COLUMBIA NATIONAL WILDLIFE REFUGE
Othello, Washington

ANNUAL NARRATIVE REPORT
Calendar Year 1990

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

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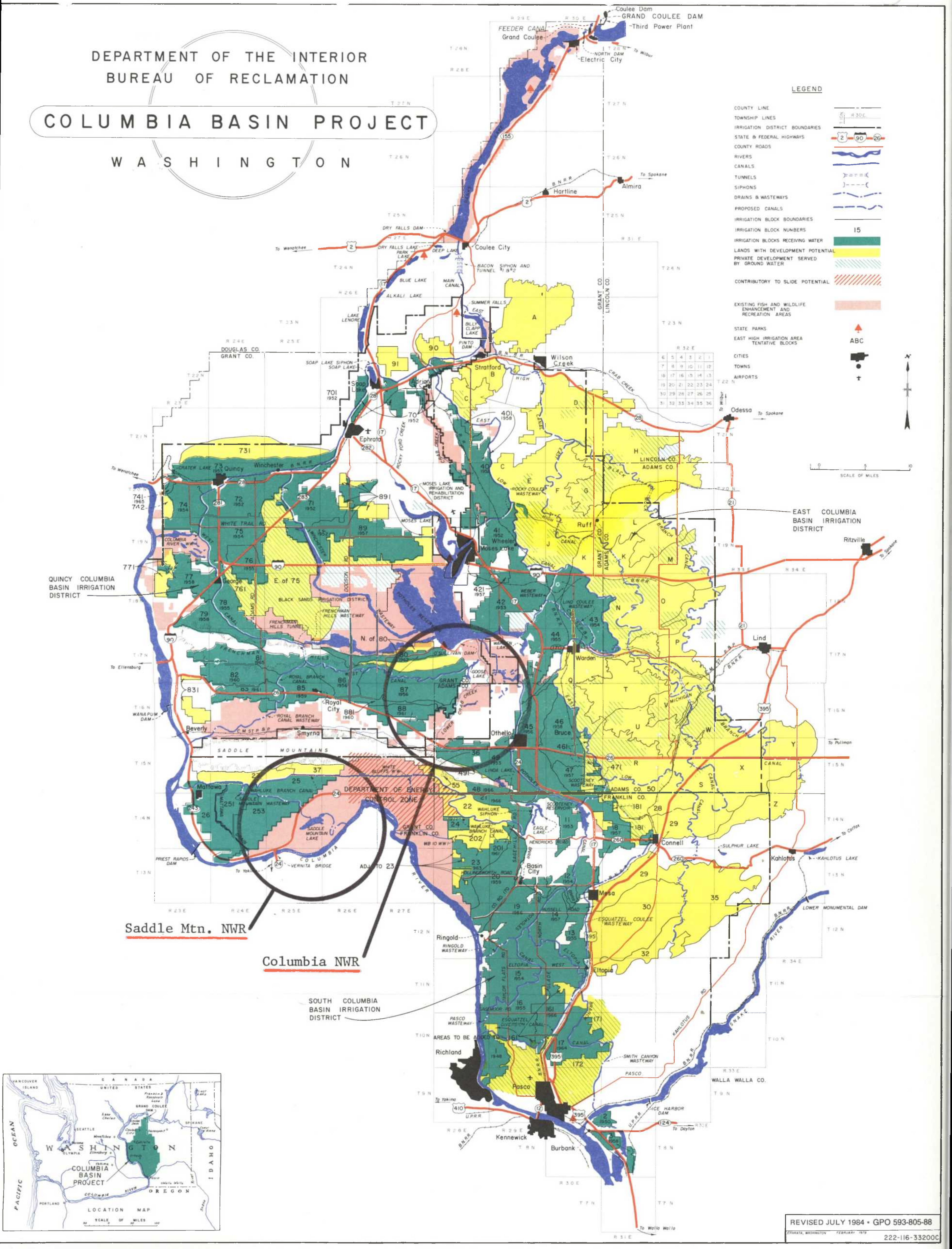
Review and Approvals

David E. Goeke	3/28/91	David E. Goeke	3/28/91
Submitted By	Date	Refuge Manager	Date
Associate Manager, ID/OR/WA	7/1/91 Date	ARD-Refuges and Wildlife	Date


DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA BASIN PROJECT
WASHINGTON
LEGEND
COUNTY LINE
TOWNSHIP LINES
IRRIGATION DISTRICT BOUNDARIES
STATE & FEDERAL HIGHWAYS
COUNTY ROADS
RIVERS
CANALS
TUNNELS
SIPHONS
DRAINS & WASTEWAYS
PROPOSED CANALS
IRRIGATION BLOCK BOUNDARIES
IRRIGATION BLOCK NUMBERS
IRRIGATION BLOCKS RECEIVING WATER
LANDS WITH DEVELOPMENT POTENTIAL
PRIVATE DEVELOPMENT SERVED BY GROUND WATER
CONTRIBUTORY TO SLIDE POTENTIAL
EXISTING FISH AND WILDLIFE ENHANCEMENT AND RECREATION AREAS
STATE PARKS
EAST HIGH IRRIGATION AREA TENTATIVE BLOCKS
CITIES
TOWNS
AIRPORTS
GRAND COULEE DAM
Third Power Plant
QUINCY COLUMBIA BASIN IRRIGATION DISTRICT
EAST COLUMBIA BASIN IRRIGATION DISTRICT
SOUTH COLUMBIA BASIN IRRIGATION DISTRICT
DEPARTMENT OF ENERGY CONTROL ZONE
Saddle Mtn. NWR
Columbia NWR
LOCATION MAP
REVISED JULY 1984 • GPO 593-805-88
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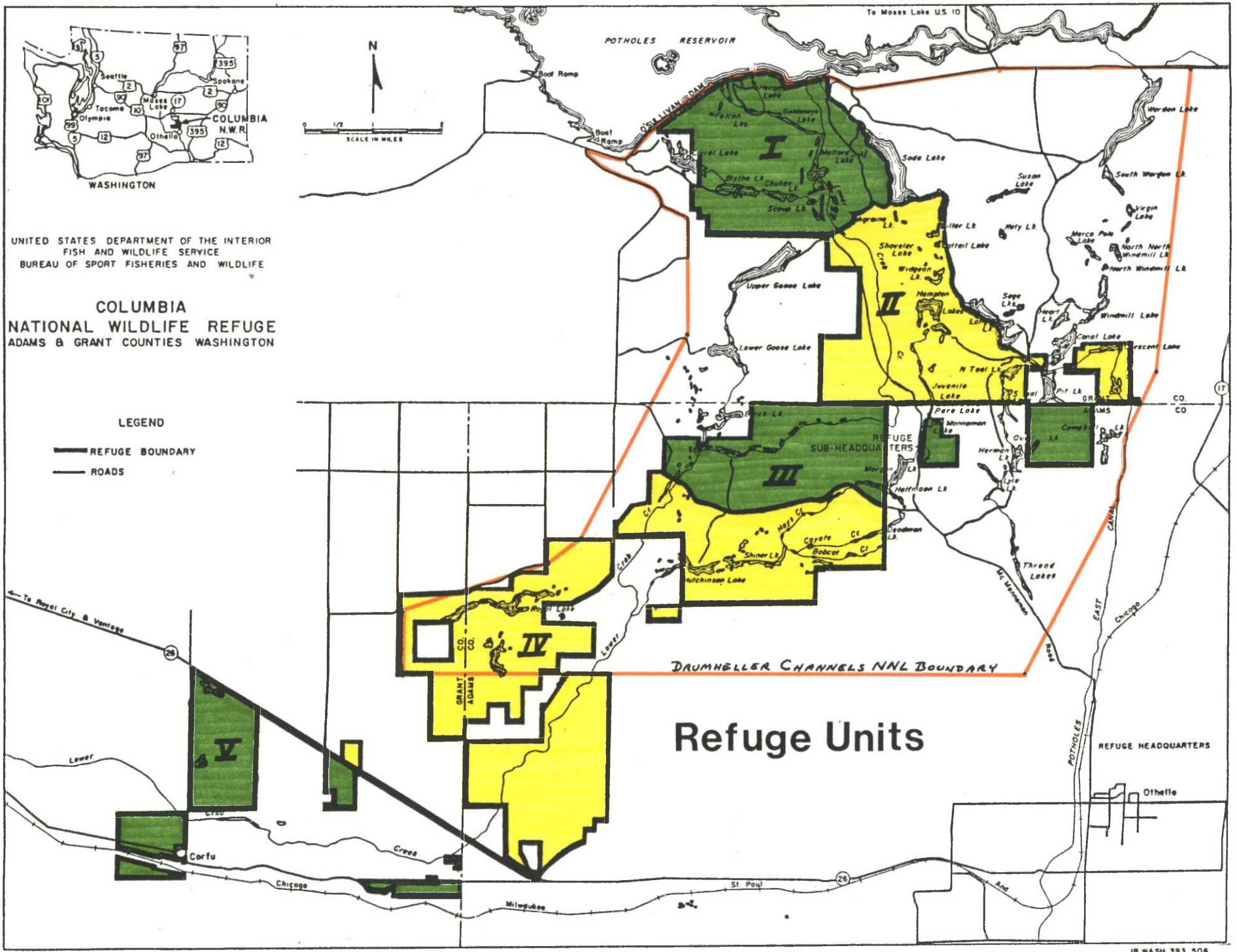

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INTRODUCTION

Columbia National Wildlife Refuge was established in 1944 by P.L.O. 243 and has been actively managed since 1955. The approved boundary of the refuge includes a total of approximately 32,300 acres, of which there are 9,100 acres of inholdings and 23,200 acres managed by the refuge. In addition, there are ten tracts of land between the west end of the refuge and the Columbia River totaling 1,700 acres that are managed by the refuge. The refuge is located in the Columbia Basin of eastern Washington near the town of Othello and is also responsible for management of Saddle Mountain NWR.

Columbia is managed primarily for wintering waterfowl but also supports high public use, especially for fishing. Geologically the setting is channeled scabland formed when great glacial floods gouged through basalt layers leaving distinctive canyons or "channels" and numerous rocky buttes and cliffs. The climate is semi-arid and most of the land is covered with sagebrush and grasslands dominated by cheatgrass. As a result of the surrounding Columbia Basin Irrigation Project, however, the refuge has over 3,800 acres of wetlands with numerous lakes, ponds, and streams. During the past 40 years, the irrigation project has developed over 600,000 acres of productive, irrigated farmland which forms the basis of the local economy. Associated water and wildlife not only provide recreation for local residents, but also attract numerous visitors from all over the state.

Columbia NWR is located in the Channeled Scablands of eastern Washington. Most of the refuge's numerous lakes and ponds were created by seepage and the raised water table resulting from diversion of Columbia River water for the Columbia Basin Irrigation Project. This view is from the Black Lake bridge over Crab Creek looking east in Marsh Unit III. 9/27/89 DEG

INTRODUCTION

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HABITAT MANAGEMENT (Cont.)

G. WILDLIFE

H. PUBLIC USE

EQUIPMENT AND FACILITIES

J. OTHER ITEMS

K. FEEDBACK - - - (nothing to report)

L. INFORMATION PACKET - - - (inside back cover)

A. Highlights

The Eagle Lakes NWR proposal was reactivated with a new 9,560-acre boundary. (Section C.1c)

Columbia NWR became active in planning for the proposed expansion of the Bureau of Reclamation's Columbia Basin Project. Under current planning, the refuge will receive and manage approximately 21,000 acres of wildlife enhancement lands. (Section C.1d)

Three refuge staff positions turned over, resulting in significant manpower shortages for most of the year. (Section E.1)

Station funding was a "lowlight" for much of the year. (Section E.5)

Purple loosestrife continued to pose a major threat to refuge wetlands with approximately 230 man-hours spent on control. (Section F.10)

Duck use was up 86 percent over 1989, goose use was the highest ever recorded, and swan use was the highest since 1981. (Sections G.3a,b,c)

Ten pairs of double-crested cormorants nested on the structures erected for them in Marsh Unit I. (Section G.4)

A mountain lion was clearly observed on the refuge in May, and other observations suggest at least one has been in the area since 1986. (Section G.8)

Second-year operation of the Royal Slough experimental fish screen demonstrated increased operational potential for the structure. (Section G.11b)

Public visitation totaled over 185,000 for the third time in the last four years. (Section H.1)

Construction of the Drumheller Channels National Natural Landmark Interpretive Site was begun. (Section I.1b)

Efforts to resolve the long-standing problems resulting from refuge abuses by refuge neighbor Dwayne Michel reached a high level of (encouraging) intensity. Meanwhile, Michel abuses also reached new levels. (Section J.3)

B. CLIMATIC CONDITIONS

Calendar year 1990 began with January being warmer than normal and windy. The average temperature ranged 10^{0} above normal and the wind blew for about a week with gusts over 50 mph. Overall, the winter of 1989-90 (December 1989, January and February 1990) ranked as one of the warmest on record. Water impoundments remained free of ice for the most part, however, a short cold snap in February did freeze some standing water. Winter precipitation of 1.36 inches was somewhat below the normal for the period (3.06 inches). Snowfall totaled about 8 inches,

of which 6 inches fell during December, compared to a normal total of about 14 inches.

During the spring months (March, April, and May), temperatures averaged 51.2° F, 1.2° above normal (50.0° F). Springtime precipitation was 2.99 inches, 1.23 inches above normal (1.76 inches). The average temperature of 69.1° F for the summer (June, July, and August) was slightly above the normal 68.9° F. However, this was considered one of the hottest summers on record with about 30 days having temperatures over 90° F. Seasonal precipitation totaled 1.87 inches, 168 percent of normal.

Fall (September, October, and November) was warmer than normal with an average temperature 52.4° F, 2.1° above normal for the season. November was considered one of the windiest Novembers on record. Fall rainfall totaled 2.01 inches, 75 percent of normal (2.67 inches).

December 1990 began with the first 18 days averaging above normal temperatures until an Arctic front moved into the Columbia Basin. The cold front was accompanied with high winds and drifting snow. Temperatures dropped into the minus category but for the most part hovered around 10° F to 15° F through the end of the month. Overall, most will remember 1990 as windy and warm.

The following table summarizes the year's weather:

Weather Summary 1990*

	Temperature (°F)						Precipitation (In.)		
Month	High	Low	Ave. High	Ave. Low	Ave.	Depart	Total	Normal	Depart
Jan.	57	25	44.5	33.0	38.8	10.3	.85	1.12	-.27
Feb.	58	05	44.6	25.8	35.2	- .9	.17	.79	-.62
Mar.	69	20	56.3	32.8	44.6	2.4	.85	.60	.25
Apr.	76	30	66.4	39.9	53.2	3.5	1.00	.51	.49
May	84	33	68.2	43.4	55.8	-2.3	1.14	.65	.49
June	90	41	76.0	50.4	63.2	-2.2	.60	.57	.03
July	104	44	88.8	56.9	72.9	1.3	.43	.22	-.21
Aug.	103	46	85.1	57.0	71.1	1.2	.84	.33	.51
Sept.	92	45	83.2	50.2	66.7	4.3	.00	.34	-.34
Oct.	85	26	62.0	30.1	46.1	-4.6	1.21	.54	.67
Nov.	67	27	52.6	36.4	44.5	6.4	.20	.98	-.78
Dec.	55	-8	30.6	17.3	24.0	-7.7	.60	1.15	-.55
Annual	104	-8					7.89	7.80	.09

* Weather station located 6 miles ESE of Othello.

C. LAND ACQUISITION

1. Fee Title

Acquisition activities burst out during 1990 from several directions and required a great deal of time. In January the Service was notified the Eagle Lakes area was involved in a bankruptcy and was available for purchase. Then, in early March the Washington Department of Wildlife announced it would no longer be willing to accept management responsibility for wildlife enhancement lands associated with planned expansion of the Columbia Basin Project. These events occurred just as the Hanford Reach Wild and Scenic River Study intensified into the alternatives selection process (discussed in Section C.1 of the attached Saddle Mountain NWR Annual Narrative Report), which appears headed toward a several-fold expansion of that refuge. Together, the new thrusts pushed aside other duties to meet the immediate needs for facts, figures, and planning documents. These activities and earlier, ongoing projects are detailed below.

a. Clayton Michel Exchange

This transaction involves exchange of approximately 50 acres of refuge land in four small tracts south of Highway 26 for the permanently installed irrigation facilities on Farm Units 69, 70, and 72. See Section C.1 of the 1986 Annual Narrative Report for a map and an explanation of the history and complicating factors involved. Initiated in 1986, this exchange action has languished on a back shelf somewhere almost ever since and seems to be going no where slowly. Apparently the Service is waiting for information from the Michel lawyer.

b. Black Lake Inholding

This project is moving only slightly faster. In 1989 the owners of the strip of land (65 acres) around Black Lake informed the refuge that they were planning to construct a recreational development on the property and were planning to utilize access through the refuge. This access route has been a bone of contention for many years, and the proposed development would have conflicting impacts on the refuge. The owners are receptive to the alternative of selling, and the process of making an offer is slowly proceeding.

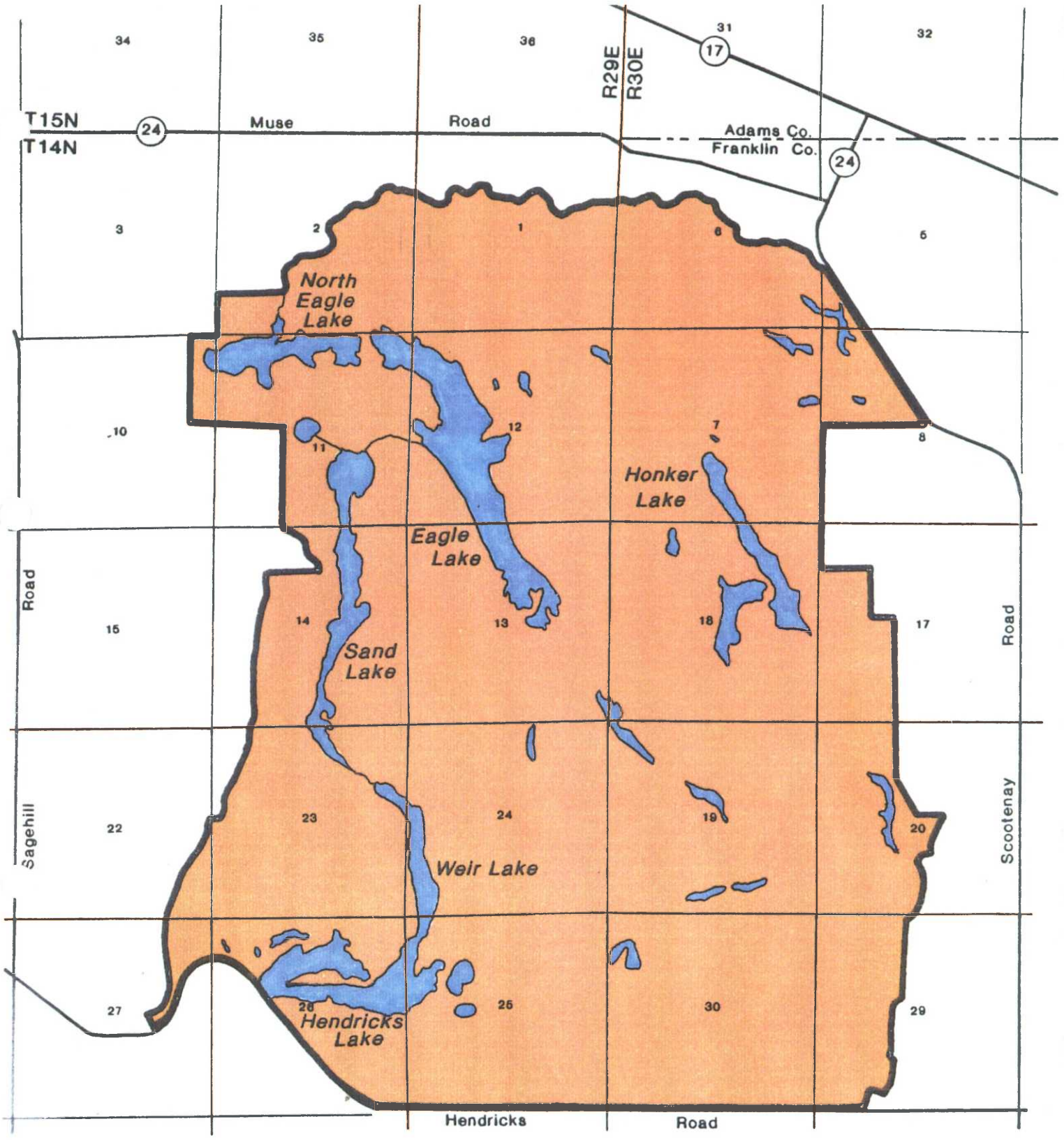
c. Eagle Lakes Proposal

During the late 1970s, there was a major planning effort associated with the anticipated acquisition of 18,600 acres of land south of Othello for establishment of the proposed Eagle Lakes NWR. The Bureau of Reclamation was going to purchase the land and turn it over to the Fish and Wildlife Service. Then, in 1980 the money set aside for the purchase was cut by Congress as part of a budget reduction effort, and the refuge proposal died. A few years later the owner of the property, who had made many questionable "improvements" on the property in a probable attempt to raise the selling price to the government, declared bankruptcy.

Efforts to establish Eagle Lakes NWR with a newly defined boundary were revived following indication of a willing seller. The proposed 9,560-acre refuge is heavily used by wintering mallards and Canada geese. 3/23/90 DEG

In January the Service was notified by the lawyers handling the bankruptcy that a large portion of the property formerly proposed for the refuge was available for purchase, and they questioned our interest. We inspected the property and immediately saw that a 6,300-acre tract of the 8,500 acres available included the heart of former refuge proposal. The Service responded that it was interested, and the Columbia staff quickly delineated a boundary that included the best part of the formerly proposed refuge area. They also drafted a Preliminary Planning Proposal (PPP) for a 9,560-acre refuge (see following map). In conversations with the son of the former owner (the son is the current owner of the two other major tracts within the proposed refuge and is operator of the hunt club that operates on the entire area) he said that he would like to see the area kept together in its present condition and that he would probably be willing to sell to the government. It all looked easy.

Appraisals and inspections were made and tours were held. On April 30 the PPP was approved by the Deputy Director. Contacts were made and the Mellon Foundation became interested, through their agent in The Conservation Fund, in acquiring the property for the Service. In the meantime the son of the former owner was busy behind the scenes buying out the interests of the creditors. When The Conservation Fund made its purchase offer to the bankruptcy lawyers, it found it was dealing instead with the new owner of the combined properties that make up almost the entire refuge area. This



PROPOSED EAGLE LAKES NATIONAL WILDLIFE REFUGE

simplified the overall negotiations, but unfortunately the owner now has more leverage and is again shooting for inflated values. As a result, the process has slowed considerably while the owner explores his opportunities to find a developer interested in making him rich. So far no one seems to have taken the bait, and we remain hopeful that a refuge purchase will eventually be arranged. The area is certainly worth the effort!

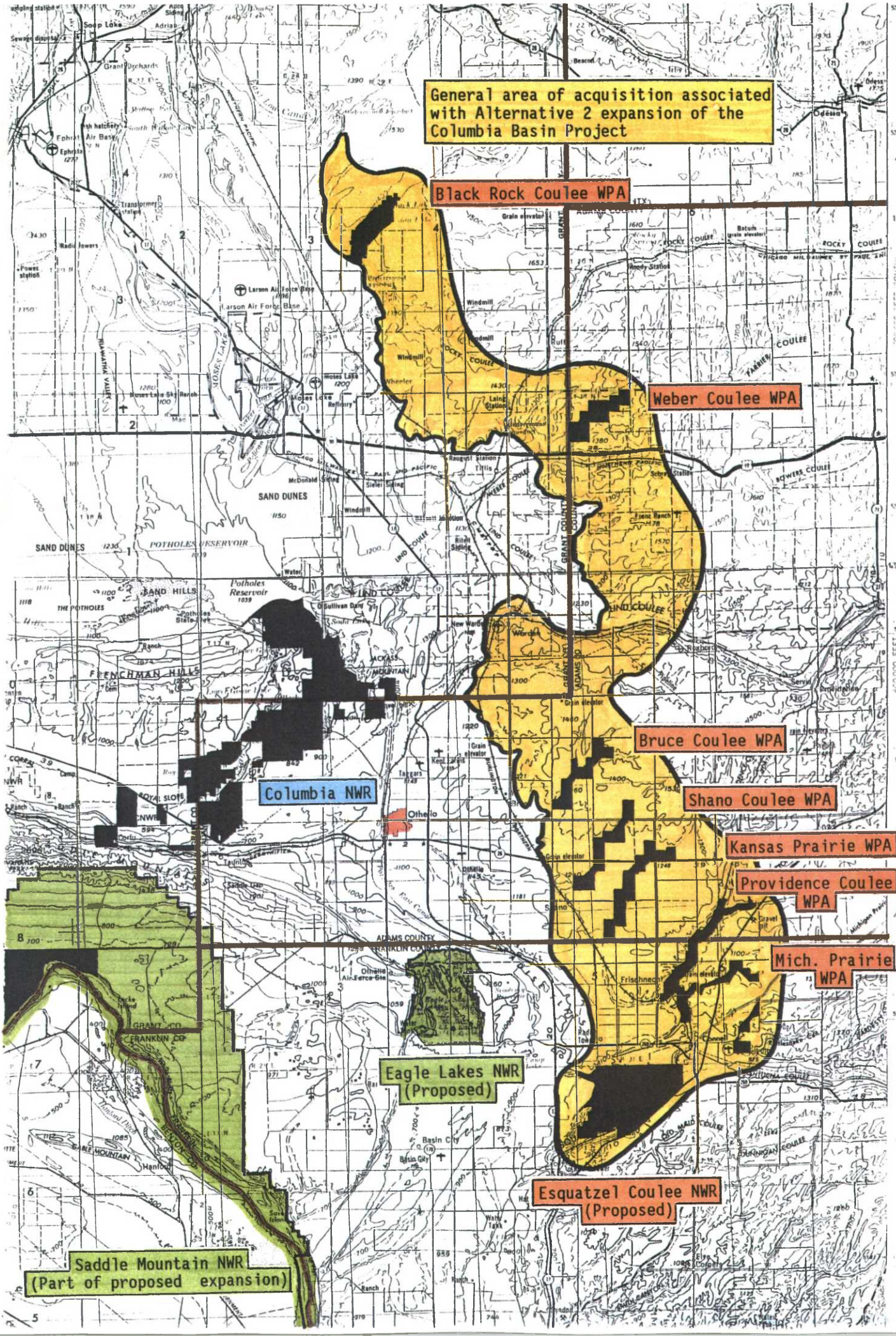
d. Irrigation Expansion Lands

For many years the Bureau of Reclamation has been working toward completion of the second half of the Columbia Basin Project. To date approximately 630,000 of the planned 1 million acres of irrigation development has been constructed (see area map at the beginning of this report). Planners and the irrigation districts have conceded that the potential for total completion of the project is not likely in the foreseeable future. Alternative 2 of the planned expansion, however, proposes construction of facilities to irrigate approximately 87,000 acres of land where water could be provided relatively easily by a series of piped laterals off the East Low Canal.

