuge covers, and many businesses and individuals have buildings and other structures on refuge lands to service or take advantage of recreational activities. Adverse wildlife impacts from the navigation project and activities are caused by bank erosion and turbidity, short-term water level fluctuation, periodic spills of hazardous cargoes, shoreline and vegetation damage from illegal barge fleeting, and in some areas channel maintenance dredging and disposal practices. Navigation needs make large-scale management of water levels for wildlife purposes highly unlikely.

Nature of the Conflict

At the time of our visit to the refuge, attempts to reduce the number of private structures and to mitigate the effects of barge fleeting were receiving considerable management attention. Because about 54 percent

of refuge land and water are owned by the U.S. Army Corps of Engineers, dealing with these matters requires extensive coordination between FWS and the Corps. Over the past several years, for example, FWS and the Corps have coordinated preparation of each other's resource management documents pertaining to the floodplain of the Mississippi River. This included the refuge master plan, land use allocation plans, shoreline management plans, and other plans for public use development and resource management.

In developing the 1987 refuge master plan, FWS determined that perpetual, exclusive use of FWS-owned refuge lands by private parties is not compatible with the purposes for which the refuge was established and that such use should be phased out on FWS-owned lands. FWS also recommended that Corps-owned private use areas adjacent to biologically valuable fish and wildlife habitat should be retained in the refuge and private use of these areas should be phased out in the same manner as on FWS-owned lands. They further recommended that Corps-owned areas not adjacent to valuable wildlife habitat should be removed from the refuge. These proposals were discussed in detail at many public meetings during the refuge master plan planning process and at the Corps public meetings associated with the preparation of their resource management documents.

Refuge staff spend considerable time monitoring barge fleeting and enforcing barge fleeting regulations. Barge fleeting and other navigation activities have large impacts on the refuge, such as from noise and visual disturbances, resuspension of sediments due to prop wash, bank disturbance, and vegetative destruction adjacent to mooring sites. Penalties for illegal fleeting vary with land ownership and can be difficult to enforce if operators are not observed at the site. The Corps allows temporary mooring on its land within the refuge by tying to trees, and as long as the trees are protected from permanent damage, FWS has no control over this activity. However, if there is damage to vegetation, FWS can issue a violation notice. This discrepancy is a problem, and FWS is working with the Corps and other interested agencies to form a consistent policy for the fleeting of barges on all land managed as part of the refuge.

Current Status/Outlook

Presently there are four major fleeting sites on the refuge. Conflicts have existed at these sites between navigation use and wildlife use for many years. Efforts are being made, possibly through land exchanges, to resolve these conflicts. The outcome of those efforts is not yet known.

Future requests to FWS for barge fleeting sites will be considered only if they satisfy the test of compatibility and are the ecologically least damaging alternative. If the least damaging alternative is on refuge land, a land exchange may resolve the issue.

Regarding private structures, FWS has decided that existing special use permit holders can continue to use refuge land for the duration of their lives. In contrast, the Corps has decided to perpetually allow all structures as a result of specific language in the Water Resources Development Act of 1986 (33 U.S.C. 2201). Therefore, the solutions to this issue will not be as complete as FWS had recommended and what success there is will not occur quickly.

White River

Description

The White River National Wildlife Refuge is a 112,498-acre tract located in the floodplain of Arkansas' lower White River a few miles above its confluence with the Mississippi River. The refuge includes 101,000 acres of bottomland hardwood forest; 10,000 acres of lakes, streams, and impoundments; 1,200 acres of farmland; and several recreational areas. The refuge, along with contiguous privately owned forestland, constitutes one of the largest remaining tracts of bottomland forest in the Mississippi River Valley. The White River meanders through the refuge for approximately 65 river miles and, along with the Mississippi River, subjects the area to yearly flooding. Flood conditions affect up to 90 percent of the refuge and may last as long as 6 months.