An integral part of the planned expansion is the Specific Fish and Wildlife Plan for Alternative 2 written by the Fish and Wildlife Service. Under this plan the Bureau of Reclamation is to acquire and develop lands within the irrigation expansion area for wildlife enhancement purposes. Originally, it was anticipated that management of the enhancement lands would be turned over to the Washington Department of Wildlife, but in February the Department announced it would not accept management of the lands unless annual operating funds are also provided. As a result, the Service was then asked to be the managing agency. Refuge personnel inspected the proposed acquisition areas and recognized a great deal of Service-oriented potential. This potential was described to the Regional Office and a decision was made to proceed toward Service acquisition.

At that time, Alternative 2 planning had progressed to the point where a committee made up of representatives of the Bureau of Reclamation, three irrigation districts (and their lawyers), the Washington Department of Wildlife, and the Fish and Wildlife Service was meeting on a monthly basis to complete refinements of the Fish and Wildlife Plan for final submission to the Bureau's EIS contractor. To complete the plan, a great deal of detailed management and development planning was completed by refuge personnel. Proposed acquisition will total about 21,000 acres, and costs are expected to total about $4.8 million for acquisition and $3.6 million for development.

The map on the following page shows the general area of acquisition. Areas to be acquired are expected to vary in size from as small as 15 acres to as large as 7,000 acres. The many small areas making up the "scattered tracts" part of the proposal have not yet been delineated and are not shown. It is proposed that the areas be


General area of acquisition associated with Alternative 2 expansion of the Columbia Basin Project
Black Rock Coulee WPA
Weber Coulee WPA
Bruce Coulee WPA
Shano Coulee WPA
Kansas Prairie WPA
Providence Coulee WPA
Mich. Prairie WPA
Columbia NWR
Eagle Lakes NWR (Proposed)
Esquatzel Coulee NWR (Proposed)
Saddle Mountain NWR (Part of proposed expansion)

managed collectively as the Columbia Basin Wetland Management District. The 7,000-acre Esquatzel Coulee tract is proposed as a national wildlife refuge. It is a large area of high quality, native shrubsteppe habitat with large basalt rock formations to be managed primarily for nesting raptors and their prey base. Most of the other areas will be managed as waterfowl production areas, but to do so will take a little imagination and a lot of habitat restoration and development. For the most part these areas are already under dryland farming or irrigated farming from deep wells (deemed too expensive due to rising electrical costs and because of increasing salinity problems), and almost all native habitat has been destroyed. Water will be provided through the irrigation system, lakes and marshes will be impounded in broad coulee bottoms, shrubsteppe sagebrush grasslands will be reestablished on uplands, riparian habitat will be established along waterways, and remaining native habitat areas will be protected from degradation.

4. Farmers Home Administration Conservation Easements

In cooperation with Fish and Wildlife Enhancement personnel from the Olympia field station, refuge staff inspected several parcels of Farmers Home Administration inventory properties. Most of the properties were located along the Okanogan River near Riverside and Tonasket, Washington. One parcel was located within the Colville Indian Reservation near Nespelem. Most of the lands were orchard properties whose owners were not able to meet FmHA loan payments.

All properties had varying wildlife values, but the main question was which agency would be willing to be easement manager. The Washington Department of Wildlife has been interested in some of the lands but is reluctant to manage any because of a lack of funds to care for the property. For the FWS to manage the lands, the closest managing facility would be Columbia NWR, 120 to 150 miles distant. The property on the Colville Indian Reservation was accepted into easement by the Reservation. Dispositions of the other properties are still pending.

D. Planning

2. Management Plan

The refuge Interpretive Development Prospectus, begun in 1989, was completed and approved. In addition, a companion Public Use Management and Development Plan was drafted and submitted for approval. The Prospectus is a detailed plan relating to specific development proposals, while the Public Use Plan is a more general appraisal of public use activities on the refuge and deals with how the uses will be managed. Updating the refuge's Fisheries and Grasslands Management Plans was put off for a year due to the prolonged refuge biologist vacancy.

5. Research and Investigations

Columbia NR90 - "Blackbird Studies" (13510-9001)

A study of one of the longest continuously monitored populations of free-ranging animals in North America continued in 1990 on Columbia NWR. Research activities of the University of Washington, under the supervision of Dr. Gordon Orians, continued to document reproductive biology, territoriality, and population dynamics of blackbirds on the refuge.

During the 1990 breeding season, March 1 through June 30, field supervisor Dr. Les Beletsky, and field assistants Kyle Harms, Lauren Gilson, and Shirley Davis monitored the breeding behavior of 75 male and 210 female Red-winged Blackbirds. Their work centered on marshes located on Morgan, McMannaman, and Juvenile Lakes, and on Hampton Slough. Other refuge areas used for research included Coot Lake, Marsh Unit III, Frog Lake, and Hays Creek. Monitoring of breeding included trapping and banding each individual, mapping territorial boundaries, and following the progress of each nest. Field crews color-banded 86 adult male, 106 subadult male, and 83 adult female redwings with anodized aluminum bands. A total of 321 nests were monitored, and 279 nestlings were marked with USFWS bands when 7 or 8 days old. This is the 14th consecutive year this population has been monitored during its breeding cycle.

Work continued in 1990 with Yellow-headed Blackbirds. The yellowhead project centered on Morgan and McMannaman Lakes. Field assistants color-banded 59 adult male, 3 subadult male, and 82 adult female yellowheads. They monitored 229 yellowhead nests and marked 299 nestlings with USFWS bands at 7 or 8 days of age. The breeding biology of the yellowhead differs in several interesting ways from the redwing's, and the researchers plan eventually to make behavioral and ecological comparisons between the two species.

During the 1990 breeding season, study continued of the role of steroid hormones on male and female redwing breeding behavior. Sixty territorial males were captured and had blood samples taken between April 1 and April 15, the period when the first nests were started on their territories and the males were most aggressive. When these blood samples are analyzed, researchers will be able to compare the peak testosterone levels of individual males between years, and also relate peak testosterone levels to harem size and reproductive success. In 1990 field crews also collected 320 blood samples from approximately 100 breeding females, with the objective of relating steroid hormone levels (testosterone, estradiol, corticosterone, progesterone) to female breeding phase. The research team will also use these data to test ideas about the role of aggression in female redwing breeding behavior.

Data collection continued for a telemetry study of the movements and habits of male redwings that do not yet have territories ("floaters"). Between March 15 and March 19 the field crew attached microtransmitters (total weight, including body adhesive, 4 grams;

transmitting at 151-152 MHz) to 10 male redwings which were known to be floaters. Bird activities were monitored with some success for up to 5 weeks. Four transmitters were lost and 6 were recovered for future use.

In 1990 researchers initiated a study of nestling and "extra-pair" copulations in redwings. Elizabeth Gray, a graduate student in the Dept. of Zoology, University of Washington, observed mating behavior of male and female redwings during much of the breeding season. She also took blood samples from all males, most females, and over 100 nestlings from 55 nests on the Juvenile Lake breeding marsh. Using the new techniques of DNA "finger-printing," the research team should be able to determine the exact number of nestlings per nest that were sired by males other than a female's putative mate (the male on whose territory she built her nest) and also determine which neighboring males did, in fact, sire the young in question. The results of this study will be crucial for correcting the original estimates of lifetime reproductive success of redwings breeding at Columbia NWR, and will have important implications for the study of animal mating systems.

Two papers from their Columbia NWR research were published in 1990. The citations are as follows:

1. Beletsky, L. D., G. H. Orians and J. C. Wingfield. 1990. Steroid hormones in relation to territoriality, breeding density, and parental behavior in male Yellow-headed Blackbirds. Auk 107:60-68.

2. Beletsky, L. D. and G. H. Orians. Male parental care in a population of Red-winged Blackbirds, 1983-1988. Canadian Journal of Zoology 68:606-609.

Columbia NR90 - Natural Selection and Polyphenism in Wing Melanin Pattern of *Pieris occidentalis* Butterflies (13510-9002)

The second year of a four-year study of the Western White butterfly, *Pieris (Pontia) occidentalis*, at the Columbia NWR site on Corfu Road. The purpose of these studies is to determine the patterns and mechanisms of natural selection on wing melanin pattern in this species. During the summer two extensive mark-recapture studies were conducted that enabled researchers to determine adult survivorship as functions of wing melanin traits; these experiments indicate significant selection on certain melanin traits and on body size in females but not in males. Additional experiments at this site showed that individuals flying in morning and afternoon differ significantly for aspects of melanin pattern that are important for thermoregulation. Finally, using animals collected from the site, laboratory experiments showed that the rearing conditions experienced by the larvae do not affect temperature preferences or tolerances in the adults.

E. ADMINISTRATION

1. Personnel

1 10 5 7 9 8 2

Personnel

1.	David E. Goeke	Refuge Manager	GS-12 PFT
2.	John R. Coykendall	Asst. Ref. Manager	GS-11 PFT
3.	Martha K. Collins	Asst. Ref. Mgr.(reassign. 8/26)	GS-09 PFT
4.	William R. Radke	Wildlife Biol.(trans/prom. 1/28)	GS-09 PFT
5.	Randall W. Hill	Wildlife Biol. (trans/EOD 7/15)	GS-09 PFT
6.	Joanne M. Shields	Adm. Support Asst.(retire 6/30)	GS-06 PFT
7.	Casimira Garza	Adm. Support Clk.(trans/EOD 6/3)	GS-04 PFT
8.	Jack D. Coulter	Heavy Mobile Equip. Repr.	WG-09 PFT
9.	Alfred V. Mitchell	Engineering Equip. Op.	WG-09 PFT
10.	Harvey M. Stelter	Maint. Worker (reappoint. 12/31)	WG-07 TFT

After a couple years of stability, 1990 saw a turnover of three positions that left the refuge short-handed in administrative positions for the entire year. The first change occurred when Biologist Bill Radke took a promotion transfer to Salton Sea NWR effective January 28. Bill's 2 1/2 years at Columbia set a high standard to meet, and his work on Saddle Mountain NWR greatly improved awareness of, and appreciation for, the values and importance of the refuge. Bill's replacement is Randy Hill, who transferred in on July 15 from his former position as Wildlife Biologist with the Missouri-Souris Projects Office of the Bureau of Reclamation in Bismarck, North Dakota. Now if we could only hire Randy's wife, Elaine, who also has a degree in wildlife management! To date Elaine has been helping out as a volunteer.

A second change, one dreaded almost everywhere, was the retirement of the refuge's secretary/receptionist/bookkeeper/timekeeper/cashier, the person who keeps us all out of trouble and is never paid what the position is really worth! Joanne Shields served notice a year earlier that her golden date was coming, and true to her warning, she pulled the plug effective June 30. Fortunately, we found a very able replacement in Cas Garza who accepted a promotion transfer, effective June 3, from her former position as Soil Conservation Technician with the Othello Field Office of the Soil Conservation Service. A four-week overlap helped Cas get her feet on the ground, and Joanne has continued to help immensely as a volunteer when we needed to pick her brain about various details and procedures.

After five years with the Fish and Wildlife Service and over 24 years of total government service, Refuge Assistant Joanne Shields retired at the end of June. She and her husband Kenny remain very active with the refuge as volunteers. 6/29/90 DEG

Finally, Assistant Manager Marti Collins took a lateral reassignment, effective August 26, to become manager at Minidoka NWR in Idaho, part of the Southeast Idaho NWR Complex. In her almost two years at Columbia, Marti had primary responsibility for the refuge's public use program and had the difficult task of writing the refuge's Interpretive Development Prospectus and drafted the Public Use Management and Development Plan. At year's end a selection was confirmed that will refill the vacancy as an Interpretive Specialist. Marti's replacement in February will be Jim Dougan from the National Park Service's Voyageurs National Park at International Falls, Minnesota.

In the way of other personnel actions, Harvey Stelter's temporary appointment as Motor Vehicle Operator expired in December. We are

hopeful of converting Harvey's appointment to permanent status, but until we receive approval, he was reappointed as a temporary Maintenance Worker.

5-Year Staffing

FY	Permanent Full-Time	Permanent Part-Time	Temporary	Total FTEs	Youth Programs
1991	7	0	1	8	7
1990	7	0	.75	7.75	7
1989	7	0	1	8	7
1988	7	0	1	8	7
1987	7	0	1	8	7

2. Youth Programs

6 4 1 2 5 7 3

1.	Carol Oord	Crew Leader	6/13 to 8/14/90
2.	Robyn Bagwell	Enrollee	6/18 to 8/09/90
3.	Mike Hamm	Enrollee	6/18 to 8/09/90
4.	Jose Lara	Enrollee	6/18 to 8/09/90
5.	Annette Lomeli	Enrollee	6/18 to 8/09/90
6.	Ray Ramirez	Enrollee	6/18 to 8/09/90
7.	Dannielle Waldraf	Enrollee	6/18 to 8/09/90

Columbia Refuge sponsored a non-residential Youth Conservation Corps camp for the eighth consecutive year. This was the fourth year of only 6 enrollees after four years with 12. Carol Oord, who had been a youth leader in the YCC program back in 1986, stepped in as crew leader after a six-year stint by Joel Cramer. Her previous experience in the refuge

YCC program was a benefit to the assistant manager in charge of the program, and with the cooperation and assistance of the refuge maintenance crew, the program ran fairly smoothly.

As in past years, applications were handled through the Othello High School guidance office and were accepted only from individuals who lived within commuting distance of Othello. All applications were screened by refuge staff and the Othello Police Department to prevent potential problems with crew members. Three male and three female enrollees, along with three male and three female alternates, were then selected by random drawing from a total of twelve male and nine female applicants. All members completed their 8-week appointment.

The crew had very few discipline problems. An occasional lack of motivation set in during some of the very mundane tasks, but as a whole the crew did an exceptional job. Jobs such as Russian olive tree removal were rather hazardous, but there were no lost time accidents because the crew was conscious about taking the necessary precautions to avoid injury. Four of the six enrollees had a total of seven days of absence.

During the eight week period, the crew handled a heavy workload. The enrollees:

-- received first aid and CPR training at the Job Corps center in Moses Lake, Washington;

-- picked up litter from roads, parking lots, around lakes, and at campgrounds;

-- assisted the maintenance crew in pouring concrete pads for picnic tables at Soda Lake Campground;

-- placed gravel around the pads in an effort to lessen the height difference of the pads from the ground;

-- repainted refuge entrance signs;

-- placed signs at various parking lots reminding visitors to remove their own litter and that fireworks are prohibited on the refuge;

-- removed Russian olive trees from various sites around the refuge in an effort to reduce magpie predation (Marsh Units 1 and 3);

-- spent one day at Saddle Mountain Refuge repairing a fence and putting up boundary signs;

-- helped repair a burst irrigation pipe at the subheadquarters;

-- cleared nature trails on the refuge;

-- cleaned buildings inside and outside at the subheadquarters;

-- removed weeds, trimmed trees, and cleaned buildings at the Fish and Wildlife Enhancement Office in Moses Lake;

-- removed weeds from the Othello parking lot (about 1 acre), trimmed back trees, and edged the lawn around the sidewalks at the headquarters;

-- selected rocks to be used in the masonry at the Drumheller Channels National Natural Landmark overlook.

Youth Conservation Corps enrollees helped with spreading the concrete for the new covered picnic tables at the Soda Lake Campground. 6/27/90 MKC

The students learned about the different types of wildlife on the refuge, how they interact with one another, and what is being done to create a safe environment for the wildlife. They also learned about the formation of the Drumheller Channels and how the area is currently being affected by forces of nature, such as wind and water erosion. Also discussed were the responsibilities of refuge management to the wildlife, the general public, and other agencies. Finally, the responsibility of the crew itself to educating other people about the use and misuse of the refuge was introduced.

Three field trips were taken to enhance environmental education of the crew. The first trip was to McNary Dam in Hermiston, Oregon. There the enrollees learned how the dam has been adapted to lessen the fish casualty rate. They also visited the nature trails which have been constructed. The second field trip was to Spokane, Washington, where the enrollees visited a park called Walk in the Wild. The park features animals displayed in a wild setting that are found in the Spokane area.

While in Spokane they also visited the Museum of Native American Cultures. This museum had exhibits of cultures from the ancient Incas and Mayans to the relatively "young" North American tribes like the Spokane and Yakima Indians. The last field trip was to Leavenworth, Washington to visit the Leavenworth National Fish Hatchery. The hatchery was built in the 1940s to compensate for the loss of salmon spawning grounds from the construction of Grand Coulee Dam on the Columbia River. While there the enrollees learned about different types of spawning and hatching techniques which are employed. The field trips taken during the summer program are very popular because they offer a diversion from what are sometimes rather tedious chores. They also offer a look at other conservation issues outside the local area.

3. Other Manpower Programs

One court-ordered community service laborer worked a total of 16 hours in 1990. He helped maintenance staff with roofing three of the new picnic shelters at Soda Lake, and spent the rest of his time picking up litter around the refuge. With the exception of a short period for getting him started, additional refuge staff time was not needed to supervise his work. He provided his own vehicle for litter pickup, and collected several large bags of trash. We were fortunate to have a referral with sufficient motivation to do a good job without constant supervision.

4. Volunteer Program

The volunteer program, which has blossomed since first being implemented in 1987, remained active in 1990. Kenny Shields, husband of now retired Refuge Assistant Joanne Shields, continued to donate his services in the biological and habitat management programs. His services were especially valuable following the transfer of Biologist Bill Radke, filling in on many of the inventory functions that were needed when there was no staff biologist to do the work. Kenny was also invaluable in familiarizing new Biologist Randy Hill with past refuge studies and locations of important wildlife concentration areas on the refuge. Elaine Hill, wife of the new biologist, volunteered several mornings assisting in waterfowl banding and wildlife inventory during the late summer and fall. A summary of the 148 hours of activities performed by these two volunteers is listed below:

-- Postseason mallard banding (6 hours)

-- Flicker nest box construction (12 boxes, 24 hours)

-- Flicker nest box placement (6 hours)

-- Tree planting at Columbia NWR (50 trees, 14 hours)

-- Assist with third grade Earth Day activities (24 students, 12 hours)

-- Conduct wetlands session of environmental awareness activities (10 classes, 12 hours)

-- Tree planting and filling guzzlers at Saddle Mountain NWR (50 trees and 2 guzzlers, 16 hours)

-- Preseason mallard banding (13 hours)

-- Wildlife surveys (45 hours, including 18 at Saddle Mtn.)

Activities associated with the 20th anniversary celebration of Earth Day fueled two remaining volunteer efforts on the refuge. Ten Boy Scouts and two adults from Othello Troop 805 planted trees at the Blue Bird Campground. They also used the facility for a weekend camp-out. Twenty-four students, one teacher, and eight adults planted trees at Blue Bird Campground and picked up litter at Hampton and McMannaman Lakes parking areas. This was preceded by a classroom discussion, led by the assistant refuge manager, about the need for trees, the principles about planting them, and the dangers caused by litter to wildlife.

Altogether 47 volunteers (25 males and 22 females) contributed a total of 272 hours in the following categories: maintenance (186 hours), resource support (70 hours), and public use (16 hours). The costs associated with administering the program are much lower than reported in the FY-90 year-end report. Although 136 staff hours were spent with volunteers in the CY-90 program, only about 20 hours were spent in administration of the program. The remaining 116 hours were spent working on projects or inventories with volunteers.

Teacher Cindy Lancaster and her Hiawatha Elementary School third grade students from Othello volunteered to give something back to the refuge by helping clean up litter at Lower Hampton Lake. 4/18/90 MKC

5. **Funding**

Funding for the year was filled with uncertainty (nothing new), (1) because funding levels were not made available to the refuge for Fiscal Year 1990 until early in the second quarter, and (2) because the refuge had to operate until August, well into the third quarter, before the full costs of a permanent change of station move were known. The move ended up costing $27,000, but given current averages, we had to hold back more until all the costs were known. As a result, some planned projects early in the year were cut, while some later projects benefitted from remaining money. Overall, funding from FY-1990 proved adequate; but the early delays and uncertainty, combined with the early spending cutoff dates at the end of the fiscal year, together allowed only a narrow and inefficient window to obligate a significant portion of the refuge's discretionary funds.

Fiscal Year 1991 also got off to a very slow start with repeated threats of furloughs and major shortfalls. Funds advices were again delayed into the second quarter, and despite earlier optimism, still fell significantly below the refuge's base funding level. The refuge also went into the new year again facing the unknown costs of another permanent change of station move. Fortunately, the refuge was able to help out the Service's Moses Lake Fish and Wildlife Enhancement Office with remodeling their office space, and thus was able to charge some costs to FWE funding. The remodeling will accommodate new staff working on the new Washington Wetland and Riparian Initiative, part of the Washington Ecosystems Conservation Project. In meeting the FWE need for emergency assistance to avoid prolonged contracting delays, the Service benefits by addressing the needs of the high priority wetland initiative, and the refuge benefits by charging a significant amount of labor costs to outside funding. At the same time, however, because basic refuge funding is inadequate, refuge projects must again be cut or fall behind schedule to chase available funding.

Due to the crush of business, primarily associated with the flood of land acquisition activities (see Section C.1), the refuge was unable to complete the necessary planning and preparations for participation in the 1991-92 NOVA Program. As explained in more detail in the 1989 Annual Narrative, the state of Washington's Nonhighway Road/Off Road Vehicle Activities Program (NOVA), administered by the Washington Interagency Committee for Outdoor Recreation (IAC), provides a fund of money for public use improvements on lands accessed from non-state-funded roads. The refuge's government-owned and maintained public roads qualify it, along with the Forest Service, National Park Service, and other agencies, to apply for competitive grant awards. The grant monies awarded are spendable over a two-year period. In 1988 the refuge's three grant applications were all successful for a total of $49,900 available beginning in 1989, and in 1989 two more applications were also successful for another $31,500 beginning in 1990. Much progress was made on the 1989-90 projects (see Section I.1c), but delays forced a six-month extension, to July 1, 1991, for completion of the work. Part of the delay is caused in the regional office, because this region's excellent Division of Education, Publications, Interpretation, and

Cultural Resources staff is overcommitted, underfunded, understaffed, and cannot keep up with the needs of its field stations. Hopefully, the refuge will be able to go back to the IAC in 1991 to try to secure funding for still more projects that qualify for NOVA funding.

Recent Refuge Funding (Thousands)

FY	126X	(YCC)●	124X	9120	6860	NOVA	Misc	Total
91	386.3	(13.0)		3.0	2.0			386.3▼
90	384.0	(13.0)	12.2		2.0	31.5		429.7
89	307.4◆	(12.7)	36.2		2.0	49.9	7.9■	403.4
88	299.3★	(12.8)	24.1		2.0			325.4
87	376.9	(12.8)	18.5		8.0			403.4

● Included in 126x
▼ Does not include carryover NOVA funds or WA Wetland and Riparian Initiative funds
◆ Includes 2.0 FWS Challenge Grant funds
■ Includes 46.2 large ARMM and 12.4 LUST
★ Includes 4.7 from Bureau of Reclamation, 2.0 from City of Othello, 1.2 from Grant Co. PUD

6. Safety

Monthly safety meetings were held with a variety of subjects discussed by the refuge staff. The following safety films were acquired from the State of Washington, Division of Industrial Safety and Health, and from the Regional Safety Office:

-- "Prognosis: Safety" (general safety film teaching prevention of injuries from falls, electric shocks, infection, and toxicity, etc.)

-- "Accident Report" (examined the various factors that cause accidents)

-- "Back Chat" (safe lifting techniques)

-- "Don't take it Personally" (communicating with fellow employees)

-- "Fire Safety: Fire Extinguishers" (the proper use of different types of fire extinguishers)

-- "Wires, Wind, and Weights" (video dealing with safety concepts that can prevent aviation accidents and reduce injury severity if an accident does occur)

During the year safety training was provided for YCC enrollees and refuge staff that included CPR and first aid certification. Other training included an Aviation Safety Training workshop, provided by the Division of Biological Support and instructed by Vern Cunningham at Turnbull NWR in November.

Periodic safety inspections were conducted of all fire suppression equipment, vehicles and heavy equipment, buildings, and the refuge's explosives magazines.

There were no accidents or injuries involving the refuge staff or YCC personnel this year. However, the visitors were involved in several accidents on the refuge. On May 26, a visitor driving near the North Teal Lake parking lot failed to negotiate a turn and drove off the road, turning the vehicle on its side. Everyone in the vehicle was wearing a seat belt and no one was seriously injured.

On August 25, a fatality vehicle accident occurred on Soda Lake Dam. While attempting to turn around on the dam, the driver of a pickup backed off the south side of the dam. The vehicle rolled several times, throwing the passenger out and eventually landing on top of the victim and killing him. The driver was not seriously injured and was able to seek help. This was another situation where use of alcoholic beverages and driving combined to cause a death.

Another accident occurred on October 17 when a potato truck, eastbound on McMannaman Road, failed to negotiate a turn near Hays Creek and ran off the road. The truck continued off the roadway, down a 10-foot rock embankment, and turned over, coming to a stop and dumping its load of potatoes on refuge property. The driver was fortunate and escaped with only minor injuries. The truck owner was required to remove the spilled potatoes and repair the refuge fence.

An early morning fishing trip turned to tragedy when a young woman attempted to turn her boyfriend's pickup around on the Soda Lake Dam and rolled the truck off the dam. 8/25/90 DEG

The boyfriend was ejected from the pickup and was found crushed underneath when the vehicle was removed. He was pronounced dead at the scene. 8/25/90 DEG

This year an attempt was made to help alleviate a safety problem that is thought to have arisen because of directional signing on either end of Morgan Lake Road. The signing identified a shortcut through the refuge for traffic traveling south to the Othello area and North to the Potholes Reservoir. Over the past few years traffic increased substantially with a corresponding increase in accidents and road maintenance. As a temporary measure to address the problem, wording that identified the shortcut was removed from the signs. Compared to the numerous accidents which occurred in 1989, there were no known accidents along the road in 1990. While the reduction was probably not all due to changing the signs, it was a step in the right direction. To adequately solve the problem, new directional signing will be needed in the future.

7. Technical Assistance

Assistant Manager Collins completed Breeding Bird Survey #045, the Othello route, on June 14, 1990. This route includes a segment of Columbia NWR, and this year documented the expansion of double-crested cormorants in the Potholes Reservoir area, and Columbia NWR in particular. Biologist Hill submitted quarterly reports to American Birds. Hill also helped count and compile data for the Christmas Bird Count in Moses Lake on December 30.

Assistant Manager Coykendall and Biologist Hill offered assistance in putting together portions of a birding map for Grant County and the Columbia NWR area. The birding portion of this project is being developed by the Central Basin Audubon Society, and will be published as part of a recreation guide for visitors to the Columbia Basin.

Biologist Hill assisted the Washington Department of Wildlife with a late-November waterfowl survey. Hill also compiled sandhill crane migration data for the WDW non-game biologist to aid in planning their monitoring efforts next year.

8. Other Items

a. Training and Workshops

Continuing funding constraints limited most training to mandated requirements and caused cancellation of the regional project leaders meeting. In 1990 the following training was provided:

Jan. 19	Management & Supervisory Skills for Women (6 Hrs.) by Skillpath, Inc., Pasco, WA	Collins
Mar. 5-8	Law Enforcement Refresher Training (32 Hrs.) by FWS, Sacramento, CA	Collins
Mar. 6-7	Preretirement Seminar (16 Hrs.) by Connor Consulting, Portland, OR	Mitchell Shields
Mar. 12-16	Wetland Soils and Hydrology Workshop (32 Hrs.) by FWS, Portland, OR	Coykendall
Apr. 2-6	Law Enforcement Refresher Training (32 Hrs.) by FWS, Sacramento, CA	Coykendall Goeke
Apr. 23-26	District Project Leader Meeting, Deer Flat NWR, Nampa, ID	Collins Coykendall Goeke
June 18	CPR Refresher (4 Hrs.) and Multi-media First Aid Refresher (4 Hrs.) by USBR Job Corps, Moses Lake, WA	Collins, Coulter Coykendall, Stelter YCC Crew (7)
July 31- Aug. 2	Administrative Orientation (24 Hrs.) by FWS, Regional Office, Portland, OR	Garza
Sep. 4-7	Refuge Programmatic Review, Willapa NWR Complex, Ilwaco, WA	Goeke
Sep. 18	Firearms Requalification (4 Hrs.) by FWS, Toppenish, WA	Coykendall Goeke
Sep. 24	Drug-Free Workplace (4 Hrs.) by NPS, Coulee Dam, WA	Coykendall Goeke
Nov. 20	Aviation Safety Training, (4 Hrs.) by FWS, Turnbull NWR, Cheney, WA	Coykendall Goeke, Hill
Dec. 11-12	Procurement Training (16 Hrs.) by FWS, Malheur NWR, Burns, WA	Garza

b. Awards

As always, the refuge staff continued to maintain the high tradition of doing quality work which we sometimes take for granted. Special recognition in 1990 went to Joanne Shields, who received an award for sustained high performance, and to John Coykendall, who received a special achievement award for his persistence and leadership in conducting purple loosestrife control in 1989.

F. Habitat Management

1. General

Even though the annual precipitation was about normal, growing conditions were such that grassland soils dried out early during the spring and remained dry throughout that critical growing period. These conditions persisted for the remainder of the year and very little growth occurred in the grasslands. Water levels in the refuge lakes and ponds remained stable, however, because their levels are primarily influenced by seepage from the Columbia Basin Irrigation Project. Crab Creek is also influenced by the project, and refuge stream flows were considered to be normal through the report period.

Conditions remained constant for other refuge habitats and no major changes were noted. However, some refuge areas are plagued with the invasion of noxious plants including purple loosestrife and Russian olive (see Section F.10).

2. Wetlands

During March and April rehabilitation work was accomplished on some of the Marsh Unit II and III dikes and water control structures (see Sections I.2b,c). These projects were long overdue, especially in Marsh Unit III where some thirty years of decadent vegetation buildup had almost stopped waterflow through the water control system.

With direction from the refuge's Marsh Management Plan, developed in 1989, water manipulation played an important part in management of the refuge's four marsh units. In Marsh Unit I impoundment water levels were managed to provide non-fluctuating water surface for colonial nesting birds and over-water nesters with emphasis on redhead production. Water levels were later dropped to encourage shorebird activity. In Marsh Unit II water levels were fluctuated primarily to enhance shorebird activity and improve preseason mallard banding efforts. Water management in Marsh Units III and IV emphasized constant levels to help encourage over-water nesting.

Prescribed burning was also conducted in Marsh Units I, II and III (see Section F.9a).

3. Forests

One hundred bare-root black cottonwood trees were planted in selected areas along Crab Creek and Hampton Slough. The plantings are part of a continuing effort to enhance refuge riparian habitat. Again this year, 6-inch vented plastic pipe was wrapped around the trees to help prevent damage to the trees by rodents and deer. Spraying the trees with an insecticide was also important to prevent insect damage.

4. Croplands

Farming on the refuge is accomplished by cooperative farming permittees. The refuge currently has agreements with 3 cooperators who farmed about 750 acres. Crops that were planted included 650 acres of alfalfa and 100 acres of barley and wheat. The refuge shares of crops planted (100 acres) are generally mature grains left standing in the farm fields. Also, because of the heavy use of refuge alfalfa by geese, especially during the spring, a percentage of this crop is considered part of the refuge share of crops in the form of green browse.

The mature grains left standing were extensively used by mallards during the colder periods of November and December and especially when snow covered the fields. The alfalfa green browse was extensively used by lesser Canada geese during the fall and then again after regrowth began in February through April, until the geese moved north.

5. Grasslands

Climatic conditions were not favorable for grassland plant growth in 1990. Soils dried out early in the spring and plants grew very little with most having a hard time making seed. Upland areas remained quite dry throughout the year.

7. Grazing

Grazing permits were issued to three permittees where on/off situations exist due to the absence of boundary fences. The total land involved with this type of grazing was 1,840 acres. Of this total 1,000 acres are owned by the Service outside the refuge to the west but are administered by the refuge.

Grazing was also used as a management tool in Unit V-C. This unit was grazed from July through September to break up the dense stands of weedy vegetation that existed in the unit. The permittee for the unit was selected by competitive public sale ($5.55/AUM for 150 AUMs, total $832.50). The permittee was also required, at his expense, to aerial seed approximately 30 acres of the unit with tall wheatgrass at a rate of 6 pounds per acre. Once established, the grass will help improve dense nesting cover and provide some control of noxious weeds through competition.

9. Fire Management

a. Prescribed Burning

Approximately 120 acres of grass upland, cattail, bulrush, and juncus marshland were burned between February 12 and 14 in Marsh Units I, II, and III by refuge personnel. The burns were designed to open up decadent vegetation, improve plant vigor and growth while recycling nutrients, and to set back invasion of Russian olive trees in wetland areas. In conjunction with the burns, heavy equipment was used to rehabilitate dikes, ponds and water control structures in these units (see Sections I.2b,c).

b. Wildfires

Two wildfires occurred on Columbia NWR in 1990. On June 28 the Solbreck Road Fire burned about 175 acres of cheatgrass, sagebrush and rabbitbrush east of Solbreck Road, between Hutchinson Lake and McMannaman Road. The fire spread onto the refuge from an adjacent private residence whose occupants had been burning debris. Winds spread the fire from a smoldering burn pile to cheatgrass and onto the refuge. The fire was extinguished by Adams County and refuge fire crews.

On July 5, the Lower Hampton Lake Fire was discovered after it had gone out without any help. The adjacent parking lot had fireworks remnants which were probably the cause of the fire. Fortunately, conditions were such that the fire was a creeper and only burned about one acre before going out.

Impoundments in Marsh Unit II were burned in March to aid in rehabilitation of the dikes and drainage facilities. The new permanent fire breaks constructed around Pools 2 and 3 in 1989 simplified the burning process. 3/1/90 DEG

Most of the fuels burned were thick stands of bulrush and cattails. 3/1/90 DEG

Once it all got to cooking ... 3/1/90 DEG

... the burn did a good job of removing the bulrush and permitted easy cleaning of the drainage ditch. 3/1/90 DEG

10. Pest Control

Refuge pest control consists of an annual effort to control noxious weeds. Other pesticide use on the refuge is done by farming permittees. The permittees use various herbicides and occasionally use insecticides when crops are seriously affected. All pesticide applications are monitored by the refuge staff and are documented in the refuge's annual pesticide/herbicide use report.

During 1990 refuge control efforts started in March with the application of the herbicide Oust to roadsides and parking areas for non-selective weed control. The effort encompasses about 120 miles of roadside and parking area coverage. This year only about 15 miles were covered due to other priorities. Areas that were not treated were sprayed in June with a contact herbicide (2,4-D and Banvel) to prevent the overgrowth of weeds along roadsides and in parking areas.

Spot applications with the refuge's boom sprayer on specific weed problems started in June and included about 100 acres of control work. The main target weeds were Canada thistle, Russian knapweed, kochia, hoary cress and perennial pepperweed in Units I, II, III, IV-B, and IV-C. A tank mixture of Banvel and 2,4-D amine was used with good control achieved.

Russian olive is another plant which requires control measures to prevent its rapid invasion into all wetland and riparian areas. Combined efforts by YCC enrollees and refuge staff in 1990 removed about 100 trees. The trees were cut down and stumps were sprayed with a

herbicide to prevent resprouting. Salt cedar also was discovered in Marsh Units III and IV for the first time. These plants were treated with the herbicide Rodeo to prevent any further spread.

Pretty flowers, bad plant! For the first time, salt cedar was found on the refuge. This was the only plant found in Marsh Unit III, but approximately 200 more were eradicated in Marsh Unit IV.
6/20/90 DEG

Of all the weed threats to the refuge, the potential loss of wetland habitat to invasion by purple loosestrife is considered the greatest threat. Thanks mainly to the lack of control on adjacent lands managed by the Washington Department of Wildlife, the outbreaks of loosestrife on the refuge are increasingly numerous and pose a severe problem. As a result, the eradication of purple loosestrife received considerable attention again in 1990. All of the refuge's wetlands were surveyed and all plants discovered were either pulled by hand or sprayed with Rodeo from a back-pack sprayer. This year approximately 230 man-hours were spent on control efforts compared to 180 hours in 1989.

An alternative to chemical spraying of weeds was also attempted this year, especially for control of weeds on and around Marsh Unit dikes and roads. The maintenance staff rehabilitated an old sickle mower to be used on the three point hitch of the refuge's John Deere 2350 tractor. After a few hours of using the mower it became evident that efficiency was lacking. The dikes and road edges were too rough and close cutting

Region 1

REFUGE PESTICIDE/HERBICIDE USE REPORT - 1990

STATION Columbia NWR

Proposal Number	Chemical (common name)	Date of Application	Rate of Application (lbs/acres)	Method of Application	Site Type (habitat, vegetation, crop)	Target Pest	Results (successful, failed, problems)
01	2-4-D+ Dicamba	July	3 pts/acre + 1 pt/acre	ground	rangeland	noxious weeds	Application successful - no problems
02	2-4-D Amine	May	3 pts/acre	ground	cropland	Canada thistle mustard	Application successful - no problems
03	Rodeo	June-August	4 pts/acre	ground	habitat cropland	non-selective weed control	Good on areas treated - no problems
04	Rotenone	March	2 lb/acre ft.	boat	North & South Teal Lakes	rough-fish	Application successful - no problems
05	Diuron	November	10 lb/acre	ground	roadsides parking lots	non-selective weed control	Application successful - no problems
06	Oust	March	6 oz./acre	ground	roadsides parking lots	non-selective weed control	Fair results on areas treated - no problems
07	Velpar-L	March	1½ qts./acre	ground	cropland	cheatgrass mustards	Application successful - no problems
08	Sencor	March	1 lb/acre	ground	cropland	lambsquarter cheatgrass	Application successful - no problems

was not possible. Combined with the sickle mower's deficiencies, it became obvious that a new mower will be necessary, along with improved dike maintenance, if we want to increase reliance on non-chemical weed control.

The following is a cost breakdown of the refuge's 1990 weed control program:

Chemicals	$2,600
Refuge manpower and equipment	6,000
Total	$8,600

Weed control costs were considerably lower than 1989 ($19,080). This was primarily due to forced budget cuts which prevented contracted helicopter spraying and reduced force account efforts on roadsides, parking lots, and grassland areas by refuge staff (see Section E.5).

12. Wilderness and Special Areas

Planning and work continued in 1990 on the interpretive site for the Drumheller Channels National Natural Landmark (see Section I.1b). Designated as a National Natural Landmark in 1986, the Drumheller Channels area encompasses 44,906 acres, of which approximately 18,000 acres are included within the boundary of the refuge. This erosional landscape is characterized by hundreds of steep-sided hills surrounded by a network of channels and represents the most spectacular tract of butte-and-basin scabland on the Columbia Plateau.

G. WILDLIFE

1. Wildlife Diversity

The diversity of wildlife found on Columbia NWR is closely related to the variety, quality, and juxtaposition of habitats found on the refuge. At least 213 species of birds have been observed at Columbia NWR, and at least 86 species nest on the refuge. In addition, 30 species of mammals, 9 species of reptiles, 5 species of amphibians, and 30 species of fish have been identified on the area. During 1990, two species of birds were seen for the first time on the refuge. A blue-plumaged budgerigar was seen for two days during mid-September, associating with a flock of blackbirds and actively feeding on goosegrass seedheads in Marsh Unit II. This was certainly an escaped cagebird. In early October a single Bewick's wren was found in brushy riparian vegetation at the north end of Marsh Unit I. This species has been experiencing a rapid range expansion along the Snake and Columbia Rivers in SE Washington, but this is the first sighting for the Potholes area.

2. Endangered and/or Threatened Species

State and federally listed endangered species which occur on the refuge include the American white pelican, the sandhill crane, and the peregrine falcon.

White pelicans are rarely seen on the refuge, although they occur from spring until mid-October on Potholes Reservoir. Fifty-two pelicans were still using the reservoir on October 17, five days after the opening of waterfowl season. None were reported on the refuge this year.

Lesser sandhill cranes are common spring and fall migrants through the refuge. Spring arrivals were first seen during the last week of February and left by early April. Fall migration was more closely documented, in part because of some spectacular flights in early October. A population of approximately 20,000 cranes normally stages in Douglas County about 40 miles north of the refuge during September. This year the first refuge sighting was on September 11. Flocks of 10-50 were seen in the Royal Slough area throughout September, with most of the birds feeding in alfalfa and wet pasture near Crab Creek south of Highway 26. Calls from farmers west of Royal Slough came in on October 2 to report 300-400 "whooping cranes," and Assistant Manager Coykendall reported four flocks totalling 2,900 birds from Royal Lake to Corfu. The peak was reached on October 5 when Biologist Hill and volunteer Kenny Shields observed 5,500 in wet pasture, corn fields, and overhead flocks headed south. This single-day peak (three hours of observation) represents a quarter of the population that migrates through the Columbia Basin each year. A few remained through the opening of hunting season (October 13) but left soon after.

State and federally listed threatened species occurring on the refuge include the bald eagle and the ferruginous hawk. Ferruginous hawks were not seen on the refuge during 1990 but were spotted along Saddle Mountain ridge near the Corfu unit of the refuge. Bald eagles winter on the refuge, with most birds using the Royal Lake and Crab Creek areas at the south end of the refuge, and the Hampton Lakes area in the north. Concentrations of waterfowl, especially during December and early January at the end of the hunting season, are the attraction. Bald eagles are counted during North Columbia Basin waterfowl surveys. The peak population for the north basin occurred on the December 26 survey during the cold snap. On that count 82 eagles (49 adult, 33 immature) were recorded, including 39 on Banks Lake (which was completely frozen).

The pygmy rabbit (*Sylvilagus idahoensis*) is a small species similar in appearance to our widely distributed Nuttall's cottontail. Following a possible sighting in 1989 by Biologist Radke, further investigation into the presence of this species on the refuge was undertaken. In early October Biologist Hill and Assistant Manager Coykendall accompanied Ron Friesz, a Washington Department of Wildlife biologist studying the only known populations in the state (in Douglas County), to the area where Radke had seen the rabbit. Friesz initially indicated that the sagebrush areas in the vicinity looked like good pygmy rabbit habitat as they typically use deep soil areas. After looking at the location where Radke had seen the rabbit and collected droppings, that area and another across the canyon that appeared suitable were searched. No evidence of pygmy rabbit burrows or droppings was found. Upon further evaluation, Friesz indicated that active sites in Douglas County were at higher elevation and had younger sagebrush plants. This latter characteristic is important, because during the winter pygmy rabbits live almost exclusively on young sagebrush growing low to the ground. The area that

was searched included mature plants with most leaves out of reach for the small rabbit. Although Friesz did not rule out the possibility that pygmy rabbits occur on the refuge or at the site that was visited, he saw no evidence that they occur here.

As a follow-up to this inspection, Friesz showed Biologist Hill and volunteer Ken Shields several pygmy rabbit burrows at two large occupied tracts in Douglas County. Several droppings were collected at burrows, and photos were taken of a large variety of burrows in both grazed and ungrazed areas on hillsides and level ground. We are now aware of the distinguishing characteristics of pygmy rabbit burrows and the appearance of preferred habitat should it be encountered on the refuge.

3. Waterfowl

Columbia NWR was set aside "as a refuge and breeding ground for migratory birds and other wildlife," and a primary benefit of the refuge is to provide sanctuary areas necessary to protect wintering waterfowl in the North Columbia Basin. During the year, at least 22 species of waterfowl utilized the refuge, with mallards making up close to 95% of the ducks during the winter months.

Two unusual species of waterfowl were observed on the refuge during 1990. Biologist Hill saw single white-fronted goose flying through Marsh Unit I on October 4. This species probably migrates through the Columbia Basin in small numbers every year, but they are infrequently observed on the refuge. On October 25 Hill saw a juvenile-plumaged surf scoter resting on one of the small ponds in the Falcon Lakes chain. This species is generally found along the Pacific coast, but does turn up on some larger inland bodies of water such as Potholes Reservoir and the Columbia River.

Waterfowl numbers both on and off the refuge were surveyed using methods similar to past years. Abbreviated surveys were completed while the biologist position was vacant. Refuge personnel participated in five aerial surveys in the basin during October through December, including a mid-winter waterfowl flight the day after Christmas. The mid-winter flight that covers Washington's northeast counties was delayed continually by wind, fog, or snow. It was cancelled when poor weather conditions delayed the flight beyond January 20. Cold temperatures during the week of the North and South Columbia Basin flights greatly reduced non-flowing open water, and waterfowl use in the NE counties was probably very low during that period. Weather conditions changed significantly during the second week of January. Large numbers of geese moved into the north basin with the warmer weather, and results from a mid-January survey of the NE counties would not have been representative of populations using the area during the preferred survey period.

Jamison Lake, Grimes Lake, Saint Andrew Lake, and the Quincy HMA were flown during the first four flights, but were dropped for the mid-winter flight because they were completely frozen. Monthly ground counts, pair counts, and brood counts were conducted to estimate waterfowl use and production on the refuge. During aerial surveys, the refuge contracted with Executive Flight Inc. of Wenatchee. Howard Wagner and Gene Davis

were excellent pilots, and with a new office and planes operating out of the Moses Lake airport, the operation was much more efficient than in 1988 when there was difficulty in scheduling flights out of Wenatchee.

The number of waterfowl using the refuge from year to year is primarily controlled by weather patterns and the amount of ice-free water and available food. This was probably the case in 1990 as ducks, geese and swans all showed dramatic increases from 1989. Waterfowl use-days on Columbia NWR for the years 1981-1990 are presented in the following table.

Refuge Waterfowl Use-Days 1981-1990

Year	Swans	Geese	Ducks	Total
1990	8,160	1,374,451	4,523,220	5,905,831
1989	5,350	357,750	2,429,583	2,792,683
1988	3,450	538,560	3,937,380	4,479,390
1987	5,310	859,410	5,610,630	6,475,350
1986	6,043	706,400	2,567,310	3,279,753
1985	4,110	565,500	1,770,450	2,340,060
1984	7,230	521,174	3,594,222	4,122,626
1983	5,850	1,025,400	3,175,830	4,207,080
1982	5,280	543,450	4,515,000	5,063,730
1981	8,680	998,690	10,716,519	11,723,889

a. Ducks

Duck numbers were up throughout the Columbia Basin, including Columbia NWR, during 1990. Duck use on the refuge was up 86 percent from last year, although less than 6 percent above the ten year average. Most use occurred during January, November, and December. A peak population of about 54,000 mallards was present on the refuge for a two-week period during early November, with a majority of the birds concentrated at Royal Slough and the Hampton Lakes.

Pair counts were conducted following the refuge Wildlife Inventory Plan. The most common nesting species include mallards, cinnamon teal, ruddy ducks, and redheads. A total of 694 ducks were produced during 1990, about 38 percent below the ten-year average, and about 19 percent below last year's production estimate. Brood counts were begun very late because of the vacant biologist position, so incidental brood information was used to calculate mean brood size. Forty-seven broods were tallied and averaged by species to obtain Class III brood sizes. The paucity of broods counted and the late-season data collection may have biased data to imply much poorer production than actually occurred. However, brood production calculations for 1990 indicate major declines from 1989 for five of ten duck species and for eight of ten versus the ten-year average. There is a need to identify whether the trend is due to habitat degradation, pesticide toxicity, predation, data collection techniques, or some other factor.

The following table depicts duck production on Columbia NWR during the past 5 years.

Duck Production on Columbia NWR (1986-1990)

Species	1990	1989	1988	1987	1986
Mallard	150	238	128	103	148
Gadwall	100	117	75	36	57
Am. Wigeon	7	7	2	3	1
B-w Teal	13	97	17	69	25
Cin. Teal	161	148	96	346	293
N. Shoveler	3	23	11	7	1
Redhead	150	141	141	173	121
Ruddy	110	69	75	71	87
Misc. Species	4	14	8	1	7
Total	694	854	553	809	740

b. Geese

Canada goose use in 1990 was the highest ever recorded at Columbia NWR. The 1,374,451 use-days was 284 percent above last year and 83 percent above the ten-year average. Peak numbers were present during mid-November when more than 25,000 lesser Canada geese were present in Marsh Unit IV. A combination of open water and available food during the winter, and mild temperatures with a late fall green-up of cheatgrass on the refuge held geese for these record levels. Great Basin Canada goose production on the refuge is not significant, with four pair raising an estimated twelve goslings to flight stage. Canada goose broods were recorded at Soda Lake and Marsh Unit I. Predation and human disturbance work together as serious threats to refuge goose production.

c. Swans

Tundra swan use on Columbia was representative of high North Columbia Basin totals for 1990. January, November, and December counts were among the highest ever recorded for the North Basin, and the 8,160 use-days is the highest on the refuge since 1981. The 1990 total is up 53 percent from last year and 37 percent above the ten-year average. Most use occurred on Upper Hampton Lake and Royal Slough during the fall. A peak count of 182 tundra swans was made on the refuge November 7. Open water, sanctuary from disturbance, and a good supply of pondweed tubers probably contributed to the high use.

4. Marsh and Water Birds

At least 13 species of marsh and water birds were present on Columbia during the year. Common breeding species include pied-billed grebes, Virginia rails, soras, and American coots. Virginia rails were especially common in September when approximately 100 were using shallow marsh areas throughout the refuge. Although great blue herons, and black-crowned night herons are common during the spring and summer, none of these birds nest on the area. A large colonial waterbird rookery

exists north of the refuge at North Potholes Reserve, and birds from this rookery commonly utilize Columbia NWR as a feeding area. Refuge personnel and volunteers erected artificial nest platforms during the winter of 1989 in Marsh Unit I to enhance the opportunity for wildlife diversity in this unit. Although no nesting took place on the structures during 1989, up to 70 double-crested cormorants used the platforms for resting and sunning while feeding heavily on trout stocked in the marsh unit. During 1990, 10 pairs of cormorants nested to produce a total of 14 young. This constitutes the first confirmed nesting of this locally expanding species on the refuge.

Success! In an effort to encourage colonial water bird nesting on the refuge, these nest platforms were erected in Marsh Unit I in early 1989. In 1990 double-crested cormorants built 10 nests and fledged at least 14 young. 6/21/90 DEG

During 1990, 325 American coot pairs produced an estimated 100 young. This figure may be well below actual production because of low brood sample size and sampling bias. Eared grebes were documented nesting on Royal Slough for the third consecutive year since 1963 when three occupied nests were found on August 23.

Common loons, a sensitive species, are regular spring and fall migrants on the larger refuge lakes. The refuge population peaked in November when 15-20 loons were seen on Soda Lake. Banks Lake and Potholes Reservoir provide habitat for the largest North Basin concentrations of migrating loons during the fall, although fall waterfowl flights did not reveal large concentrations in 1990 as in previous years.

5. Shorebirds, Gulls, Terns, and Allied Species

Throughout 1990, at least 20 species in this category were observed on the refuge. Birds known to have nested on Columbia included the killdeer, black-necked stilt, American avocet, spotted sandpiper, long-billed curlew, and common snipe. Ring-billed gulls, California gulls, and Caspian terns nest adjacent to the refuge at Potholes Reservoir and use Columbia NWR as a feeding and loafing area.

6. Raptors

At least 18 species of raptors utilized Columbia NWR for varying amounts of time during 1990. The abundance of eroded basalt cliffs on the refuge support a relatively high density of both cavity nesting and platform nesting raptors. Common breeding species include red-tailed hawks, American kestrels, common barn owls, and great horned owls. In addition, several pair of northern harriers nest in refuge marsh habitats. Prairie falcons were not found nesting again this year. Peak numbers of raptors use the refuge during fall and winter months while feeding primarily on rodents. In addition to the above species, this region provides wintering habitat for rough-legged hawks, short-eared owls, and an occasional snowy owl, which was again seen east of Potholes Reservoir in December. Unusual was the one immature golden eagle flying over Migraine Lake on September 12.

During the year, a number of injured or orphaned raptors were delivered to the refuge headquarters. These birds are normally turned over to Taffy Mercer, a licensed rehabilitator in Kennewick. During 1990, two American kestrels, one red-tailed hawk, one great horned owl, one northern harrier, and fifteen common barn-owls were delivered to Ms. Mercer for rehabilitation.