The White River refuge supports about 230 different species of birds, including a variety of ducks, Canada geese, and woodpeckers. Other animal species on the refuge include squirrels, turkeys, white-tailed deer, and black bear. The southern bald eagle, American alligator, and Florida cougar are threatened and endangered species that also live on the refuge.

Purpose and Objectives

Executive Order 7173, dated September 4, 1935, established the White River National Wildlife Refuge "in order to effectuate further the purposes of the Migratory Bird Conservation Act (45 Stat. 1222) . . . subject to valid existing rights, as a refuge and breeding ground for migratory birds and other wildlife . . ." The White River refuge has as its primary

mission the management of bottomland forests to enhance and perpetuate habitat values for migratory waterfowl. In June 1986 the refuge revised specific objectives for accomplishing its mission that included providing for waterfowl maintenance and production and threatened species, as well as wildlife interpretation and observation, hunting, and fishing.

Compatibility Issue

Refuge records indicate that houseboats were present on the refuge when it was created in 1935. According to the Houseboat Management Plan, FWS made little or no attempt to control houseboat use on the refuge until 1962 when, despite considerable opposition by houseboat owners, the refuge manager succeeded in restricting the houseboats to designated sites and in requiring that the owners obtain a special use permit. The permit granted houseboat owners the right to moor their boats to the river bank, access for vehicles, and permission to place certain items on the bank.

The refuge manager considers the use of houseboats as the only use occurring at White River that is not compatible with refuge purpose and objectives. Further, houseboat use on refuge property does not adhere to FWS policy, which states essentially that houseboats may be permitted on national wildlife refuges only where navigable waters not under FWS jurisdiction border refuge lands, and then only if all other alternatives have been determined infeasible.

Nature of the Conflict

In November 1983 a supervisory inspection at the White River refuge revealed a serious aesthetic problem of poorly maintained and unsightly houseboats on the refuge. The refuge manager was asked by the region to prepare a report on the history and problems associated with the houseboat moorage, and to make recommendations to resolve the problem. In a subsequent inspection in 1984, the refuge manager was asked to develop an action plan and schedule for eventually phasing out the permitting of houseboats on the refuge.

In July 1986, FWS met with houseboat owners to present its plan of phasing out houseboat use on the refuge. According to FWS records, houseboat owners were generally receptive to cleaning up past problems of litter, sanitation, and inadequate maintenance, but were generally opposed to all other proposed changes.

In August 1986 Arkansas' two U.S. Senators wrote FWS concerning the proposal to eliminate houseboats at the White River refuge. In September 1986 the FWS Director responded that

> "Overall, I believe that our decision to phase out houseboat use on the refuge, instead of ordering an immediate cessation as we have recently done at new units of the Refuge System, is more than fair to the houseboat users."

In October 1986 a report from the House Committee on Appropriations, which accompanied House Joint Resolution 730, expressed the Committee's concern with the actions taken by FWS at White River. The Committee specified that no change in special use permit conditions be made until FWS responded to the Committee about its plans and the Committee responded. The Committee also encouraged FWS to negotiate with the houseboat owners to arrive at a mutually agreeable settlement.

Current Status/Outlook

FWS submitted its final report to the Committee in October 1987. In March 1988 FWS officials notified an Arkansas Congressman that FWS would proceed with its houseboat plan and its permit requirements for houseboats. According to the letter, FWS would make two significant changes from wording of previous permits: (1) permits are renewable annually for the lifetime of the permittee and (2) houseboats may not be replaced. The refuge manager submitted an example of the letter he planned to send to the houseboat owners concerning the new permit to the regional director.

In a June 29, 1988, letter, the FWS Director notified the Chairman, Subcommittee on Interior and Related Agencies, House Committee on Appropriations, that FWS had begun implementing the plan presented in the October 1987 report FWS submitted to the Committee. At the time of our visit, we were told that the houseboat owners were complying with the process for implementing the new plan.

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