7. Other Migratory Birds

Black-billed magpies were uncommon nesters on the refuge 25 years ago. However, during the past 10 years, a serious invasion of Russian olive trees in the Columbia Basin has provided abundant nest sites. Magpies have taken advantage of these sites on the refuge, and have become serious predators of waterfowl and passerine eggs. In an effort to limit numbers of nesting magpies, over 50 Russian olive trees were removed from Marsh Unit I during 1989. A greater effort was made in 1990, and YCC crews removed 77 trees from Marsh Unit I and approximately 150 from Marsh Unit III. By removing black-billed magpie nest sites in waterfowl production units, we hope to indirectly decrease nest predation by this species.

As riparian habitat has benefitted in response to the total elimination of cattle grazing on refuge lands, passerines associated with riparian habitat have also benefitted. Increasing numbers of eastern kingbirds, northern orioles, lazuli buntings, yellow-breasted chats, and song sparrows are nesting on the refuge. One of the most important riparian habitats on the refuge is located on the Corfu Unit, which supports significant stands of native willows interspersed with ponds and upland habitat. Furthermore, this area is currently still devoid of Russian

olive trees, making its value to native wildlife extremely important. A constant water supply for this area would make it an excellent area for a nature trail with a boardwalk.

The mourning dove coo count, conducted annually by refuge personnel each May, showed the highest number of doves since refuge record-keeping began (going back to 1970), with an 80 percent increase in the number of doves over last year. Common migrants passing through the refuge included yellow-rumped warblers, white-crowned, savannah, and Lincoln's sparrows. Rock wrens were especially common this year in all rocky areas. Two ash-throated flycatchers were seen in early August along Morgan Lake Road at the Crab Creek crossing. This cavity-nesting species has become rare in Washington, and the potential for breeding in the area may warrant the placement of nest boxes in suitable breeding habitat.

8. Game Mammals

Both mule deer and white-tailed deer have been observed on the refuge. Mule deer are widespread, but infrequently seen. The much rarer white-tailed deer are only just beginning to show up in the Columbia Basin due to a westward expansion by this species. Although deer may be legally hunted with bow or shotgun on open refuge lands during state season which runs concurrently with the waterfowl season, very few animals are taken from the area legally. This year the refuge mule deer population began the summer with 20-30 adults. We suspect that less than half that number of animals entered the winter on the refuge. Although deer movement associated with hunting seasons and fall harvest of apples and grains can influence the refuge deer population, poaching may be a serious problem on the refuge. Evidence confirmed at least one case of poaching on the refuge, with one deer killed and one more wounded and possibly killed (see Section H.17).

Cottontail rabbits may be hunted on the refuge during state seasons running concurrently with the waterfowl hunting season. Because cottontail populations have been low in the area in recent years, this sport has received little attention. The cottontail population rebounded during 1990, and at least one hunter called from the Spokane area to inquire about rabbit hunting areas on the refuge.

Mountain lions were not known to occur regularly in the Columbia Basin. The tracks that trapper Del Kramer found along Crab Creek in Marsh Unit II during 1986 were the first confirmation that lions occur on the refuge. During May of 1990, Donna Michel and a field hand clearly observed an adult mountain lion near Crab Creek in the Marsh Unit IV area of the refuge. Further investigation indicated that two East Irrigation District employees also watched a lion for 15 minutes in 1989 just five miles south of Othello near Linda Lake. During a conversation with Geoff Smith, an animal damage control officer with APHIS (USDA), he mentioned that a lion may have been working up and down the Crab Creek corridor for the last few years. He reported three confirmed sightings of lions ranging from White Bluffs (along the Columbia River) to Crab Creek in the refuge.

10. Other Resident Wildlife

California quail, chukars, and ring-necked pheasants continue to maintain their populations on the refuge. Although no formal surveys are conducted for these species on Columbia NWR, Washington Department of Wildlife brood routes in Adams and Grant Counties indicated that 1990 pheasant production was down more than 90 percent from 1983, and has been declining since the mid-1980s. Production on the refuge was poor in 1990. California quail in western Adams County are restricted to Crab Creek and surrounding areas. After the population was nearly wiped out during the hard winter of 1985, quail numbers have been increasing annually, although refuge production was only fair. Based on brood surveys in eastern Adams County, quail production was up substantially from 1989. Chukars are found on Saddle Mountain at the south end of the refuge, where production was good in 1990.

Commonly observed mammals on the refuge include the muskrat, beaver, porcupine, coyote, and yellow-bellied marmot. Also present, but less often seen, are raccoons, badgers, striped skunks, mink, long-tailed weasels, and Washington ground squirrels. A number of bat species utilize the refuge, but no extensive work has been done to document these animals.

Reptiles and amphibians actually observed on the refuge include the painted turtle, side-blotched lizard, western skink, yellow-bellied racer, gopher snake, northern Pacific rattlesnake, Pacific treefrog, and the introduced bullfrog. Bullfrogs maintained their large population on the refuge, with greatest densities found in the shallow marsh impoundments that form Marsh Units I and II.

11. Fisheries Resources

a. General

At least 30 fish species are found on the area, with trout, bass, sunfish, perch, and carp being the most abundant. Forty-five lakes of the refuge support fisheries; ten of these are managed for warmwater species, three contain both warmwater and coldwater species, and the remainder are managed as coldwater fisheries.

The 1986 refuge Fishery Management Plan set forth a cooperative management system by the FWS and the Washington Department of Wildlife (WDW). The WDW manages aquatic systems on the refuge for the maintenance and production of fish, while the FWS manages aquatic systems on the refuge for maintenance and production of migratory birds. These two management strategies are often mutually exclusive and are not without conflicts. However, the overall objective is to provide a variety of angling opportunities to the public which are compatible with waterfowl use on the refuge.

On March 28, Washington Department of Wildlife fisheries biologists treated Pit Lake and North and South Teal Lakes with rotenone as part of lake rehabilitation. A nearly complete kill was achieved on

pumpkinseed sunfish, black crappie, and carp. No toxicity was detected during testing on June 5.

Carp continue to plague the refuge waters, both from a fisheries and a wildlife standpoint. All four marsh units hosted large carp populations during 1990. During trapping operations for pre-season mallard banding, carp were caught in duck traps in Marsh Units I and II. One morning 27 2-pound carp were removed from a single trap! Marsh Unit II was drained during late fall and will start fresh in the spring of 1991. Marsh Unit I brood ponds were lowered enough to eliminate most fish on the east side of Crab Creek, but the large impoundments on the west side and in the main creek impoundment will remain infested until the next drawdown and rotenone application. Marsh Unit IV ponds had adequate ice and snow to create winterkill conditions, but seepage probably allowed a continuous supply of oxygen into Royal Slough to maintain fish through the winter. Seepage into Marsh Unit III prevents pools from freezing enough to create winterkill conditions.

b. Royal Slough Experimental Fish Screen Operations

In 1987 the Royal Slough wetland was restored by constructing a pair of 850-foot siphons from Royal Lake to resupply water after the natural underground seepage routes apparently became sealed off (see 1987 NR, Section I.1). In 1988 six impoundments were constructed along the overflow route between Royal Slough and the Crab Creek Wasteway. Together, Royal Slough and the new wetlands between the siphon and the wasteway are now designated Marsh Unit IV (see 1988 NR, Section I.1). More than 100 acres of wetlands are included in the marsh unit, and at least two more impoundments are planned.

In 1989 an experimental fish screen, designed and constructed by refuge personnel with funding assistance from the Bureau of Reclamation, was installed to test the feasibility of preventing carp from entering the wetland complex through the siphons (see 1989 NR, Section I.1). Water supplied to the wetlands through the siphons was first screened by the 1/8-inch slots of the siphon intakes, passed through a small pond with a porous rock dam intended to provide additional screening, and then passed through the experimental screen structure. The heart of the test facility is the two 42-mesh screens (with holes measuring .0138 inch) that effectively screen out all fish eggs and fry and much more.

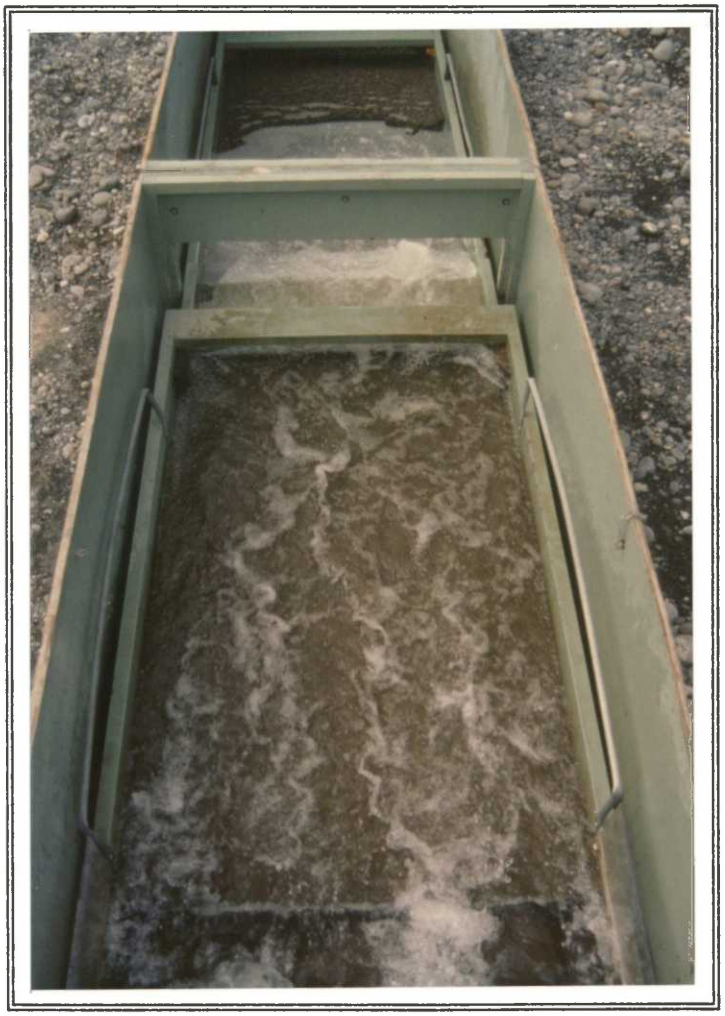
Results of the 1989 testing were very encouraging, but several questions arose that could not be answered conclusively with the facility at its original location. Significant numbers of carp fingerlings 2-3 inches long were caught on the screen in 1989. To prove that fish of this size were a result of a brood pond situation between the siphon outfall and the screens, the test facility was moved prior to 1990 operations to eliminate the pond. A large tank was installed at the siphon outfall to still the water which then flowed directly over the screens.

To answer questions from 1989, the Royal Slough experimental fish screen was moved to the siphon outfall, and the effects of the intermediate pond were eliminated. 5/4/90 DEG

The second year of testing confirmed that nothing measuring more than 1/8-inch thick was passing through the siphon intake screens. The maximum size of fry found on the screens in 1990 was about one inch, and there were very few of that size. It is apparent that the vast majority of fish fry passing through the siphons are less than 1/2-inch long.

A second problem found in 1989 was the accumulation of silt that accelerated plugging of the screens and increased the frequency of screen cleaning. In 1989 the silt was thought to be a function of increasing fish activity in the intermediate "brood pond," because the silt accumulation did not become a problem until late in the test period. Moving the screens and eliminating the pond did not eliminate the silt, but it did confirm that silt will be an operational problem.

In 1990 the silt problem started as soon as the siphons were activated. The source of the silt was readily apparent, because the Crab Creek Wasteway, flowing into Royal Lake upstream from the siphon intakes, was dumping a great deal of silty water into the lake, discoloring everything downstream. The siphon intakes are also very close to the bottom, and undoubtedly the activity of spawning and feeding carp around the siphon intakes aggravates the suspension and intake of silt particles. At the original location, the timing of the silt problem was delayed by the stilling effect of the "brood pond" until the developing carp fry reached a size and number that kept the silt particles suspended until the water



The test facility is designed to screen out all fish eggs and fry from the water diverted from Royal Lake. The biggest problem encountered is the silt brought into the lake from the Crab Creek Wasteway just upstream from the siphons.

5/29/90 DEG

reached the screens. Modification of the siphon intake area, tentatively planned for 1992, will hopefully reduce the problem.

Testing will continue in 1991, and efforts will be made to secure funding for a full-sized, permanent operational facility. If the costs of construction can be kept reasonable, the facility has the potential for broad application on wildlife enhancement areas planned as part of the Alternative 2 expansion of the Columbia Basin Project, most of which are proposed for Fish and Wildlife Service management as Waterfowl Production Areas (see Section C.1d). On the proposed WPAs the silt problem would be inconsequential, because the water would be supplied directly from the irrigation supply system and would not carry a silt load.

As the first screen loads up, excess water overflows onto the second screen. In a full-scale structure, there would be a second pair of screens to allow cleaning without interruption of the water flow. 5/29/90 DEG

Operation of the screen in 1990 confirmed that carp fingerlings over 1" long are not getting through the siphon intakes and that the vast majority of fish fry entering are less than 1/2" long. The brown flakes are deposits loosened from inside the siphon tubes. The quarter is 1" across. 5/29/90 DEG

12. Wildlife Propagation and Stocking

Trout populations on the refuge are sustained by annual stocking. During 1990 Washington Department of Wildlife personnel stocked 102,069 Rainbow trout, 3,443 Eastern brook trout, and 29,910 Lahontan cutthroat trout fingerlings at various locations.

14. Scientific Collections

The only scientific collecting activity on the refuge during 1990 occurred under the Special Use Permit issued to Dr. Joel Kingsolver. In his study of the Western White Butterfly, Kingsolver collected several specimens for lab study (see Section D.5).

15. Animal Control

Beginning in 1986, the Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) was designated to handle problems involving wildlife depredations. However, the refuge continues to receive complaints dealing with goose, crane, woodpecker, and skunk related problems. Columbia personnel normally direct these complaints to APHIS Animal Damage Control Specialist Geoff Smith.

Animal control on the refuge is sometimes necessary to remove nuisance animals such as beaver and muskrats, which undermine dikes, plug water control structures, and make marsh management difficult. Once again, local trapper Del Kramer proved to be an asset to the refuge by removing seven beaver from the refuge during the winter.

16. Marking and Banding

Four bird species, and a total of 1,642 individuals were banded this year to meet Work Activity Guidance. All 1990 banding accomplished at Columbia involved meeting waterfowl quotas.

The 1990 postseason banding quota for the Columbia Basin was 1,000 mallards of each sex, for a total of 2,000 ducks. John Annear from Umatilla NWR coordinated the effort with banding conducted at McNary, Toppenish and Columbia Refuges. Trapping began on January 22 immediately after the close of goose season. Six traps were used at Upper and Lower Hampton Lakes. Ducks were not heavily concentrated due to the mild winter conditions until the final week when lakes froze over. The combination of a large percentage of recaptures with recurring predation problems led to termination of banding on February 16 after a total of 17 nights trapping. Banding was conducted by a crew of the two assistant managers, with help from other refuge staff or volunteers when needed or available.

A total of 1,078 ducks were banded, including 305 female mallards, 771 male mallards, 1 male lesser scaup, and 1 male hooded merganser. An additional 848 mallards were banded at Toppenish and 673 mallards at McNary. The total of 2,599 mallards banded exceeded the quota for total mallards but again fell short of the quota for females.

Heavy duck use in Pool 3, Marsh Unit II, following drawdown in August, aided preseason banding efforts. Here, Biol. Hill and ARM Coykendall bring in a load of mallards. 8/13/90 C.Oord

Duck traps baited with corn may be the answer to carp control. This trap in Marsh Unit I caught 27. Too bad the trap wouldn't catch ducks at the same time. 9/14/90 RWH

The 1990 preseason banding quota for the Columbia Basin was 300 mallards of each sex and age class for a total of 1,200. John Annear of Umatilla NWR coordinated banding efforts for the Basin with McNary NWR and Columbia NWR. In 1990, Regional Office direction was to concentrate banding efforts on local birds. Baiting began in Marsh Unit-II at the beginning of August. Banding occurred over a seven-week period beginning August 8 using one to four traps. Additionally, two traps were placed in Marsh Unit I from September 10-14 with no success. Individual traps were relocated or pulled for brief periods because of predation. Banding efforts ended on September 24 due to poor trapping success. During the seven-week period, 561 mallards and 3 cinnamon/ blue-winged teal were banded. Ten mallards and one teal were lost to predation during that period, and an additional six mallards were found dead in the traps. These drownings were a result of hypothermia assumed due to stress induced by mammalian predators. One of the six had been banded at our station in 1988 with a $100 reward band. Banding efforts were carried out by four refuge personnel and two volunteers. The following table shows a breakdown of mallard banding by sex and age.

Columbia NWR Preseason Mallard Banding Results

		Males		Females		
Week	Losses	AHY	HY	AHY	HY	Total
1	0	23	18	19	18	78
2	1	40	13	21	9	83
3	1	33	23	34	13	103
4	6	43	30	32	10	115
5	4	26	6	17	7	56
6	3	27	18	19	17	81
7	2	18	14	4	9	45
Totals:	**17**	**210**	**122**	**146**	**83**	**561**

In addition to the above birds, 340 male and 104 female mallards were banded at McNary NWR. Their banding effort did not begin until September 13, so none of this total is included toward the "local" goal of 1,200. An additional 100 birds were banded by Washington Department of Wildlife. A somewhat arbitrary cutoff date of August 24 (the end of week 3) was selected for "local" birds because of an apparent immigration of new birds at the beginning of the next week. Females were still found molting flight feathers into mid-September, and late nesters from other nearby areas probably made up a majority of the birds banded during this period. If we include the entire Columbia Basin as the area of local recruitment, 60-70% of all mallards banded at Columbia NWR in 1990 (preseason) might be classified as local birds. However, it is apparent that young birds disperse widely from fledging areas. The increase in young birds during weeks 3 and 4 indicate new birds into the area, and a mallard trapped on August 27 had been banded as a flightless juvenile at Summer Lake, Oregon just 4 weeks earlier. This flight 300 miles north is indication of wide post-fledging dispersal. An adult mallard trapped on August 28 had been banded three weeks earlier in British Columbia, probably indicative of normal fall migration.

Compared to recent years' banding efforts, our sex ratio improved with 41% of the total as females versus 36% in 1989 and 37% in 1988. The number of ducks banded per trap night during 1990 was 3.9. This

compares to 5.2, 6.2, and 5.9 ducks per trap night in 1989, 1988, and 1987, respectively. The timing of trapping was the main contributing factor, as efforts to capture local rather than migrant mallards reduced trapping success. Other contributing factors included predation and the unsuccessful trapping effort at Marsh Unit I.

In addition to the reward-banded bird and the juvenile banded a month earlier in Summer Lake, Oregon, there were other interesting band returns or recoveries from 1990. Three mallards banded at Columbia NWR in 1985, 1988 and 1990 were harvested in Arkansas. These birds were most likely hatched in Alberta and followed Pacific and Central Flyway routes different years during fall migration. Two other mallards banded as adults at Columbia in 1976 survived at least 15 winters. One that had been shot was turned in by an elementary school teacher from Richland, Washington. The other was retrapped in Edmonton, Alberta, and may still be passing on his genes.

Banding and marking associated with research projects included two University of Washington studies on blackbirds and butterflies (see Section D.5).

H. Public Use

1. General

The number of total visits to the refuge in 1990 increased slightly over that of 1989, to approximately 185,455. The following table compares visits to the refuge in several different categories for the past five years.

	1990	1989	1988	1987	1986
Consumptive Recreation					
Hunting, general waterfowl	2,690	1,060	8,670	9,026	6,200
Hunting, upland birds	780	530	2,317	2,833	2,000
Hunting, big game	10	5	5	7	5
Fishing, warmwater	79,021	80,431	67,030	78,474	67,380
Fishing, coldwater	75,404	71,757	72,525	78,861	58,325
Nonconsumptive Recreation					
Camping	42,451	16,776	37,446	45,184	35,260
Picnicking	29,710	29,115	25,707	28,319	23,390
Wildlife/Wildlands Observ.					
Foot	1,865	1,851	1,701	4,784	1,645
Land vehicle	3,735	3,702	3,303	9,072	3,460
Photography	930	922	832	2,262	825
Total Refuge Visits	185,455	185,200	169,400	185,270	142,800

Public use figures are based on data gathered from a series of infrared traffic counters at various locations on the refuge. Even though the counters are camouflaged and located away from people concentrations, they are subject to occasional, but costly, vandalism. Also, the three large dry cell batteries required (two 6-volt, one 12-volt) last only about 60-90 days and cost $16.25 per set. As a result of the high maintenance costs, four Compu-Tech Systems seismic TR-41 trail/road counters were purchased with accessories ($1,628) for testing. These counters each operate for one year on only four alkaline "D" cell batteries at an annual battery cost of about $4 per year compared to $65-98 per year for the older counters. The new counters can also be totally buried and should be highly vandal resistant.

Efforts continued through the year to develop interpretive facilities for the refuge (see Section I.1b,c) and to shift the public use emphasis more toward interpretive/educational opportunities. It has been a slow process with little Service funding available. Fortunately, the refuge is receiving $81,400 from the Washington Interagency Committee for Outdoor Recreation (IAC) to improve public use facilities and construct new interpretive facilities (see Section E.5).

2. Outdoor Classrooms - Students

For the ninth consecutive year refuge personnel presented on-site environmental awareness sessions for all Othello third grade students and their teachers. Royal City also participated for the third year. The week prior to their visit to the refuge, 1-hour slide programs were presented to the students at the three elementary schools to provide an introduction to the National Wildlife Refuge System and its mission. The intent of the overall program is to provide an outdoor experience for the students that relates to wildlife and conservation subjects the teachers are presenting in the classroom. In 1990 a total of 249 students participated accompanied by 23 parents, 10 teachers, and 5 others.

As in the past, the field trips consisted of a half-day bus visit for about 50 students (2 classes) per day over a one week period to various parts of the refuge. At different stops students disembarked to learn about the geology of the area, marsh ecology, birds in general, raptors, waterfowl, snakes and other reptiles, and wildlife use of the cliffs and other habitat types. Also, the University of Washington blackbird researchers continued their cooperation with the program by again talking to the groups and demonstrating blackbird trapping and banding activities.

4. Interpretive Foot Trails

Use of the three established trails was light, but no effort was made to promote their use while development of the interpretive signs and trailhead sites is proceeding. Preparation of the signs fell behind schedule, but a 6-month extension of the Washington IAC contract was granted until July 1, 1991. At the recommendation of the regional office EPIC staff (Dick Kuehner, Glenda Franich, & Pete Weher),

following their field review in September, the marsh trail in Unit II was changed to form a loop around Pools 2 and 3.

The Frog Lake Trail, seen here looking back toward the west and Frog Lake, is one of three interpretive foot trails under development. This scenic trail interprets shrubsteppe and cliff habitats. 9/12/90 DEG

5. Interpretive Tour Routes

The 22-mile Rimrock to Wetlands Scenic Auto Drive, established in 1989, is a reality on paper and on the new porcelain-on-steel orientation signs which will be erected in early 1991, but it too has not been promoted to the public while signing is being completed. Hopefully, signing and incorporation into the maps of refuge leaflets will be completed in 1991.

7. Other Interpretive Programs

Prior to her transfer to Minidoka NWR in August, Assistant Manager Marti Collins organized several other interpretive activities. In addition to several off-refuge slide programs, local Earth Day, Take Pride in America, and Cub Scout and Boy Scout activities were organized. Particularly noteworthy was a request from Othello third grade teacher Cindy Lancaster on behalf of her class to do something for the refuge. In April Marti met with the class to talk about Earth Day and the Take Pride program, the problems of litter in America, and the need for recycling. A week later Mrs. Lancaster, 24 students from her class, and 6 others spent half a day on the refuge planting trees near the Blue Bird Camp and picking up litter from around the Hampton Lakes and McMannaman Lake parking areas.

8. Hunting

The 1990-91 hunting seasons opened at noon on October 13, 1990. The duck season was split with the first half ending on October 21, and the second half extending from November 4 through December 30. Pheasant season ended on December 31, quail and partridge on January 12, and goose season on January 20. Bag limits for upland birds and geese were the same as 1989. The four-duck bag limit could include not more than three mallards; not more than one hen mallard; not more than one pintail of either sex; and not more than two redheads, two canvasbacks, or one of each.

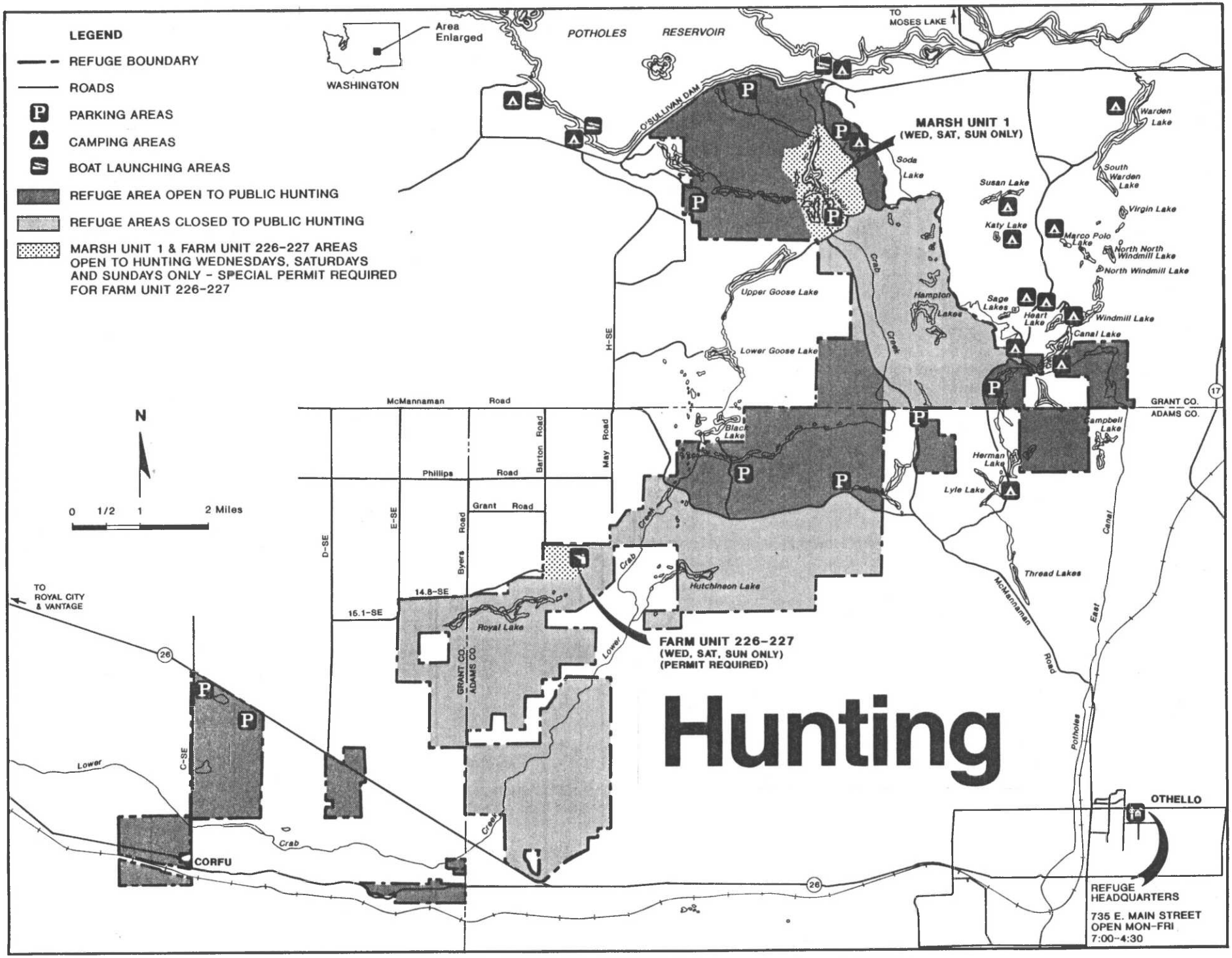
Weather conditions during the hunting season were quite mild. Warm, sunny days prevailed through October, and November also was warmer than normal. December was milder than normal for the first 18 days until an arctic front moved into the Columbia Basin, freezing most lakes and ponds for the remainder of the season.

Hunting success for waterfowl was good during the first two weeks of the season. It then tapered off to fair and finally to poor when the cold weather arrived in December. Waterfowl hunter visits were estimated at 1,125, slightly above 1989 (1,060). Total refuge harvest for the season was estimated at 920 birds, compared to 850 last year. Mallard, green-winged teal, widgeon and gadwall continued to be the main species taken.

The slight increase in hunter visits and birds harvested can be attributed in part to more hunters using the Marsh Unit I and Marsh Unit III areas. In 1990 Marsh Unit I waters were again maintained at normal levels and attracted a fair number of birds through most of the season. Marsh Unit III also attracted more birds during the hunting season because of the marsh rehabilitation project done during the spring.

The only significant goose hunting on the refuge occurs at the permit hunting area located at Farm Unit 226/227. There were 43 goose-hunting days for the season (Wednesdays, Saturdays, and Sundays only, excluding the first Saturday) and 3 blinds for each day, making a total of 129 permits available and issued. Each permit holder could bring one companion for a total of 258 potential permit hunters. A total of 1,290 applications were received. Of these, 50 were not included in the drawings either because they were duplicates, received late, or requested a non-hunt date, leaving 1,240 valid permit applications. This was similar to the 1989 total of 1,296 valid applications. Hunters using their permits had fair success in October and November and poor results for the remainder of the season. Based on bag checks and report cards returned from hunters, it was estimated that 220 hunters harvested about 80 geese and 10 ducks.

Approximately 320 upland bird hunters visited the refuge during 1990/91 season, compared to 1989's 530 and 1988's 2,310. The reduction can be attributed primarily to the continuing low pheasant production which resulted from another poor nesting season. Overall, pheasant populations were down throughout the Columbia Basin.


LEGEND
REFUGE BOUNDARY
ROADS
PARKING AREAS
CAMPING AREAS
BOAT LAUNCHING AREAS
REFUGE AREA OPEN TO PUBLIC HUNTING
REFUGE AREAS CLOSED TO PUBLIC HUNTING
MARSH UNIT 1 & FARM UNIT 226-227 AREAS OPEN TO HUNTING WEDNESDAYS, SATURDAYS AND SUNDAYS ONLY - SPECIAL PERMIT REQUIRED FOR FARM UNIT 226-227
Area Enlarged
WASHINGTON
POTHOLES RESERVOIR
TO MOSES LAKE
O'SULLIVAN DAM
MARSH UNIT 1
(WED, SAT, SUN ONLY)
Soda Lake
Susan Lake
Katy Lake
Warden Lake
South Warden Lake
Virgin Lake
Marco Polo Lake
North North Windmill Lake
North Windmill Lake
Windmill Lake
Canal Lake
Sage Lakes
Heart Lake
Hampton Lakes
Upper Goose Lake
Lower Goose Lake
Crab Creek
H-SE
McMannaman Road
Phillips Road
Grant Road
Barton Road
May Road
D-SE
E-SE
Byers Road
14.8-SE
15.1-SE
GRANT CO.
ADAMS CO.
Black Lake
Campbell Lake
Herman Lake
Lyle Lake
Thread Lakes
Hutchinson Lake
Royal Lake
Lower Crab Creek
FARM UNIT 226-227
(WED, SAT, SUN ONLY)
(PERMIT REQUIRED)
TO ROYAL CITY & VANTAGE
C-SE
CORFU
Crab Creek
McMannaman Road
East Canal
Potholes
OTHELLO
REFUGE HEADQUARTERS
735 E. MAIN STREET
OPEN MON-FRI
7:00-4:30
N
0 1/2 1 2 Miles

Hunting

Mule deer are the only big game species hunted on or near the refuge. The nine-day season (Oct. 13-21) has a small following, mostly by local hunters. It was estimated that about 10 hunters visited the refuge. However, there were no reports of deer taken on the refuge. With the low numbers of deer on the refuge and in the area, it is difficult to justify continued deer hunting on the refuge. The Washington Department of Wildlife, however, has been strongly opposed to closing the refuge to deer hunting.

Estimated costs to operate the 1990-91 hunting program for the Columbia Refuge were as follows:

Administration	$ 530.00
Posting/area preparation	1,400.00
Law enforcement activities	3,600.00
Hunt leaflets	816.00
Materials (signs, paint, etc.)	100.00
Vehicle use	1,100.00
	$7,546.00

9. Fishing

Fishing is by far the most popular public use activity on the refuge with approximately 154,422 visits in 1990. About 77,878 people fished for warmwater species and 76,544 fished for coldwater species. Combined, this was only 2,234 visits above 1989.

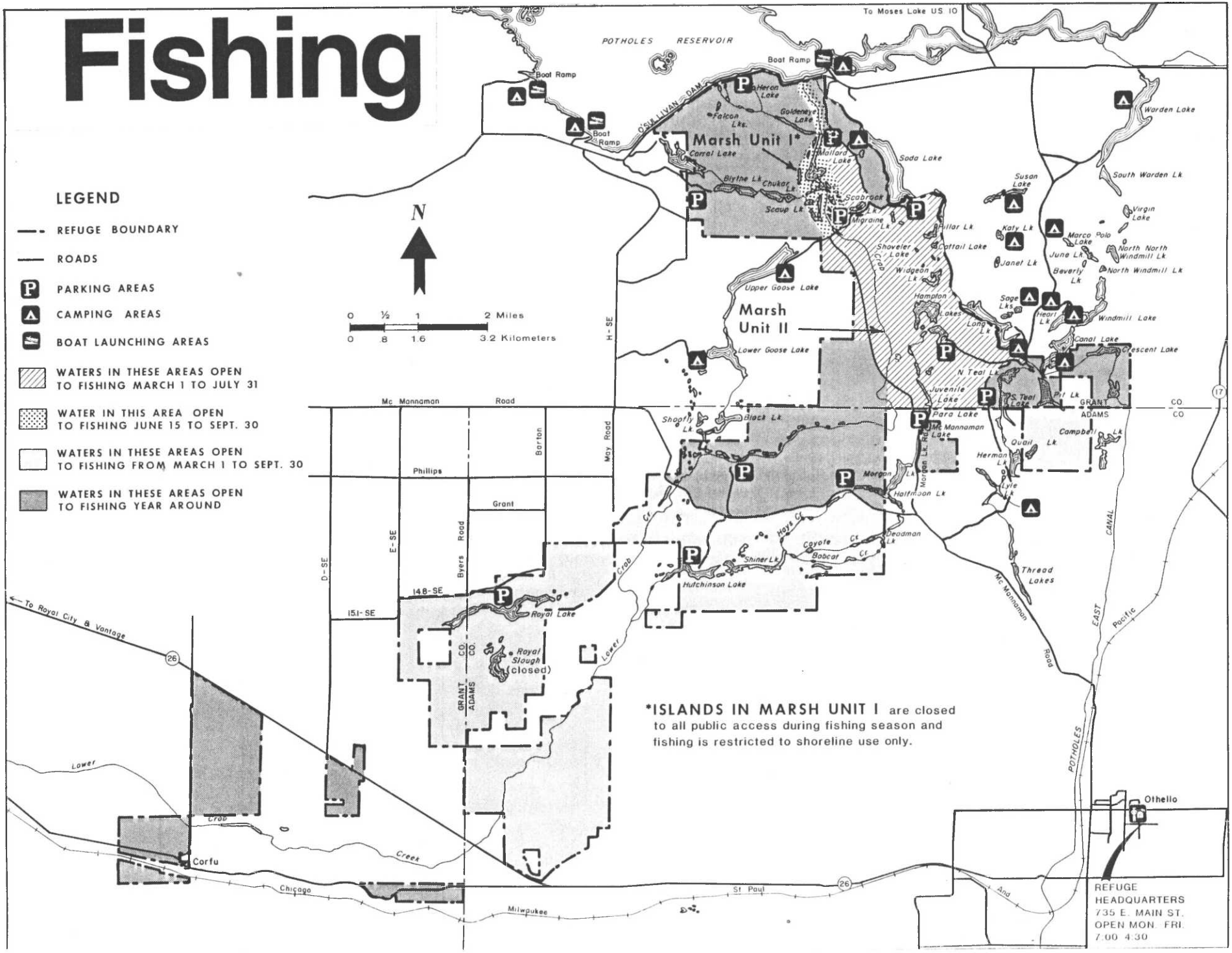
Fishing seasons are divided into year-round fishing, for areas of the refuge that are open to the public all year long, and a March 1 to July 31 or September 30 season for sanctuary areas. An exception is Marsh Unit I which opens June 15 to September 30 to protect nesting waterfowl. Rainbow trout are the main fish species in most refuge water, except for the Bobcat and Coyote Creek ponds, Hutchinson, Royal, and Shiner Lakes, where bass, crappie, and bluegill are the attraction. Thousands of fisherman also fish Soda Lake from the refuge for a wide variety of both warm and coldwater species, primarily perch, crappie, walleye, and trout.

This year ice fishing conditions were not favorable due to mild temperatures during January and February. Mild temperatures also prevailed for the March 1, Thursday opener on seasonal waters. Use on opening day peaked at approximately 550 anglers, up slightly from 400 in 1989 but still well below the more normal 1,500 for opening day in 1988. Angling for trout was good but dropped to fair by the end of the March, after heavy fishing pressure harvested most of the fish.

A breakdown of the costs associated with operating the fishing program in 1990 is shown below:

Administration	$ 250.00
Posting/area preparation	1,400.00
Law enforcement activities	3,200.00
Fishing leaflets	155.00
Materials (signs, paint, etc.)	150.00
Vehicle use	1,100.00
	$6,255.00

Fishing



*ISLANDS IN MARSH UNIT I are closed to all public access during fishing season and fishing is restricted to shoreline use only.

The first Saturday of the new trout season drew large numbers of fishermen as usual. Elimination of parking along the road approaching the Lower Hampton L. parking area has greatly improved access and reduced congestion. 3/3/90 DEG

Traditionally one of, if not the, most popular trout fishing lake in eastern Washington, Upper Hampton Lake is typically ringed with shore fishermen and covered with boats early in the season. 3/3/90 DEG

The improved parking area at Blythe Lake has also greatly reduced off-road vehicle trespass and habitat damage.

3/3/90 DEG

10. Trapping

Recreational trapping is prohibited on the refuge. Section G.15 discusses the removal of nuisance animals as a control measure.

11. Wildlife Observation

Although the refuge is not a major birding attraction, a fair number of people visit each year to observe and photograph wildlife, and they often stop at refuge headquarters for directions to the best areas. Unfortunately, 1990 had no particularly noteworthy wildlife anomalies to provide special attractions.

12. Other Wildlife Oriented Recreation

The Blue Bird Campground is a restricted use facility maintained in accordance with a provision of the original purchase agreement for use by scout and other organized groups. Among the groups that used the area in 1990 were a plant identification class and a bird identification class from the North Cascades Institute and a field ecology class from the University of Washington.

13. Camping

Soda Lake Campground is the only public camping area on the refuge and is the single most heavily used refuge site, primarily because of the associated fishing activity on Soda Lake. Use in 1989 was below normal

at 16,776 visits, partly due to temporary closure of the campground for rehabilitation work and partly due to reduced ice fishing due to mild weather. In 1990, however, use jumped back to 42,451 visits, the highest since 1987. Ice fishing activity was high early in the year, and rehabilitation work did not hinder later use. See Section I.2a for a description of the current rehabilitation activities.

14. Picnicking

Soda Lake Campground has the only organized picnic facilities on the refuge. Nine new sheltered picnic tables were erected during the year (see Section I.2a). Picnicking is not thought to be a destination activity on the refuge, but is a major use associated with the heavy fishing use on Soda Lake.

15. Off-Road Vehicling

All off-road vehicles are prohibited on the refuge, and the damage from illegal use has diminished over the last few years. Much of the decrease can probably be attributed to the apparent general decrease in popularity of small three and four-wheel ORVs in the area.

16. Non-Wildlife Oriented Recreation

With designation of the Drumheller Channels National Natural Landmark in 1986, the scenic values of the area have slowly gained greater recognition. These values are also being recognized in the refuge's development of the Rimrock to Wetlands Scenic Auto Drive, a 22-mile route that provides interpretation of natural features and a pleasant recreational drive.

During mild spring months with normal or above normal precipitation, the refuge's desert uplands burst forth in color with the bloom of native flowers, and many people are attracted to photograph and enjoy the scenery. Unfortunately, the spring of 1990 was a dud with few flowers, little green at all, and an early brown-out to summer.

Rock climbing, an increasingly popular activity in other parts of the country, is making its appearance at Columbia. With the high use of refuge cliffs by nesting raptors and other wildlife, this activity has the potential for considerable negative impact and will probably be prohibited.

17. Law Enforcement

The number of citations issued by refuge officers decreased from 48 in 1989 to 31 in 1990. This probably can be attributed to more patrol time spent on the refuge. The number of refuge regular patrol officers were also reduced from three to one by year end because of personnel moves. Enforcement activities included the usual weekly and weekend patrols made during the hunting and spring fishing season, and periodic patrols made during the rest of the year.

As in the past, refuge officers assisted Special Agent Dean Tresch from Spokane with enforcement activities on hunting clubs and other adjoining areas. This effort netted close to 20 additional citations while on these patrols. Assistance by refuge officers was reduced in 1990, however, because more time was spent by Agent Tresch in the Pasco, Richland, and McNary NWR areas.

The following table shows the nature of cases made in 1990 compared with 1989. Some of those listed such as fishing closed waters, were referred to the local Washington Department of Wildlife agent for disposition. All other cases were prosecuted in federal court.

Violation	1990	1989
Lead shot possession	3	16
Overlimit (pintail; mallard hen)	-	1
No federal duck stamp	4	3
No state duck stamp	2	4
Illegal take (swan; hen pheasant)	-	1
Unplugged shotgun	1	-
Late shooting	-	2
No hunting license	1	2
Hunting closed area	2	-
Trespass closed area	2	-
Fishing closed waters	8	1
No fishing license	1	3
Use of spinning equipment at Quail Lake	-	3
ORV use/driving off roadway	-	3
Unauthorized parking	5	2
Unauthorized camping	1	-
Illegal vehicle use	-	1
Unauthorized vehicle	-	1
Vehicle trespass	1	1
Destruction of government property	-	2
Leaving scene of an accident	-	1
No falconry permit	-	1
TOTALS	31	48

Other items of interest involving law enforcement included a farm tractor that was found by a refuge officer October 10 almost submerged in Halfmoon Lake. Upon further investigation, it was discovered that the tractor had been stolen from Othello Tractor Salvage on October 5. The tractor had been driven from Othello to the turn-off at Halfmoon Lake, then west around a dry wetland before being driven into the west end of the lake. The used Massey Ferguson tractor was being sold on consignment when stolen. The incident was handled by the local police authorities. No apprehension has been made to date.

Another incident occurred on November 7. The maintenance staff, while spraying roadsides north of the Marsh Unit II trailhead parking area, discovered fresh evidence of a deer poaching incident. Evidence revealed that the poacher had killed one deer and loaded it up into a vehicle. A fresh blood trail leading away from the area indicated a second deer was also wounded but was not recovered. No apprehension has been made yet in this case either.

Vandalism is still the most frequent violation on the refuge, but the violators are rarely caught. At least this was done by a happy vandal. 5/11/90 DEG

For the second time in recent years (also 1987), a piece of equipment was stolen locally, driven off-road around the refuge, and then abandoned. This tractor was stolen in Othello and was later run into Halfmoon Lake. 10/10/90 DEG

Fortunately, the tractor was a newer model with sealed fuel and lubrication systems and a maintenance-free battery, and there was no evidence of water contamination. 10/11/90 RWH

I. Equipment and Facilities

1. New Construction

a. Royal Slough Experimental Fish Screen

Operational progress of the 1990 fish screen testing is described in Section G.11 of this report. Earlier construction details of the screen structure itself are found in the 1989 Narrative Report, Section I.1. Wetlands construction to form Marsh Unit IV is described in the 1988 NR, Section I.1; and a description of the siphon construction is in the 1987 NR, Section I.1.

In 1990 the experimental fish screen structure was moved to screen the water directly from the siphons, thus eliminating the variables associated with the small stilling pond that was created between the siphon outfall and the screens. Prior to moving the structure, the fixtures shown in the accompanying photograph were constructed on the ends of the siphons to help block the seepage of air back up the siphons. This allows restriction and regulation of the siphon flow without loss of prime at less than full flow. In addition, an old boiler tank was installed to dissipate the force of the water coming out of the siphon before it enters the screen structure. Both the air blocks and the stilling tank worked as intended.

To help block the seepage of air back up the 850' siphons and prevent the resulting loss of prime, the blue fixtures shown above were installed. The air blocks also allow regulation of the water flow with the valves at upper right. Previously, the siphons could only by operated at full flow. 5/10/90 DEG

b. <u>Drumheller Channels NNL Interpretive Site</u>

Field work began on this project in 1989 with site planning and layout and construction of a parking area, a foot trail to the interpretive site, and the concrete footing and slab for the interpretive structure (see 1989 NR, Section I.1c). At that point field work was suspended for the winter. In the late spring of 1990, after completion of Marsh Unit II and III rehabilitation projects, work began on construction of the block core for the stone masonry interpretive structure. The onset of hot summer weather, however, delayed the stone masonry work until fall, when about 60 percent of the masonry was completed before freezing temperatures again forced shutdown. During the interim, the porcelain-on-steel interpretive and public orientation signs were completed and received from the contractor, Winsor Porcelain Enamel Display Incorporated of Olympia, Washington.

Actual construction of the Drumheller Channels NNL interpretive site finally started with construction of the block core. A clay model is visible on the first blocks. 5/8/90 DEG

Sign supports were added and the entire structure will be faced with basalt stone masonry. 5/30/90 DEG

Masonry walls are also being constructed at the entrance to the site from the parking area. (Val's water bottle with a beer label is just to wet the rock.) Unfortunately, the onset of cold weather prevented completion in 1990. 10/24/90 DEG

c. Interpretive Foot Trails (1989-90 NOVA)

Delays in preparation of the site plans and the interpretive signs forced a six-month extension for completion of the project until July 1, 1991. At year's end we are awaiting both from the regional office.

d. Miscellaneous

A parking area measuring approximately 100' x 40' was constructed off Morgan Lake Road next to Crab Creek at the service road entrance to Marsh Unit II. A heavy rock base was laid down and covered with several inches of crushed gravel, and the area was bordered with large basalt boulders. The parking area serves mainly fishermen walking in to Lake Marie and the north end of Juvenile Lake.

2. Rehabilitation

a. Soda Lake Campground (1989-90 NOVA)

An effort was made in 1980 to eliminate camping in its entirety from Columbia NWR. At the time, there were five designated campgrounds on the refuge, and they were an immense operational liability. The Washington Department of Wildlife, anticipating a heavy increase in use of their neighboring campgrounds, objected strongly. As a compromise, it was decided to close four of the campgrounds but to retain the Soda Lake Campground, because the lake itself is off the

refuge and use of the campground has little wildlife impact. It was also decided that the Soda Lake Campground would be rehabilitated to bring it up to Fish and Wildlife Service standards. No funds were forthcoming for the project from the Service, but in 1988 outside funding was secured from the Nonhighway Road/Off-Road Vehicle Activities Program (NOVA) of the Washington Interagency Committee for Outdoor Recreation (IAC) (see 1988 NR, Section E.5). Some rehabilitation work was completed earlier, but the project did not make significant progress until late 1988 and 1989 (see respectively 1988 NR, Section I.2; and 1989 NR, Section I.2a).

In 1990 nine 8' x 12' concrete slabs were poured and nine new sheltered picnic tables were erected. A tenth covered table is being held in reserve. The new facilities were purchased with IAC NOVA funds and replaced four deteriorated shelters removed in 1989. The new tables and shelter frames are metal and should be more durable and vandal resistant. Concrete slabs and privacy screens for the chemical toilets will be constructed in early 1991. A porcelain enamel refuge orientation sign was received from the contractor and will also be erected in 1991.

b. <u>Marsh Unit II Dikes</u>

After a couple years of good intentions but interrupting priorities, in 1990 the dikes for Pools 2 and 3 in Marsh Unit II (approximately 2,300') were finally reshaped and raised, and the dike tops were graveled. Ditches through the impoundments were also cleaned out and reshaped, and encroaching cattails in Pool 3 were disked under after the pools were burned (see Section F.9a).

After two years of delays, dikes in Marsh Unit II were finally reshaped and raised, dike tops were graveled, drainage ditches were cleaned, and cattails were disked back. 3/1/90 DEG

c. Marsh Unit III

In 1988 much of the water diversion channel in Marsh Unit III was cleaned out, but the east end was skipped due to potential conflict with that year's University of Washington red-winged blackbird research study. In the spring of 1990, the impoundments were drained and Pools 2-4 were burned off (see Section F.9a). The diversion channel to and through Pools 3 and 4 was then cleaned out (Pool 2 remained too wet due to seepage from springs), and the main basins of the two pools were deepened using the refuge's D-5B low-ground-pressure crawler/dozer. About 1,500 cubic yards of muck and cattail roots removed from the two pools was loaded, trucked, and dumped as backfill in the marsh Unit III gravel pit.

Too soft to walk, too thick to swim! The low ground pressure capability of the refuge's D-5B proved its value during rehabilitation of Marsh Unit III impoundments. 3/21/90 DEG

Over the years, encroaching vegetation mats nearly choked out the unit's shallow impoundments. About 1,500 cubic yards of muck and roots was removed from Pools 3 and 4. 3/30/90 DEG

The cleaned impoundments are still too shallow, but significant additional improvements would require a major design overhaul and reconstruction of the entire marsh unit. 3/30/90 DEG

3. Major Maintenance

a. Roads

The refuge has an extensive system of more than 50 miles of graveled roads, 19 graveled parking areas, and one campground with several large graveled areas that require regular maintenance. The 11.5 miles of public road are bladed at least once each spring and fall when moisture conditions are best. Increasingly, some heavily used sections of both public and service roads must receive extra attention as gravel wears thin and dust holes develop or as corduroy conditions become excessive. In addition to routine blading, three weeks were spent during the summer replenishing gravel, watering, and blading deteriorated portions of Morgan Lake Road and part of the Teal Lakes Road. Repeated efforts to date have been unsuccessful in securing the funding necessary to properly rehabilitate the roads.

The deteriorating condition of refuge roads requires increasingly great amounts of time spent annually on repair and maintenance. The 11.5 miles of refuge roads regularly used by the public was constructed using refuge pit-run gravel, none of which was crushed. The rounded refuge rock does not bind well and has a tendency to wear off to the sides of the road. This would not be as much of a problem in an area of year-round rainfall, where timely maintenance is practical, but at Columbia the highest normal rainfall for the months of March through October is .65 inch with an average of only .47 inch. Normal total rainfall for this 8-month period is 3.76 inches compared with normal evaporation in excess of 50 inches for the same period.

What this means is that there is very little moisture in the gravel surface during the time when use is heaviest and when regular maintenance is most needed. As a result, blading of the roads is only practical during early spring and fall. When repair and maintenance is needed during the dry months, water must be hauled and spread to work the gravel and get the fines (small grained materials) to help bind the coarse material. This makes the dry season work very costly, because the portion of the road used for hauling of the repair gravel must also be watered to keep it from breaking up under the heavy loads. Unscheduled road repair work also delays or forces abandonment of other planned activities and wreaks havoc with schedules, because the needed repairs cannot be ignored.

The solution to this degenerating situation is to bite the bullet and regravel the roads properly with crushed gravel that will bind and hold together through the driest part of the year with minimal blading and raking. In the process, the roads would be widened where needed, and combined with the better road surface, safety conditions would be significantly improved. There are several good refuge locations where a crusher could utilize coarse gravel deposits to make the crushed material needed. At the best location,

in Marsh Unit II, the removal of crusher rock could be done in such a way as to increase the size of Pool 4, leaving no remnant pit.

b. Miscellaneous

Several other significant maintenance activities were also completed:

-- The water line for the subheadquarters farm unit irrigation system ruptured at the tee connection for the shop area fire hydrant. A temporary repair was made to continue operation of the irrigation system, but the repair necessitated bypassing the hydrant. In the future the hydrant will be relocated down the hill, between the pumphouse and the carpenter shop.

-- The old, metal septic tank at the refuge subheadquarters corroded to the point where the top partially caved in. It was replaced by a contractor with a new 1,000-gallon concrete tank.

-- Beaver activity necessitated periodic checks of water control structures and culverts to prevent washouts of roads and dikes. The problem was more aggravated in some areas in 1990, because trapper Del Kramer was out of action for awhile following an operation early in the year (see Section G.15).

4. Equipment Utilization and Replacement

a. New Accessions

After cutting spending and holding back funds to cover expected moving costs for the new refuge biologist, the move cost less and funds were available late in the year to purchase some needed equipment and supplies. New equipment purchased included a 12-foot aluminum boat, 9.9-horsepower motor, and trailer ($2,423) primarily for use in purple loosestrife control; a mortar mixer ($2,018) for stone masonry work (monthly rental costs would have almost equaled the purchase cost); a new pump and engine ($1,464) for the fire unit on loan to the rural fire district at Mattawa; four new seismic traffic counters and accessories ($1,628); and 75 new Best padlocks ($1,618).

b. Dispositions

Several items have become excess to refuge needs but none were disposed of in 1990.

c. GSA Fleet

Two 1984 Chevrolet 4x2 pickups were returned to GSA in exchange for two new 1990 Dodge 4x2 pickups.

d. **Modifications**

In 1989 the 1975 International Cargostar was converted to a water truck with the addition of a 2,000-gallon tank (see 1989 NR, Section I.4d). In 1990 the truck was further modified with the addition of fittings and pipes to permit drafting to fill from available water sources in the field.

e. **Equipment Maintenance**

Several maintenance needs deferred from 1989, and others arising in 1990 were accomplished.

-- Caterpillar D-5B Worn out partial rock guards were replaced with full-length roller guards, the brakes and parking brake were adjusted, and a broken window was replaced for a total of $4,119.

-- Mack 10-yard Dump Truck Air brakes were repaired ($332) and the eight drive tires were replaced ($888). Refuge personnel also sandblasted the dump box and completely repainted the truck.

-- John Deere 670A Motor Grader The four drive tires were replaced for $1,161.

Acquired from the BLM in 1986, this 1974 Mack truck was a worn-looking, orange beast. The truck has proven its worth, however, and during the winter the refuge crew refurbished it with new paint and tires and needed repairs. 2/2/90 DEG

-- 1975 International Water Truck The auxiliary water pump and motor were replaced for $215, and four new tires (acquired in trade for the grader tire hulls) and two tires removed from the Mack dump truck were installed.

-- Ford 555 Backhoe/Loader Tractor The front wheel king pins were replaced for $102.

5. Communication System

Two Bendix/King programmable, hand-held portable radios with leather carrying cases, battery chargers, speaker microphones, and extra alkaline battery packs were purchased with fire funds. Exchange of the two GSA vehicles discussed in Section I.4c necessitated dismounting and remounting the respective radios.

6. Computer Systems

The refuge's computer capabilities were greatly improved with the addition of two more computer systems and three inkjet printers. The following equipment was purchased for a total cost of $5,804.

2 Uniq 286 dual speed microcomputers with 40mb hard disk drives, Orbit VGA graphics boards, Acer multisync color monitors, and WordPerfect 5.0 and Direct Access software packages

2 Datashield P-125 power monitors

3 Hewlett Packard DeskJet 500 inkjet printers

1 Grolen workstation

The new equipment has eliminated the wait for use of what was formerly the refuge's only computer, and it has greatly improved the efficiency of those who now have ready access to a machine and can eliminate much paper and pencil work. The quiet and compact inkjet printers are a big improvement over the noisy pin-type printers and provide consistently high quality output without the problem of fading print quality due to wearing ribbons.

J. Other Items

3. Items of Interest

As reported in past Annual Narrative Reports (to some degree in almost every report), the ongoing problems with the Michel Family, primarily Dwayne Michel, continue to plague the refuge. Efforts to summarize the history of Michel abuses against the refuge and formulate strategies and actions to resolve the long-standing problems required an excessive amount of time in 1990. A detailed history of Michel problems was prepared, and in January the Regional Director and regional Refuges and Wildlife personnel were briefed. Following the briefing process, proposed recommendations and strategies to deal with the nine primary

While preparations go on to deal with the Michel issues, cattle trespass (the most chronic issue), if not blamed on the refuge, is always blamed on someone else. Still, ... 6/20/90 DEG

... this gate to the Michel inholding in Section 24 near Royal Lake was not left open by refuge personnel, or fishermen, as Michel claimed. 6/20/90 DEG

issues/problems were prepared, and a substantial package with detailed references and maps was submitted in September for regional staff and solicitor review. Then, on December 5-6, Regional Director Marv Plenert, Assistant Regional Director John Doebel, and Associate Manager Sandy Wilbur visited the refuge to personally review the problems, and the RD and ARD met with Dwayne Michel to hear his "concerns." At the end of the year, nothing had been finalized, and we are still waiting for a completed review of the particulars from the Regional Solicitor.

Meanwhile, the Michels remained active and increasingly flagrant in their abuse of the refuge. In addition to several cattle trespass incidents, 1990 abuses included the following:

-- There was a repeat of a 1989 incident where a Michel tractor, pulling a tooth-wheeled packer, drove cross country on the refuge through old sagebrush stands for several thousand feet. In September of 1990 the same thing happened again. In the first incident the equipment was driven through a gate in the refuge fence where a locked chain had been cut. In the second incident the refuge fence was cut and left down. A few days later, the chain on the nearby refuge gate was cut again, and a Michel lock was inserted, even though the neighboring property belongs to the Para Family and not the Michels.

-- In October Viola Michel (Dwayne Michel's mother) and one of the Michel employees drove a tractor and pickup several hundred yards off a refuge road and took down a refuge fence to construct a hunting blind next to the refuge boundary.

-- Hunting parties, apparently organized through affiliation with the Carnation Company, were again allowed by the Michels to hunt their 160-acre, Section 24 inholding property in the midst of the refuge's Royal Lake/Marsh Unit IV sanctuary area. This is contrary to a written 1972 agreement between Viola Michel and the refuge following a major hunting controversy at that time. Hunters can reach the area only by passing through refuge lands posted closed to all entry. Dwayne Michel first tried to have refuge personnel arrested for interfering with the Michel "rights" of access in 1989 (see 1989 NR, Section J.3) and claimed the 1972 agreement still allowed the Michels and their "guests" to hunt on the inholding. During the December meeting with Regional Director Plenert, however, Dwayne Michel (from RD Plenert's notes) "said that he went along with no hunting in Sec. 24 til we changed grazing & kicked him off refuge - didn't feel obligated to keep hunters out anymore."

Because of the sensitivity of the preparations underway to seek a "permanent" solution to these problems and others, these abuses of the refuge and violations of refuge regulations were not prosecuted as they could have been. Hopefully, this situation will change in 1991, because as of this writing, two more equally blatant abuses (one from the fall of 1990 and one current in 1991) are being dealt with now.

A more blatant violation was a repeat of a 1989 trespass with a tractor pulling a tooth-wheeled packer. Rather than load the equipment on a truck, a refuge fence was cut and the tractor was driven cross-country. A refuge gate is located in front of the parked van. 9/26/90 DEG

The fact that the neighboring property belongs to the Para Family and not the Michels doesn't seem to matter either. 9/26/90 DEG

When Michel found the trail too rough for the packer he was pulling, he simply drove off through the sagebrush, ...
9/26/90 DEG

... leaving a permanent scar that will last many, many years.
9/26/90 DEG

A few days after refuge personnel repaired the cut fence, a Michel lock was found inserted in the chain of the nearby gate. 10/9/90 DEG

Yet another indication of disregard for refuge property, was a Michel off-road trespass to reconstruct a hunting blind just across the fence on Michel property. 10/22/90 DEG

Here a Michel vehicle is on refuge property while Viola Michel and one of her hired men work on the new blind only a few feet from the refuge boundary. 10/22/90 DEG

At least in this case the fence was only taken down from the stretch post instead of being cut. 10/22/90 DEG

During a fact finding tour and review of the numerous Michel problems, (l.-r.) RD Marv Plenert, ARD John Doebel, and AM Sandy Wilbur inspected the new hunting blind in the NE corner of the Michels' Section 24 inholding near Royal L. 12/5/90 DEG

4. Credits

Preparation of this report was as follows:

Goeke	Sections A; C; D (except 5); E.1,5,8; G.11a; H.1-7,11-16; I; J; Photo Captions; Maps
Coykendall.	Sections B; E.6; F; H.8-10,17
Hill.	Sections D.5; E.2-4,7; G

The report was edited by Goeke, and for the first time most of the original writing was done on computers, vastly improving the completion process. Cas Garza provided technical assistance and helped with word processing and production.

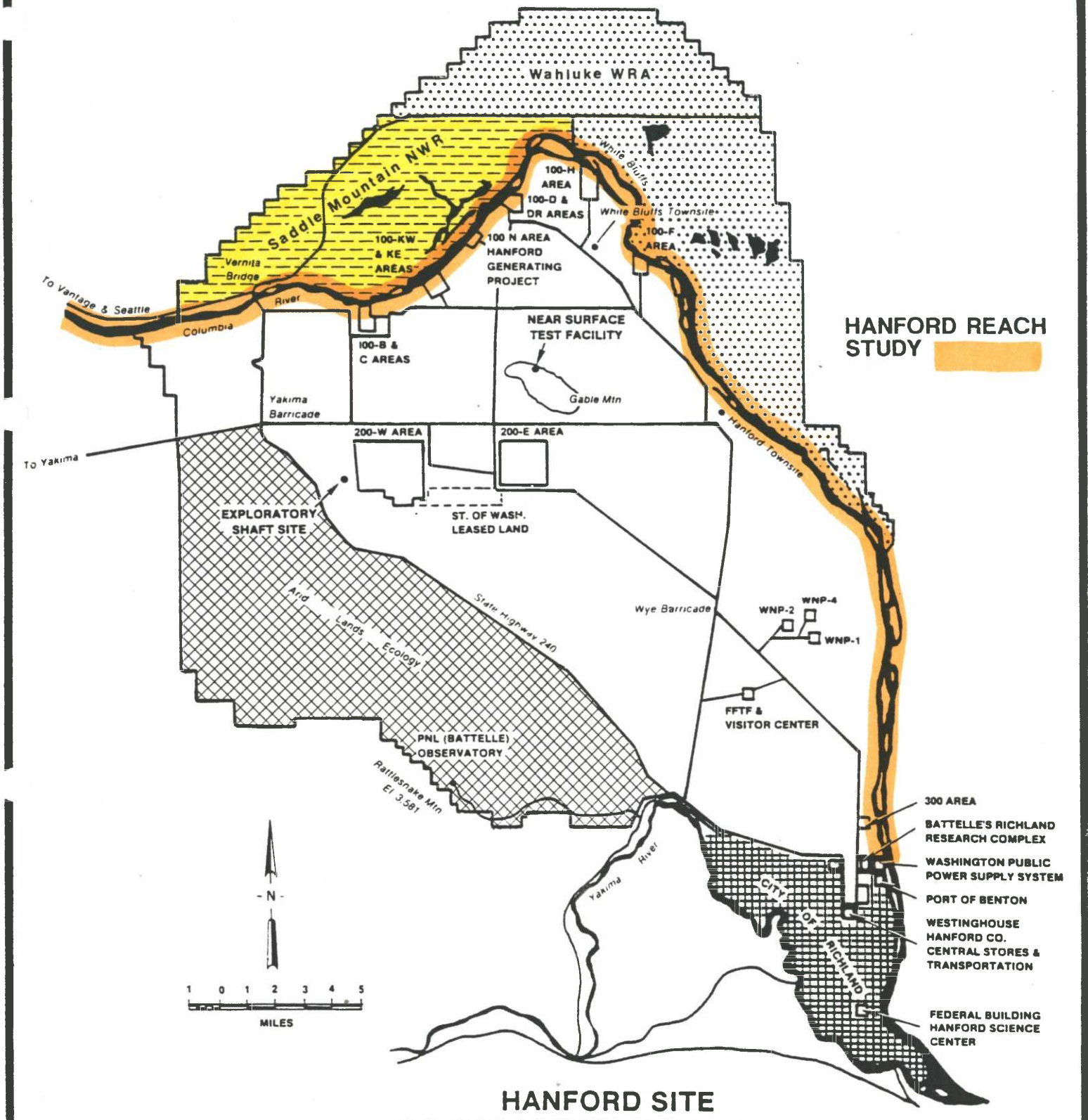
SADDLE MOUNTAIN NATIONAL WILDLIFE REFUGE

Othello, Washington

ANNUAL NARRATIVE REPORT

Calendar Year 1990

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM



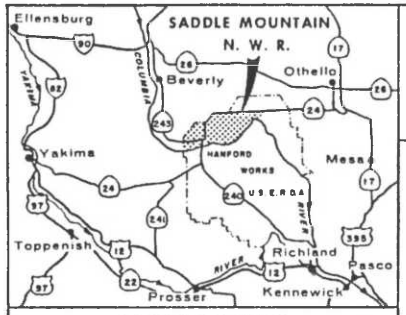
HANFORD SITE
U.S. DEPARTMENT OF ENERGY
570 sq. miles

SADDLE MOUNTAIN NATIONAL WILDLIFE REFUGE

GRANT COUNTY, WASHINGTON

UNITED STATES
DEPARTMENT OF THE INTERIOR

UNITED STATES
FISH AND WILDLIFE SERVICE



LOCATION MAP

0 5 10 20 30
SCALE IN MILES

R 24 E 119° 45' R 25 E 119° 40' 119° 35' R 26 E 119° 30' R 27 E

T 15 N

T 14 N

T 13 N

46° 45'

46° 40'

Wahluke Wildlife Recreation Area
(Washington State Game Dept.)

(UNDER CONSTRUCTION)

Saddle Mountain

Wasteway

Saddle Mountain Lake

Pond 1

Pond 2

Pond 3

Grant County

Benton County

COLUMBIA RIVER

HANFORD WORKS
(E. R. D. A.)

WILLAMETTE MERIDIAN

COMPILED IN THE DIVISION OF REALTY
FROM SURVEYS BY B.L.M., U.S.G.S., F.W.S.

20° 30'
MEAN

INTRODUCTION

TABLE OF CONTENTS

J. OTHER ITEMS

INTRODUCTION

The view northwest across the refuge, the Columbia River, and the dramatic White Bluffs, a formation known for its Miocene vertebrate fossils which include camel, bison, bear, and rhinoceros. 8/31/89 WRR

The 30,180-acre Saddle Mountain National Wildlife Refuge lies adjacent to approximately 18 miles of the last free-flowing stretch of the Columbia River east of Mattawa in eastern Washington's Grant County. This shrubsteppe region is characterized by low precipitation and seasonal temperature extremes. Dominant vegetation includes big sagebrush, Sandberg's blue grass, cheatgrass, and gray rabbitbrush. One of only three cactus species native to the state, *Opuntia polyacantha*, is also present on the refuge. The refuge lies at an elevation below 900 feet, and has very little vertical relief other than the noteworthy White Bluffs.

Prehistorically, the area was used by the Wanapum Indians, who lived along the shoreline of the Columbia River and subsisted primarily on salmon. Archaeological investigations have also identified the numerous bones of bison and pronghorn, indicating food sources which are no longer present in this part of Washington. Most of the river has been impounded behind dams, inundating land and destroying archaeological sites. However, that part of the river which is adjacent to Saddle Mountain NWR has been little impacted, and the refuge contains over 17 valuable archaeological resources ranging from large village sites to burial grounds. Some of these sites have been nominated for inclusion on the National Historic Register.

Historically, David Thompson explored the main Columbia in the early summer of 1811, and visited Priest Rapids just upstream from the present refuge. Saddle Mountain NWR encompasses lands which at one time contained major pioneer travel routes, several homesteads, water pumping stations, and associated canal systems used to irrigate extensive agricultural tracts at the settlements of Haven, Mitchell, and Wahluke.

More recently, lands now encompassed by the refuge were used by the military during and after World War II to develop and defend the Hanford Nuclear Reservation. The military condemned this property in March of 1943, and residents had as little time as 2 weeks to evacuate their homes and farms. The military abandoned the site shortly after 1960, but the refuge contains remnants of anti-aircraft installations, radar establishments, underground Nike missile deployment sites, and motor pool facilities.

Because of its location within the security zone of Hanford's N Reactor, the area encompassing the refuge is closed to public entry, and has been closed to access and authorized grazing for 45 years, rendering it unique from surrounding public lands. Saddle Mountain NWR has been administered as a satellite of Columbia NWR since November 30, 1971, under a permit from the U.S. Department of Energy (DOE). Facilities on the Hanford Site are currently used for research, commercial nuclear energy production, production of titanium and plutonium, and nuclear waste disposal.

Saddle Mountain NWR was established "for the development, advancement, management, conservation, and protection of fish and wildlife resources." A primary objective of the refuge is to provide habitat and protection for wintering waterfowl. Other objectives on Saddle Mountain NWR are: (1) to provide important habitat and protection for at least 38 endangered, threatened, sensitive, and state wildlife Species of Special Concern along with nine rare plant species, (2) to manage aquatic habitats for production of waterfowl, (3) to preserve the environment of the refuge in a natural condition, (4) to protect all archaeological sites from vandalism and unauthorized exploration, and (5) to provide and encourage use of the refuge by universities for study of the natural environment.

A. Highlights

The Wild and Scenic River Study of the Hanford Reach, authorized by Congress in 1988, is winding up and could lead to enlargement of Saddle Mountain NWR to include the entire 51-mile Reach and an area of about 95,000 acres. (Section D.3)

B. CLIMATIC CONDITIONS

Calendar year 1990 was the fifth consecutive year with above-normal temperatures, and with two weeks remaining in December, was on track to become the warmest year on record. An arctic outbreak beginning on December 19, however, ended that possibility. The average temperature for the year still ended up at 55.6° F, 2.4° above normal and the fifth warmest year on record.

Precipitation for 1990 totaled 5.07 inches, 81 percent of normal (6.25 inches). Calendar year snowfall totaled 7.4 inches, 6.1 inches of which fell during December, compared to a yearly normal of 13.7 inches.

Most people will remember 1990 for its wind, and although the average speed of 8.1 mph was only .4 mph above normal (7.7 mph), the number of days with gusts greater than 40 mph and 50 mph were the most on record. Seven months during 1990 recorded wind gusts over 50 mph. Several of these high wind events were accompanied by dust, causing reduced visibility.

Weather Summary 1990*

	Temperature (°F)						Precipitation (In.)		
Month	High	Low	Ave. High	Ave. Low	Ave.	Depart	Total	Normal	Depart
Jan.	60	22	48.3	32.6	40.4	10.3	.77	.97	-.20
Feb.	64	9	47.9	27.4	37.6	- .2	.09	.56	-.47
Mar.	76	24	61.3	34.8	48.0	3.6	.10	.40	-.30
Apr.	81	37	71.4	44.4	57.9	5.6	.40	.39	.01
May	94	39	72.9	48.5	60.7	- .6	.86	.53	.33
June	96	47	83.5	56.7	70.1	.8	.36	.45	-.09
July	110	46	95.2	66.4	80.8	4.2	.14	.16	-.02
Aug.	108	52	90.4	63.2	76.8	2.2	.83	.29	.54
Sept.	98	48	88.5	56.3	72.4	6.2	T	.29	-.29
Oct.	80	31	64.1	40.5	52.3	- .8	.78	.46	.32
Nov.	68	26	55.7	37.3	46.5	7.0	.02	.80	-.78
Dec.	57	-12	32.1	16.1	24.1	-9.0	.72	.95	-.23
Annual	110	-12					5.07	6.25	-1.18

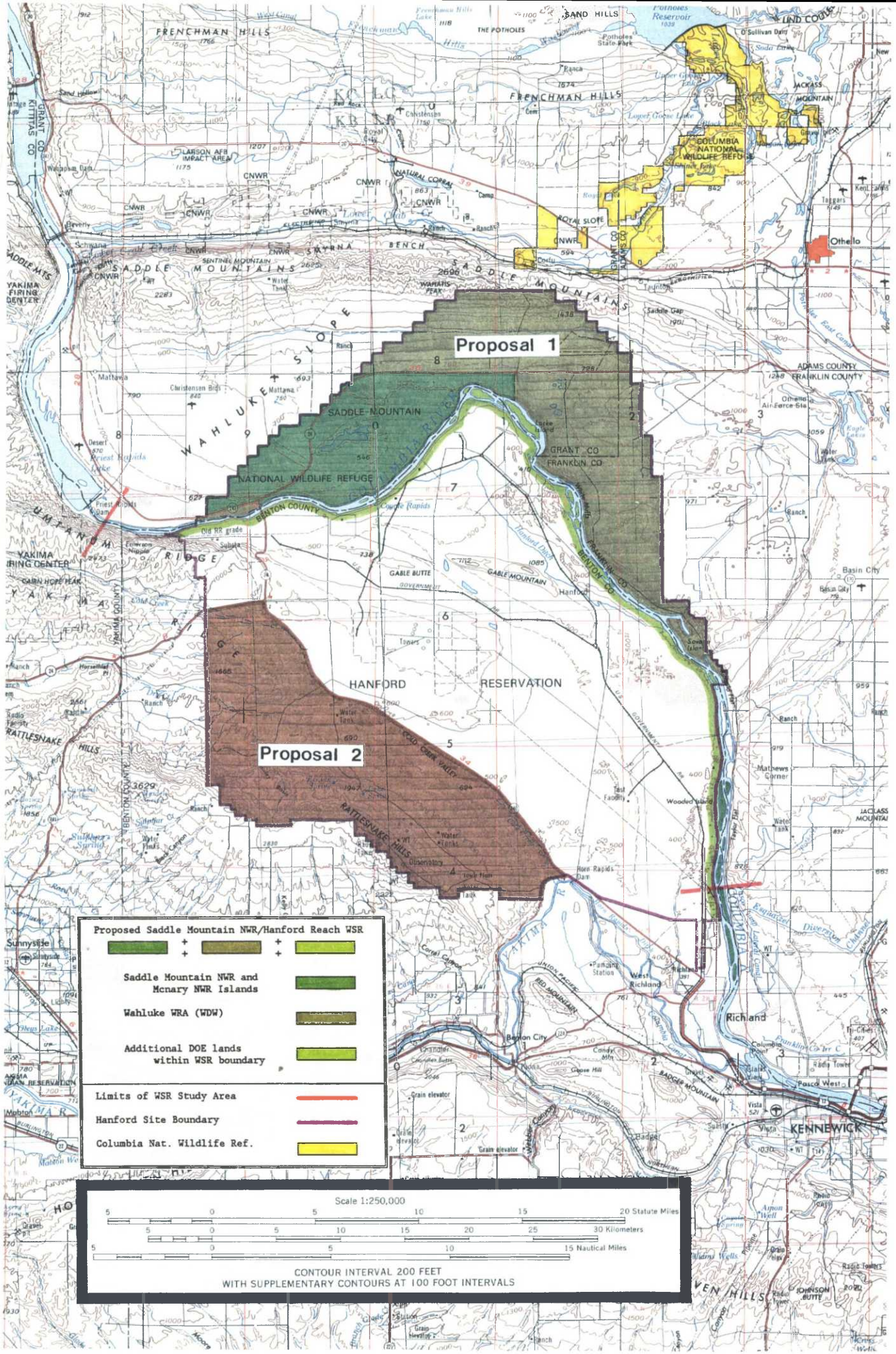
* Weather station located on the Hanford Site.

D. Planning

3. Public Participation

Since early in 1989, Columbia NWR personnel have been actively participating in a comprehensive study intended to permanently protect the Hanford Reach of the Columbia River. The Hanford Reach is a 51-mile section of the Columbia River extending from one mile below Priest Rapids Dam downstream to the McNary Pool north of Richland, Washington, and is the last free-flowing section of the river in the United States. The study process is progressing toward potentially very significant changes for Saddle Mountain NWR, so a detailed description of activities to date is warranted. A map of the area showing Saddle Mountain NWR, the Hanford Reach, and adjacent management areas, is on the following page identified as "Proposal 1." (This map is adapted from an earlier effort, and the area identified as "Proposal 2" is the Rattlesnake Hills Research Natural Area, a separate issue for future consideration.) As a background to current activities, the following is reprinted from the "Hanford Reach News," an update (Winter, 1989) on the Hanford Reach Study by the National Park Service.

> ***About the Hanford Reach*** *- While the Hanford Reach Study officially began in 1988 with the passage of a law directing the study, its origins go back more than twenty years. In the mid-1960s, the Ben Franklin Dam was proposed on the lower reaches of the 51-mile segment of the Columbia River. Many agencies and organizations reacted with concerns about environmental damage and suggested giving the Hanford Reach permanent protection from dam development. The outcry over the project caused the Army Corps of Engineers to suspend action on the Ben Franklin Dam in the early 1970s. With the suspension of the project, the initiative for permanent protection of the reach waned.*
>
> *In 1987, the Army Corps of Engineers began the public scoping process for the Mid-Columbia Navigation Study. The study was investigating the possibility of developing a series of barge lifts and dredged channels through a large segment of the middle Columbia River, including the Hanford Reach. Again, agencies and organizations reacted with objections and renewed calls for permanent protection of the Hanford Reach. The Army Corps of Engineers again suspended their project, but not before a coalition of public agencies and private organizations succeeded in getting Congress to authorize a study of protection alternatives for the Hanford Reach.*
>
> *In November,1988, Congress passed Public Law 100-605, which directs the Secretary of the Interior, in consultation with the Secretary of Energy, to conduct a "comprehensive river conservation study" of the Hanford Reach. The act directs the agencies to evaluate the natural and cultural resources, scenery, and recreational activities of the reach and investigate alternative strategies for the protection of important values. The study will be completed in November, 1991, with the presentation of a study report to Congress.*


Proposal 1
Proposal 2
SADDLE MOUNTAIN NATIONAL WILDLIFE REFUGE
HANFORD RESERVATION
COLUMBIA NATIONAL WILDLIFE REFUGE
SADDLE MOUNTAINS
WAHLUKE SLOPE
FRENCHMAN HILLS
SAND HILLS
YAKIMA RIDGE
RATTLESNAKE HILLS
Othello
Richland
KENNEWICK
Proposed Saddle Mountain NWR/Hanford Reach WSR
Saddle Mountain NWR and Mcnary NWR Islands
Wahluke WRA (WDW)
Additional DOE lands within WSR boundary
Limits of WSR Study Area
Hanford Site Boundary
Columbia Nat. Wildlife Ref.
Scale 1:250,000
5 0 5 10 15 20 Statute Miles
5 0 5 10 15 20 25 30 Kilometers
5 0 5 10 15 Nautical Miles
CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS

The act also establishes rules for the development of new projects and the operation of existing projects along the reach for a period of eight years (until November, 1996). Major projects such as the dam and navigation developments proposed for the reach are specifically prohibited. Other new projects are subject to review by the Secretary of the Interior to ensure that the important values of the Hanford Reach are protected.

The study began with a scoping process which identified issues that the public wants to see addressed in the course of the study. The resource assessment is currently being conducted and is scheduled for completion in February, 1990. The consideration of protection alternatives and environmental analysis will follow, with a draft study report and environmental impact statement due for public distribution in early 1991.

Because so many agencies, organizations, and individuals are concerned about the future of the Hanford Reach, the study process emphasizes public information and participation. Public meetings, newsletters and updates, and press releases focus on keeping the general public informed and involved. Agencies, organizations, and individuals with particular interests in the reach are represented on the study task force, a 40-member organization which advises the study team on all major facets of the study. The study team is composed of the National Park Service, U.S. Fish and Wildlife Service, and the U.S. Department of Energy.

In 1989 Refuge Biologist Bill Radke acted as a resource advisor to the study task force and was actively involved in the resource assessment phase of the study process. The study team (under the leadership of the National Park Service) and the task force were divided into working groups for the resource assessment, each of which considered one of the following resource categories:

-- Fisheries Resources
-- Wildlife Resources
-- Botanic Resources
-- Geologic & Hydrologic Resources
-- Recreational Resources
-- Agricultural Resources
-- Cultural Resources
-- Visual Resources

After they described the resources in their category, each working group was asked to evaluate their significance. The basis for the evaluation was the **rarity** or **quality** of the resources in comparison with those on other rivers in Washington State, in the Pacific Northwest, or in the United States. Whenever possible, the evaluations were based on the findings in previously published studies and inventories. Where such information did not exist, the working groups interviewed subject experts about the significance of resources. The results of the evaluation were reviewed by an independent group of resource experts. The results of the evaluation, organized by levels of significance, are as follows with short excerpts about their significance from the NPS summary:

Resources of National Significance

-- **Fall Chinook Salmon** - One of the most important resources of the Hanford Reach is the fall chinook salmon. Of the adult fall chinook passing above McNary Dam on the Columbia River, more than half reproduce or spawn within the Hanford Reach (more than 90,000 adult salmon in 1987). The Reach supports the second largest naturally reproducing chinook run in the continental United States.

-- **Intact Ecosystem** - Five major habitat types are well represented in the area: shrubsteppe, riverine, riparian, bluff, and island. Good examples of each of these habitat types are becoming rare in the Columbia Basin. The concurrence of all types along the Hanford Reach, intact and in excellent condition, clearly elevates the area to national importance. Ecosystem values along the Hanford Reach have been confirmed in a 1980 evaluation by the U.S. Fish and Wildlife Service, which ranked the area as the second most important habitat area in Washington State (first if non-biological criteria were excluded).

-- **American Indian Cultural Resources** - Among the important Indian cultural resources are ancestral cemeteries and burial grounds, treaty fishing sites, sites for current practice of traditional Indian religion, anadromous fisheries, subsistence and medicinal plants, and old homesites and place names.

-- **Archeological and Historical Sites** - There are at least 120 inventoried archeological sites along the Hanford reach, nearly half of which have been designated as part of the seven archeological districts and two sites on the National Register of Historic Places. Many potentially significant sites remain uninvestigated. The Hanford Reservation's 100-B Reactor is an historic site that was an important facility during the Manhattan Project which developed the first atomic bomb. The reactor is designated on the Historic American Engineering Record and is currently under consideration for addition to the National Register of Historic Places.

-- **Energy Facility Siting** - A combination of hydrologic and geologic features of the Hanford Reach study area have made it suitable for development as one of the largest nuclear complexes in the United States. The basalt geologic material, low seismic hazard, and abundance of cooling water contribute to the Hanford Reservation's historic and continuing ability to be licensed for nuclear facilities.

-- **Federally-Recognized Rare Plant Species** - Two plant species along the Hanford Reach are of national significance: persistentsepal yellowcress (*Rorippa columbiae*) and Columbia milkvetch (*Astragalus columbianus*). The first is classified as endangered in Washington and California and threatened in Oregon. The latter is classified as threatened in Washington. Both are classified as candidates for the federal threatened and endangered species list.

-- **Federally-Recognized Rare Wildlife Species** - There are 11 species present along the Hanford Reach which are recognized on federal lists of rare wildlife. Two species are classified as endangered: the Aleutian Canada goose and the peregrine falcon. Both are rare migrants and winter residents along the Reach. One, the bald eagle, is classified as threatened. It is a regular visitor to the Reach in the winter. The remaining eight species are recognized as rare but have not been formally listed under the Endangered Species Act. Three are formal candidates for listing: the ferruginous hawk, Swainson's hawk, and long-billed curlew. The remaining five species are classified as federal sensitive bird species.

Resources of Regional Significance

-- **White Bluffs Fossils** - In addition to being among the most striking visual features of the Hanford Reach, the White Bluffs are a rich area for fossils. As a result of their formation from Lake and stream sediments, the bluffs contain the fossilized remains of many animals that lived or fed along the water, including rhinoceros, camel, deer, horse, mastodon, bear, coyote and many rodents. The fossil record extends back more than two million years.

-- **Historic Sites** - There is a rich body of historical literature and oral history material on settlers in the towns of Hanford and White Bluffs prior to their eviction for the creation of the Hanford Engineer Works in 1943. The many remnants of this period include the old Hanford school building, numerous foundations, old ferry docks, and derelict orchards.

-- **Ringold Agriculture** - The Ringold area is particularly notable among the agricultural areas of the Columbia Basin because of the microclimate created by the Columbia River and White Bluffs. The microclimate features warmer temperatures in summer, as well as greater mixing of air. The Ringold area frequently produces the earliest harvests of cherries in Washington State.

-- **Waterfowl Hunting** - The abundance of waterfowl and availability of favorable conditions for hunting make the Hanford Reach an excellent location for waterfowl hunting. The upper portion of the Reach is closed to hunting, but hunting opportunities are excellent along the many sloughs and islands in the lower Reach.

-- **Salmon and Steelhead Fishing** - The abundance of fall chinook in the Hanford Reach has attracted an abundance of anglers; there have been an average of 22,000 angling trips per season from 1985-89. The success of these anglers has made the Hanford Reach first or second among mainstem and tributary areas of the Columbia River in sport salmon catch for the last five years. In the same 1985-89 period, there have been an average of 19,000 angler trips per season for steelhead. The success of steelhead anglers along the Hanford Reach was sufficient to place the area in the top five rivers in Washington State in steelhead sport catch in 1988-89.

-- **Flatwater Boating** - Although much of the boating along the Hanford Reach is related to fishing or hunting use, the segment is notable as a flatwater boating reach in its own right. An analysis of flatwater boating rivers in the Pacific Northwest Rivers Study, identified the favorable conditions of flow and scenery as important features and concluded that the Hanford Reach is an outstanding area for flatwater boating.

-- **State-Recognized Rare Plant Species** - In addition to the two plant species mentioned in the previous discussion of federally-recognized rare plants, there are four plants listed as sensitive in the State of Washington. they are dense sedge (*Carex densa*), shining flatsedge (*Cyperus rivularis*), southern mudwort (*Limosella aculis*), and false pimpernel (*Lindernia anagallidea*).

-- **Scenery along the White Bluffs** - The landscape along the Hanford Reach is particularly significant for two characteristics: the scale of its features and its lack of disturbance. The Reach is a place of powerful features, including the mighty free-flowing Columbia River, the broad basalt plains, the distant mountain ridges, and the spectacular White Bluffs. These features are remarkably well preserved. Despite the development of nuclear facilities along the shoreline, much the same now as it would have appeared a century ago. It remains one of the last wild landscapes along the Columbia River.

-- **State-Recognized Rare Wildlife Species** - There are 53 species of birds, mammals, reptiles and amphibians, invertebrates, and fish within the Hanford Reach study area that are on state lists of rare wildlife. This concentration of rare wildlife species is sufficient to elevate the Hanford Reach to regional significance for this category. Four bird species are classified as endangered in the state: the American white pelican, Aleutian Canada goose, peregrine falcon, and sandhill crane. Another two are classified as threatened: the bald eagle and ferruginous hawk. The remaining species, which are listed in the full resource assessment report, are classified as state species of special concern.

Following publication of the resource assessment and two public hearings, one in Richland and one in Basin City, Refuge Manager Goeke became a regular member of the task force for the remaining phases of the study process. During the remainder of the year, study team and task force efforts concentrated on analyzing the nature of existing conditions and the adequacy of present controls to provide the desired resource protection. The goal of the process was identification of a list of potential protection alternatives and selection of a preferred alternative for public review in an environmental impact statement.

Task force meetings were held once a month until late in the year when the pace increased to meet planning deadlines. The broad spectrum of task force participants included resource agency and organization representatives, private landowners from within the study area, county commissioners, tribal representatives, and others. A loyal nucleus of about 25-30 members attended regularly. As can be imagined, the

discussions were often lively, frequently frustrating, and occasionally somewhat heated. The Park Service did a good job, however, in the unenviable role of keeping the process on track and maintaining peace among the participants.

During the task force debates, several main interests became apparent.

(1) Everyone wanted to protect the values that were identified, and the majority felt that inclusion of all the Hanford lands on the left side of the river (as if facing downstream) should be part of the protection alternative. These are the lands presently administered by the Service as Saddle Mountain NWR and those administered by the Washington Department of Wildlife as the Wahluke Wildlife Recreation Area.

(2) None of the private landowners wanted to have their lands included within the protection alternative. On the one hand the landowners demand recognition of the Ringold agriculture as a significant resource, and on the other they don't want the same lands protected. The landowners don't want anyone else to change their land use, but they also don't want to be told they can't change use if they change their minds.

(3) None of the user groups (regardless of whether it is fishermen, hunters, tribal interests, or "environmentalists") is willing to see their "use" diminished as a result of choosing a protection alternative. They also do not want to see uses of the Hanford Reach increase to the point where their particular use interest is degraded.

(4) The county commissioners on the task force from Benton County (in particular!) and Franklin County were unwilling to give up on the possibility of future privatization of the federal lands. They did not want to concede anything that might preclude future agricultural development, and they were often the most outspokenly intractable and uncompromising in their position.

Finally, the process came down to selecting a preferred protection alternative. Task force working groups outlined protection parameters and offered several recommendations. Then, in December the Fish and Wildlife Service, National Park Service, and Bureau of Land Management were invited to offer management proposals that would address the task force recommendations. On December 18 NPS Deputy Regional Director William Briggle presented the NPS proposal, a National River to be administered by the NPS; BLM Resource Area Manager Ann Aldrich presented the BLM proposal, a National Conservation Area to be administered by the BLM; and Refuge Manager Goeke presented the FWS proposal, a National Wildlife Refuge with a Wild and Scenic River overlay to be administered by the FWS. The Service proposal was the best received and is being described as the preferred alternative in the environmental impact statement.

If the NWR/WSR proposal goes forward as currently planned and is accepted by Congress, Saddle Mountain NWR will become a major refuge in

the Pacific Northwest. Highlights of the action would include the following.

(1) The refuge area will increase from 30,000 acres to approximately 95,000 acres. The Washington Department of Wildlife, current administrator of the Wahluke WRA, has indicated its support for the NWR/WSR proposal.

(2) The Department of Energy would be expected to convey all or most of the property to the FWS. During the interim, elimination of the present 30-day DOE revocation clause will greatly enhance FWS management options and control. The officially recognized, 1990 change of mission for the Hanford Reservation to environmental restoration, and the closure of nuclear production facilities, greatly facilitates this action.

(3) Since almost all of the land within the proposed NWR/WSR boundary is already federally owned, the proposal can be easily implemented without a significant acquisition effort or expenditure.

(4) All of the significant resources described earlier, combined with the improved operational control resulting from consolidated administration, will make the expanded refuge a major wildlife and fisheries management area.

E. Administration

2. Youth Programs

The YCC crew spent just one day at Saddle Mountain this year, placing refuge signs and repairing fence along the boundary.

4. Volunteer Program

Volunteer Kenny Shields participated in wildlife inventory and habitat work at Saddle Mountain totalling 34 hours in 1990. His knowledge of past biological work, refuge travel routes, and overall enthusiasm about the role he plays on the refuge have made Kenny's assistance both invaluable and enjoyable to the new biologist.

F. HABITAT MANAGEMENT

1. General

Although the wildlife values are outstanding along the Hanford Reach, it is really the relatively undisturbed nature of the area's habitat types, their uniqueness, and the fact that all are found in one proximity, which contributes to the ecological importance of the Reach and Saddle Mountain NWR. Several habitat types in the Hanford Reach are notable due to their ecological importance and use by a great diversity of species. These habitat types can generally be classified as

shrubsteppe, riverine, riparian, and island, all of which are found on and adjacent to the refuge.

The FWS permit from the Department of Energy (DOE) to administer Saddle Mountain NWR has a 30-day revocation clause, making habitat development a risky investment. However, even with a long-term agreement, little active habitat management is envisioned. The refuge provides a sanctuary for wildlife utilizing shrubsteppe habitat and is currently achieving this objective. Construction of existing lakes, ponds, and watercourses was accomplished by the Bureau of Reclamation during the 1970s as part of a wasteway to the Columbia River. Further wetland development would not be desirable or very effective because of the sandy soils and resulting shrubsteppe alteration.

The view looking east from Highway 24 north of Vernita Bridge. The Saddle Mountains are at the left horizon above Saddle Mountain Lake, and the White Bluffs along the Columbia River are visible at the right horizon. Sagebrush grassland habitat (shrubsteppe) covers most of the refuge. 9/7/90 DEG

2. Wetlands

Water for the refuge comes from the Columbia Basin Irrigation Project's Saddle Mountain Wasteway, and has created over 1,000 acres of open water consisting of one 730-acre lake, two large ponds, and 20 smaller impoundments. This water system was created by the Bureau of Reclamation to prevent erosion as water flows from the wasteway's outlet through the refuge to the Columbia River.

6. Other Habitats

Before settlers began to develop the land in Eastern Washington during the mid-1800s for agricultural purposes, the native upland vegetation on Saddle Mountain NWR was dominated by big sagebrush and bunchgrass such as Sandberg's bluegrass and bluebunch wheatgrass. This native vegetation, however, has been dramatically altered by years of livestock overgrazing, agricultural development, the introduction of cheatgrass, and subsequent wildfire. Today, at least 66 plant species have been documented on the area, with big sagebrush, rabbitbrush, spiny hopsage, and bitterbrush being the most noticeable. Sandy sites are dominated by Indian rice grass and snow buckwheat.

Most noticeable on the refuge are huge flat expanses of cheatgrass, tumblemustard, and Sandberg's bluegrass. The areas were altered over 50 years ago through plowing and irrigation. The disruption of soil organisms and rapid invasion of cheatgrass have worked together to prohibit most native vegetation from reestablishing on the sites. Large numbers of Canada geese use these areas for browse, and long-billed curlews choose these areas for nesting. Overall, however, these abandoned fields make up the most unproductive areas on the refuge.

Riparian vegetation has established naturally along the Saddle Mountain Wasteway and now includes large cottonwood trees, various willows, and other native vegetation. Exotic species such as Chinese elm, weeping willow, and Russian olive are also present in small numbers. The Columbia River, through this part of Eastern Washington, historically had almost no woody vegetation along its banks because of periodic violent flooding. Early settlers had to build and heat with driftwood brought down annually by these floods. Priest Rapids Dam now controls the water level along the Hanford Reach, allowing the establishment of mulberry trees along the Columbia River.

During April refuge personnel planted a total of 25 black cottonwood and honey locust trees at selected locations on the refuge. Survival of the trees will enhance habitat for a number of wildlife species but primarily will enhance Swainson's hawk nesting habitat.

10. Pest Control

During August a survey was conducted of refuge water areas to look for purple loosestrife. None was discovered. In 1988 several plants were discovered and sprayed, but none have been found since then.

11. Water Rights

Saddle Mountain Wasteway is no longer the terminal wasteway for all lands within the Wahluke Slope portion of the Bureau of Reclamation's Columbia Basin Irrigation Project. Water from this wasteway emptied into Saddle Mountain Lake, then traveled through a series of smaller ponds before eventually seeping back into the Columbia River. The recent development of Block 26 of the project may change this. Although the Bureau says that flow of water to the refuge will not be stopped, a reduction seems inevitable. The FWS has no water rights for this area,

and the Bureau of Reclamation is unwilling to set up a long-term water management agreement.

12. Wilderness and Special Areas

The natural features of the Columbia River's Hanford Reach are significant enough to be recognized by the FWS as one of Washington state's two most important fish and wildlife habitats. This section of the river is the last unimpounded stretch of the Columbia in the United States, and hosts the last undisturbed spawning ground for fall chinook salmon on the river. The expanse of land surrounding the river is home to large numbers of wintering waterfowl and shelters a number of rare plant and animal species. (See Section D for a detailed discussion of current planning activities concerning permanent protection of the Hanford Reach.)

G. WILDLIFE

1. Wildlife Diversity

Shrubsteppe lands on the refuge support a surprising diversity of wildlife species. The large biomass of grasses, forbs, insects, rodents, and passerine birds present in a shrubsteppe region is indicative of the great importance of the lower trophic levels associated with this habitat. As shrubsteppe is rapidly being lost in eastern Washington, the refuge has become very important in preserving this habitat type and its associated wildlife. At least 185 bird species have been documented on or adjacent to the refuge at the Hanford Site, and at least 74 bird species nest on the area. In addition, at least 36 species of mammals, 9 species of reptiles, 4 species of amphibians, and 46 species of fish utilize this area in and surrounding the Columbia River.

2. Endangered and/or Threatened Species

State and federally listed endangered species which occur on the refuge include the American white pelican and the peregrine falcon. No peregrine falcons were observed during 1990. Threatened species include the bald eagle and the ferruginous hawk.

White pelicans utilized the Hanford Reach of the Columbia River throughout the year, and although nonbreeding pelicans are present in the Columbia Basin each year, they have not nested in Washington since 1926. The Hanford Reach appears to be a likely area to attempt to establish breeding pelicans for several reasons. American white pelicans prefer to nest on isolated islands or gravel bars, well away from human disturbance. The Hanford Reach contains several such islands, all of which are closed to public access through existing DOE and/or FWS restrictions, and most of which already provide favorable nesting sites for waterfowl, gulls, and other species. In addition, the Reach provides available food and forage sites for pelicans.

During 1989, decoys were placed on Island #2 adjacent to the refuge in May in an attempt to attract pelicans to the island to nest. Although no pelicans nested there in 1989 (possibly due to the lateness of decoy placement), more than 300 spent much of the late summer and fall in the area. The decoys were not placed in 1990, but the population increased to a peak of over 800 in the area, and a wintering population now exists. With these encouraging signs, the decoys will be placed in 1991 during early April Canada goose studies of the Hanford Reach islands.

The Hanford Reach has become an important sanctuary for bald eagles, holding about 10 percent of the eagles wintering in Eastern Washington each year. As a result, bald eagles are common winter residents on Saddle Mountain NWR. The number of eagles on the area peaked at 42 birds (20 adults, 22 immatures) during January, as eagles took advantage of the fall chinook salmon and waterfowl concentrations along the Hanford Reach. Large numbers of eagles utilize cottonwood groves along the river for night roosts, but often roost along the White Bluffs to soak up radiant heat during daylight hours.

Ferruginous hawks have become exceedingly rare in Washington, and are rare summer residents on the refuge. During an aerial survey conducted in 1989, biologist Radke and Battelle Pacific Northwest Laboratory biologist Richard E. Fitzner found five pair of these birds nesting across the Columbia River on the Hanford Reservation, mostly utilizing powerline structures for their nest sites. Surveys by Fitzner in 1990 found twelve pair nesting on the Hanford Reservation. With numbers of these birds increasing on the Hanford Site, it is probable that soon they will be nesting on Saddle Mountain NWR as well.

Two state threatened mollusks associated with the last free-flowing stretch of the Columbia River are also proposed federal candidate species. The giant Columbia River limpet (*Fisherola nuttalli*) and the giant Columbia spire snail (*Lithoglyphum columbiana*) are both found off shore from Saddle Mountain NWR.

The refuge shoreline, gravel bars, and offshore islands provide habitat for the endangered persistantsepal yellowcress (*Rorippa columbiae*) which flowers during July. In the past, this plant probably occurred up and down the Columbia, but today the Hanford Reach offers the only significant habitat for this federal candidate species in Washington. Moist, sandy mud flats and seasonally inundated areas of the Reach provide habitat for several state sensitive plant species including dense sedge (*Carex densa*), shining flatsedge (*Cyperus rivularis*), southern mudwort (*Limosella acaulis*), and false pimpernel (*Lindernia anagallidae*). Slopes and bluffs above the river provide habitat for additional rare plant species. A state threatened plant species, Columbia milkvetch (*Astragalus columbianus*), has not been located on the refuge. However, it has been documented in sandy soils west and south of the refuge boundary, where critical habitat has been designated for this federal candidate species. Sand dunes near the river support populations of gray cryptantha (*Cryptantha leucophae*) while upland areas provide habitat for bristly cryptantha (*Cryptantha interrupta*) and dwarf evening primrose (*Oneothera pugmae*) which are all state sensitive plants.

3. Waterfowl

Waterfowl surveys were conducted throughout the year on Saddle Mountain NWR. Ground counts were made each month, and they were supplemented with aerial counts conducted as part of the Columbia Basin Waterfowl Survey during November and December. Additional survey information was collected by Battelle biologist Fitzner during aerial counts of the Hanford Reach.

A large number of waterfowl, including at least 23 different species, use the Hanford Reach as a feeding and resting area. During a normal year, the Reach holds about 8 percent of the birds in eastern Washington, 5 percent of the birds in the entire state, and just under 1 percent of the birds in the Pacific Flyway. Saddle Mountain NWR lakes and ponds offer important sanctuary areas which are heavily utilized by migrating and wintering waterfowl until these waters freeze, moving birds to the Columbia River. Much of the Hanford Reach is maintained by the state as a waterfowl sanctuary during the waterfowl hunting season. Waterfowl accounted for a total of 1,312,590 use-days during the year, 20 percent above last year's total. The following table depicts waterfowl use on the refuge during 1990.

Waterfowl Use-Days on Saddle Mountain NWR During 1990

Month	Geese	Ducks	Swans	Total
Jan.	37,200	25,050	-	62,250
Feb.	45,000	65,700	-	110,700
Mar.	27,000	25,350	-	52,350
Apr.	4,500	15,450	-	19,950
May	1,500	5,700	-	7,200
June	2,250	8,700	-	10,950
July	2,250	10,650	-	12,900
Aug.	2,250	12,000	-	14,250
Sept.	3,750	24,510	-	28,260
Oct.	60,010	61,520	-	121,530
Nov.	225,000	246,240	600	471,840
Dec.	270,000	100,560	-	370,560
Totals	680,710	601,430	600	1,312,590

The duck population on the refuge peaked during early December with 9,500 mallards on Saddle Mountain Lake. Great Basin Canada geese are common permanent residents on the refuge, and are joined during migration and winter by lesser Canada geese and an occasional snow goose. Much research has been done on the Hanford Reach population of Canada geese, which nest primarily on twenty sparsely vegetated islands in the Columbia River. An abundance of green browse on the refuge lying adjacent to the Columbia River provided Canada geese with a safe feeding area that was heavily utilized beginning mid-November. During December, a peak of nearly 12,000 Canada geese were present on Saddle Mountain Refuge. Canada geese accounted for 52 percent of the total refuge waterfowl use-days during 1990. Tundra swans are occasional spring and autumn migrants at Saddle Mountain Refuge and utilize the open lake and ponds on the area. Swan use-days were up 82 percent from last year, with a peak of 39 swans present on Saddle Mountain Lake during mid-November.

This refuge is managed primarily as a wintering area, and waterfowl production is incidental as an objective. A number of management problems affect waterfowl production on the refuge, including: lack of water control and management, lack of suitable upland nesting cover, excessive predation, and lack of submergent vegetation and associated invertebrates caused by an abundance of carp. Production estimates are limited to random surveys rather than a formal study of waterfowl production. Annual waterfowl production on the refuge was not determined because of time constraints and the biologist vacancy. The most common nesting species include the mallard, redhead, cinnamon teal, and Canada goose.

4. Marsh and Water Birds

Saddle Mountain Lake and its associated series of smaller ponds supported at least twelve species of marsh and water birds during 1990, the most common of which were the great blue heron and the black-crowned night heron. In addition, great egrets, double-crested cormorants, various grebe species, and common loons all utilized the refuge for its sanctuary and feeding areas. Both western and Clark's grebes were present on Saddle Mountain Lake late in the breeding season and probably nested. Pied-billed grebes are a common nesting species. Historically, only a few great blue herons nested on the Hanford Reach. In the mid-1980s two colonies were established, having a total of 78 active nests. By 1989, five colonies had been established in the Reach totaling over 170 active nests. The two pair of great blue herons documented nesting on the refuge during 1988 did not nest in 1989 and were not found in 1990.

5. Shorebirds, Gulls, Terns, and Allied Species

At least 8 species from this category utilized the refuge during 1990. Common nesting species include the killdeer and the long-billed curlew. Gulls nested on the refuge islands near Coyote Rapids until about 1983, when the colony was disturbed by coyotes. Presently, ring-billed gulls, California gulls, and Forster's terns nest on two islands located downstream from the refuge and upstream from the refuge on Cabin Island in Priest Rapids Pool. These species commonly utilize refuge ponds as feeding and loafing areas. An estimated 300 long-billed curlews are supported along the Hanford Reach during the breeding season, including about 25 pairs on Saddle Mountain Refuge. At least two of the islands adjacent to the refuge in the Columbia River are used by curlews as staging areas during late summer.

6. Raptors

Shrubsteppe and riparian habitats on Saddle Mountain NWR were utilized by at least 11 raptor species during 1990. Common raptors nesting on the refuge include the red-tailed hawk, Swainson's hawk, long-eared owl, burrowing owl, and northern harrier. In addition, common barn owls have been documented nesting on the refuge. Uncommon on the refuge, the golden eagle and rough-legged hawk are seen primarily during the fall and winter. At least one pair of long-eared owls wintered on Saddle Mountain NWR, where they were seen monthly in a juniper tree.

7. Other Migratory Birds

A number of birds nest or occur on Saddle Mountain NWR's shrubsteppe habitat which are recognized as Sensitive Species or Species of Special Concern by the FWS and/or the Washington Department of Wildlife. Birds listed under these categories which are not mentioned elsewhere in the narrative include the loggerhead shrike, sage sparrow, grasshopper sparrow, and sage thrasher. All of these but the thrasher have been documented nesting on the refuge.

Riparian habitat on Saddle Mountain NWR is extensive and healthy. Song sparrows, mourning doves, eastern kingbirds, northern orioles, and black-billed magpies all nested among willow thickets associated with refuge ponds. A colony of bank swallows nests in the sand cliff on the north side of Saddle Mountain Lake, and both lark sparrows and western kingbirds nest on the refuge north of Highway 24. The most widespread nesting passerines on the refuge include the horned lark and the western meadowlark. Common ravens nested on the refuge during 1990, with most utilizing steel powerline structures as nest sites. Migrating songbirds included rufous-sided towhees, white-crowned sparrows, Wilson's warblers, and yellow-rumped warblers, and American goldfinches. A flock of what appeared to be Lapland longspurs was observed by biologist Hill on October 24, but the flock did not return and could not be verified as a new species for the refuge. Rosy finches also appeared again along the cutbank where the river hits White Bluffs.

8. Game Mammals

Mule deer are common in suitable habitat along the Hanford Reach, including Saddle Mountain Refuge. However, an accurate count of mule deer on the refuge is hampered by the fact that these animals commonly swim back and forth across the Columbia River. Locke Island, downstream from the refuge, supports a year-around herd of these animals. Expanses of bitterbrush on the refuge provide winter forage for the mule deer and reproduction in the area appears to be good. During 1990, several large bucks were seen on both sides of the river, reflecting the protected status that they receive on the refuge and the Hanford Reservation.

10. Other Resident Wildlife

Common mammals observed on Saddle Mountain NWR include coyote, badger, striped skunk, raccoon, beaver, muskrat, and black-tailed jackrabbit. Porcupine and mink have also been observed.

Historically, sage grouse were abundant on the area, but by 1982 a refuge lek in Section 34, T14N, R25E, contained only four strutting males on March 25. It has been recognized from grouse studies in other states that when a lek or its surrounding habitat is altered or destroyed, sage grouse breeding is reduced or ceases altogether. Unfortunately, the refuge lek and adjacent areas were ravaged by wildfire during 1984. After unproductive visits to the old lek during 1988 and 1989, a 1990 grouse count was considered a low priority and was not completed.

With the biologist position vacant from February until late July, little time was spent at the refuge during the warmer season when herps are out. Sagebrush lizards, a state Species of Special Concern, are common but localized on the refuge, and probably provide food for striped whipsnakes and desert night snakes, which are also Species of Special Concern that have been documented north, south, and west of the refuge and likely occur on Saddle Mountain NWR as well.

The Oregon swallowtail (*Papilio oregonius*) another state Species of Special Concern, is locally common on habitat provided by Saddle Mountain NWR. This species is restricted to shrubsteppe habitat in the Columbia Basin, where larvae feed on tarragon (*Artemisia dracunculus*) and adults feed on native thistles.

11. Fisheries Resources

A total of at least 46 species utilize the aquatic environment on and adjacent to the Columbia River's Hanford Reach. This large and varied fish population within the Reach is directly attributable to the unique and diversified ecosystem, of which Saddle Mountain NWR is a part. The Columbia River Basin produces the world's largest runs of coho and sockeye salmon. Historically, annual runs of all salmon and steelhead to the Columbia River ranged from 7.5 to 16 million. Today, about 2.5 million salmon and steelhead return to the Columbia River. While other stocks of Columbia River salmon and steelhead have been diluted with the introduction of hatchery fish, the Hanford Reach fall chinook salmon remain predominantly wild. The spawning migration of fall chinook salmon to the Hanford Reach begins in mid-August, while spawning occurs from October through November and peaks in early to mid-November.

Fish Species of Special Concern, as determined by the state of Washington, found in the Hanford Reach include the mountain sucker (*Catostomus platyrhynchus*), sandroller (*Percopsis transmontana*), paiute sculpin (*Cottus beldingi*), and the reticulate sculpin (*Cattus perplexus*).

H. PUBLIC USE

1. General

As part of the agreement with the DOE concerning administration of Saddle Mountain NWR, the refuge is closed to all public use for safety reasons, because it is within the security zone of Hanford's N Reactor. The lack of human disturbance provided by this closure is one of the strongest benefits offered to wildlife on the sanctuary area.

17. Law Enforcement

Law enforcement is difficult on this refuge because it is unmanned and located some 30 miles from the refuge office in Othello. However, scheduled law enforcement patrols were done periodically during the waterfowl hunting season, and intermittently throughout the rest of the

year. Additional inspections were also accomplished incidental to other duties conducted on the refuge.

In addition to the FWS patrols, the refuge receives some protection by the Hanford Patrol, a security force operated by Westinghouse for the Department of Energy. The Patrol conducts helicopter surveillance of the entire Hanford Site, and has boat patrols along the river. Vandalism and illegal trespass are the major problems encountered on the refuge. This year only two violations were issued for trespass and this was by a Washington Department of Wildlife agent who turned the cases over to the FWS for disposition.

J. Other Items

4. Credits

Due to a shortage of manpower resulting from personnel transfers and unfilled vacancies during most of the year (see Columbia NR, Section E.1), much of this report was reproduced from Bill Radke's comprehensive report from 1989, with some deletions and statistical updates for 1990. Parts written by others included: Refuge Manager Goeke, Sections A, D, and J; Assistant Manager Coykendall, Sections B, F.10, and H.17; and Biologist Hill, Sections E. and updates of Section G.

Fishing

Columbia National Wildlife Refuge

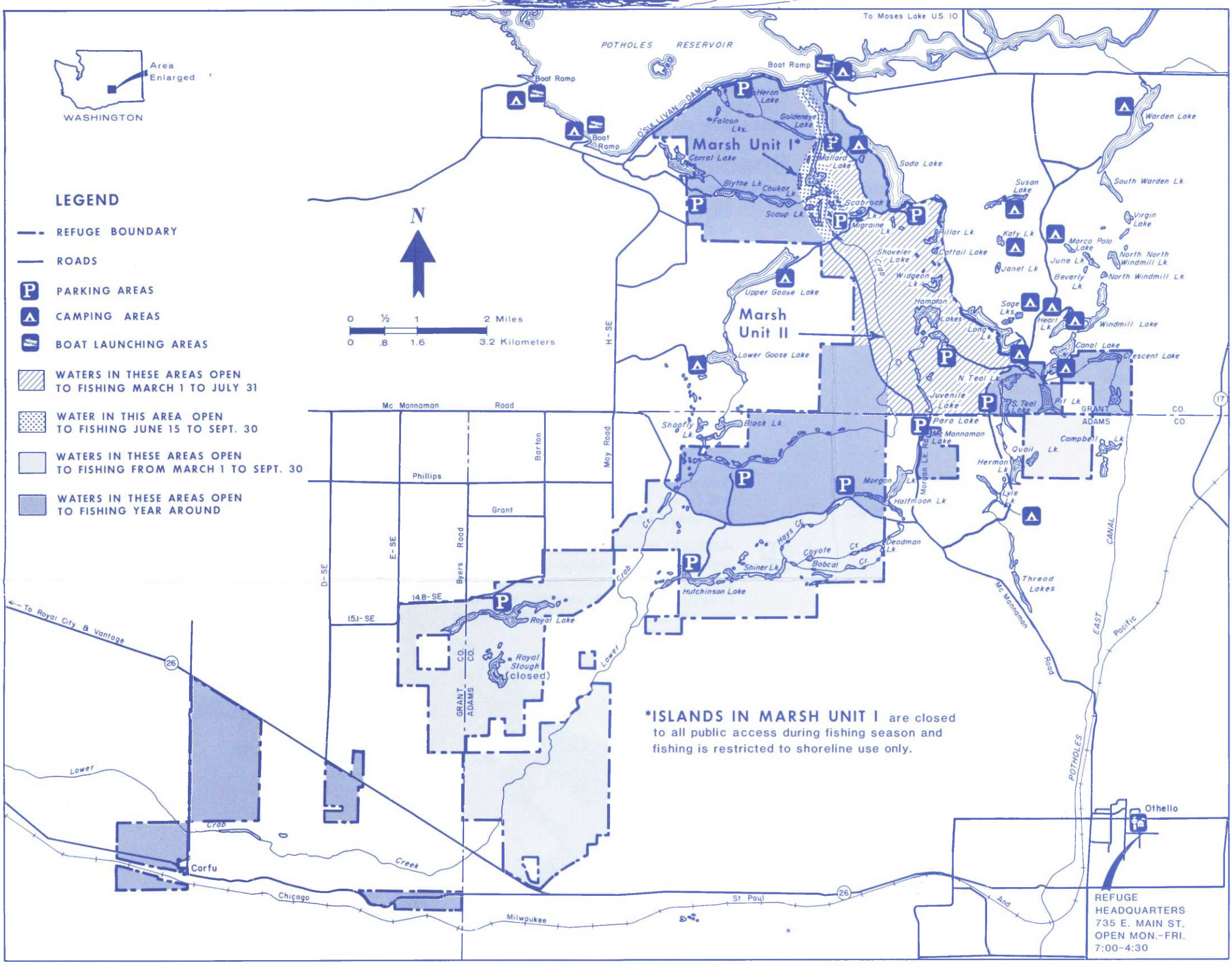
Washington

Signs to Follow

Millions of people visit National Wildlife Refuges every year. The impact of humanity descending upon refuges, if not regulated in part, can degrade these wildlands. Signs grant or restrict certain activities to provide optimum freedom for visitors while also protecting refuge elements from undue human abuse. Please respect the following signs.

This sign delineates the refuge boundary. You may enter the area only on designated access routes.

This area is closed to ALL entry. No hunting, fishing or sightseeing is permitted. No roads or trails are open to the public.



Fishing Regulations

The Columbia National Wildlife Refuge offers varied fishing opportunities for anglers of all ages. Over 50 seep lakes, sloughs, and 15 miles of streams and canals are open to fishing during some portion of the year. Common game fish include Rainbow and German Brown Trout, Largemouth Bass, Bluegill, Black Crappie, Yellow Perch and Walleye.

Daily Catch Limits

Trout Limit 5 trout.
Bass Possession limit ten (10) bass, no more than 3 over 17 inches in length.
Walleye 5 fish - 18 inch minimum.
Whitefish Limit 15 whitefish.
No Catch Limit Bluegill, catfish, crappie, perch, cod, sunfish.
Bullfrogs Protected - DO NOT TAKE.

Seasons and Waters Open to Fishing

Waters Open March 1 to July 31

- Cattail Lake
- Coot Lake
- Crab Creek from McMannaman Road to Goose Lake Road
- Dollar Lake
- Gadwall Lake
- Hampton Lakes and Sloughs
- Hourglass Lake
- Juvenile Lake (under 15 years of age only)
- Lake Marie
- Lemna Lake
- Marsh Unit II Impoundments
- Migraine Lake
- Pillar Lake
- Poacher Lake
- Sago Lake
- Scabrock Lake
- Shoveler Lake
- Snipe Lake
- Widgeon Lake

Waters Open March 1 to September 30

- Bobcat Creek and Ponds
- Coyote Creek and Ponds
- Crab Creek from Hwy 26 to McMannaman Road
- Hays Creek and Ponds
- Hutchinson Lake
- Quail Lake (See Special Regulations)
- Royal Lake
- Shiner Lake

Waters Open June 15 to September 30

- Crab Creek from Goose Lake Road to O'Sullivan Dam, including all Marsh Unit I impoundments

Closed Waters

- Royal Slough and all associated impoundments

All Other Waters Open Year-Round

General Information

All species of wildlife, including snakes, are protected except fish and game species during their respective fishing and hunting seasons. Only hook and line fishing is permitted. Fishing with bows and arrows is **NOT** allowed.

Visitors should examine their own abilities and limitations before using the refuge. Handicapped persons should fish with a partner and consult the refuge manager for suggestions for fishing the area safely.

Watch out for thin or "rotten" ice late in the winter. Extreme caution should be exercised when venturing out on the ice to fish.

Sport fishing shall be in accordance with applicable State and Federal regulations. Portions of the refuge which are open to fishing are delineated on the map on the other side of this leaflet.

Violation of refuge regulations may result in prosecution and denial of recreational privileges. The following special regulations apply to all visitors using the refuge.

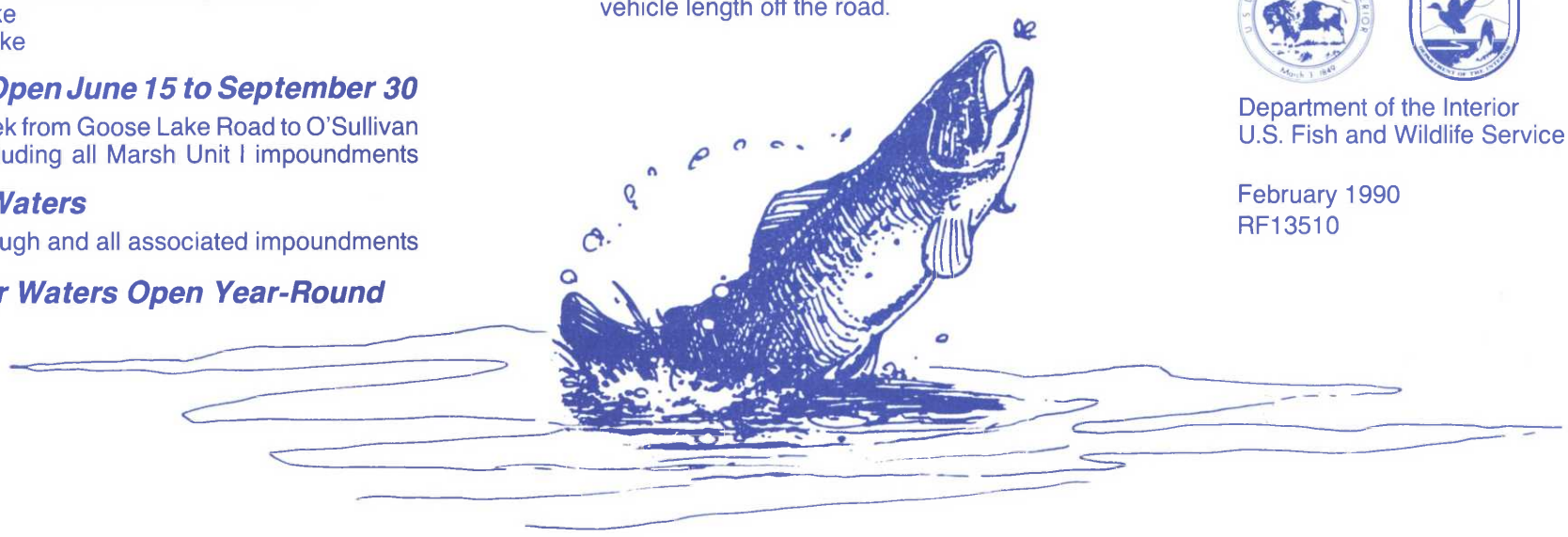
Special Regulations

ISLANDS IN MARSH UNIT I are closed to all public access during fishing season and fishing is restricted to shoreline use only.

QUAIL LAKE is open only to the use of artificial flies with a single barbless hook, and all fish must be released immediately as unharmed as possible.

BOATS or other flotation devices are not allowed on impoundments on and along Crab Creek in Marsh Units I and II. Both powered and non-powered boats are allowed on all other waters open for fishing with the exception that use of gasoline motors is prohibited on Upper and Lower Hampton, Hutchinson, Royal and Shiner Lakes.

P PARKING is permitted only in designated areas **one hour before legal sunrise until one hour after legal sunset.** During these hours vehicles may also park along roads but not more than one vehicle length off the road.



CAMPING and OVERNIGHT PARKING are permitted in Soda Lake Campground only. ALL OTHER CAMPING AND OVERNIGHT PARKING IS PROHIBITED.

FIRES are allowed in CAMP STOVES ONLY. NO OTHER FIRES ARE ALLOWED.

VEHICLES - Licensed motorized vehicles and bicycles are permitted on graveled roads only. All graveled roads are primitive so drive at your own risk. Travel is NOT permitted off roads or on roads closed to public vehicles.

ATVs - Dirt bikes, three and four wheel all terrain vehicles, and snowmobiles are not allowed on the refuge for any purpose.

HORSEBACK RIDING is allowed only on graveled roads open to vehicle use.

LITTERING is unlawful. Take your litter home with you.

FIREARMS - All firearms are prohibited except in public hunting areas during the hunting season.

DOGS and other pets must be kept leashed at all times except when dogs are being used for hunting.

HIKING AND NATURE OBSERVATION are permitted in areas only when open to hunting or fishing, with the exception that the area closing to fishing on July 31 will remain open to hiking and nature observation until October 1.

SWIMMING is prohibited in all waters on the refuge.

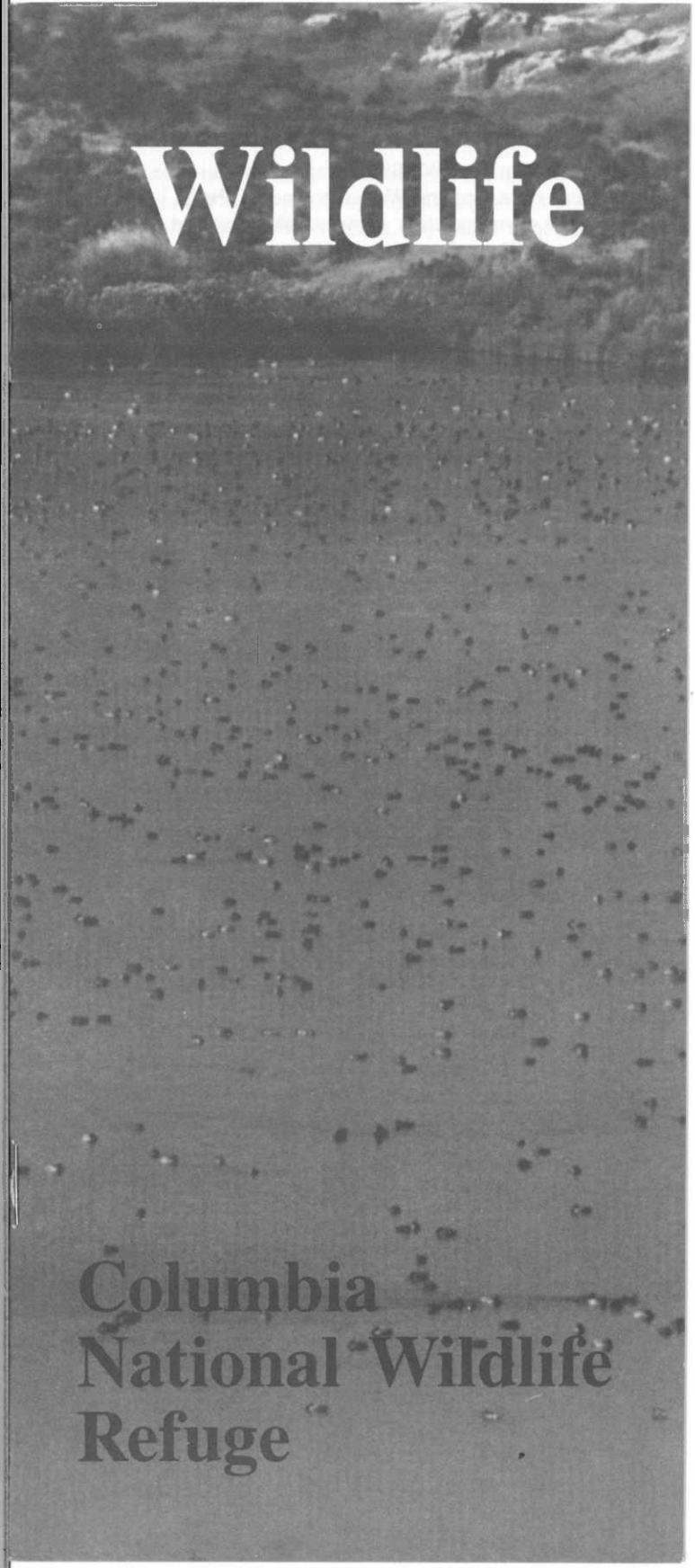
ARTIFACTS - Searching for and removing object of antiquity are prohibited.

ADDITIONAL INFORMATION may be obtained at the refuge office located at 735 E. Main Street, Othello, Washington or contact:

Refuge Manager
Columbia National Wildlife Refuge
PO Drawer "F"
Othello, WA 99344
Telephone (509) 488-2668

Department of the Interior
U.S. Fish and Wildlife Service

February 1990
RF13510



Wildlife

Columbia National Wildlife Refuge

Welcome to Columbia Refuge

Columbia National Wildlife Refuge, located in the Columbia Basin of east-central Washington near Othello, is a scenic landscape of rugged cliffs, canyons, lakes and arid sagebrush grasslands. The refuge was established in 1944 in conjunction with the Columbia Basin Irrigation Project and now totals 23,100 acres. Seepage from the Irrigation Project has created lakes, sloughs, streams, wet meadows and marshes that provide habitat for migrating and wintering waterfowl and many other species of wildlife.

Bullfrog

Habitat Diversity Supports Wildlife Diversity

The variety of refuge habitats supports a tremendous diversity and abundance of resident and migratory wildlife. While waterfowl use the lakes, sloughs and marshes, the cliffs provide habitat for owls, hawks, ravens and cliff swallows. Magpies, pheasants and quail use upland areas, while herons, American avocets and other shorebirds use wetlands. Almost 280 species of wildlife have been observed on the refuge.

Enjoying the Refuge's Wildlife

Observation of wild animals in their natural habitats has become an increasingly popular recreational activity. Binoculars or a spotting scope can greatly enhance your wildlife viewing, and use of field guide books can aid identification. This equipment will help you observe wildlife from a distance and minimize disturbance.

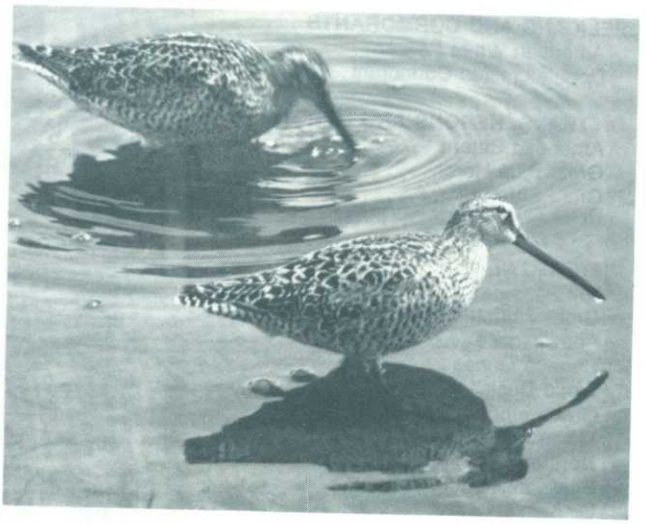
Birds

Bird populations vary greatly in diversity and abundance according to the seasons. Waterfowl populations are highest during the fall when peaks of over 100,000 birds are common. Unfortunately for visitors, the major concentration areas on the refuge are closed to all public entry during the fall and winter to provide the undisturbed sanctuary the birds need. An overlook where large concentrations of winter waterfowl are visible is located on the north side of Royal Lake at the south end of Byers Road. During the spring and summer, the entire refuge is open to public entry and wildlife viewing is best. Some of the best viewing opportunities can be found by walking the foot trails which start at the trail head located next to Crab Creek at the road crossing east of Upper Goose Lake. The self-guided trails are open for use from March 1 until October 1.

The following list contains 208 species that have been observed on or near the refuge. The list is organized in accordance with the Sixth Edition (1983) of the A.O.U. Checklist of North American Birds.

When looking at a bird, pay close attention to characteristics such as color, size, shape, wing and head markings. Always observe first and then refer to the field guide book, because the bird may not remain where it can be readily observed for a long period of time.

Long-billed Dowitchers



Birds List Key

Season Symbols

Sp - Spring, March through May
S - Summer, June through August
F - Fall, September through November
W - Winter, December through February

Abundance Symbols

a - abundant, certain to be seen in abundance
c - common, certain to be seen in proper habitat
u - uncommon, present but not certain to be seen
o - occasional, seen only a few times during the season
r - rare, known to be present but not every year
* - birds known to nest locally

threatened/endangered species

COMMON NAME	Sp	S	F	W
* Common Loon	u	o	u	
GREBES				
* Pied-billed Grebe	u	c	c	u
Horned Grebe	o	o	o	
Red-necked Grebe	o		o	
Eared Grebe			o	
Western Grebe	o	o	o	
PELICANS AND CORMORANTS				
American White Pelican	o	r	o	
Double-crested Cormorant	u	u	u	
BITTERNS, HERONS AND EGRETS				
* American Bittern	o	o	o	
Great Blue Heron	c	c	c	u
Great Egret	r	r		
Black-crowned Night-Heron	c	c	u	
WATERFOWL				
Tundra Swan	u		u	c
Greater White-fronted Goose			r	
Snow Goose	o		o	
* Canada Goose	a	u	a	a
Wood Duck	o	o	o	
* Green-winged Teal	c	u	c	c
* Mallard	a	c	a	a
* Northern Pintail	c	u	c	c
* Blue-winged Teal	u	c	u	
* Cinnamon Teal	c	c	u	
* Northern Shoveler	u	o	u	c
* Gadwall	c	u	u	u
* American Wigeon	c	o	c	c
* Canvasback	o	o	o	u
* Redhead	c	c	c	u
Ring-necked Duck	u	o	c	c
Greater Scaup	u		o	u
* Lesser Scaup	c	o	u	c
Surf Scoter				r
White-winged Scoter				r
Common Goldeneye	c	o	u	u
Barrow's Goldeneye	o		o	u
Bufflehead	c	o	u	c
Hooded Merganser	o		u	o
Common Merganser	u		o	u
Red-breasted Merganser	r			
* Ruddy Duck	c	u	u	c
VULTURES				
Turkey Vulture	r			
OSPREY, KITES, EAGLES AND HAWKS				
Osprey	o	r	o	
Bald Eagle	o		r	o
* Northern Harrier	u	u	u	c
Sharp-shinned Hawk	r	r	o	r
Cooper's Hawk	o	r	o	r
Swainson's Hawk	o	r	o	
* Red-tailed Hawk	c	c	c	u
* Ferruginous Hawk	o	o	r	
Rough-legged Hawk	o		r	u
Golden Eagle	r		r	r
FALCONS				
* American Kestrel	c	c	u	c
Merlin	o		o	
Peregrine Falcon	r		o	
Gyrfalcon				r
* Prairie Falcon	o	o	o	o
GALLINACEOUS BIRDS				
* Gray Partridge	r	r	r	r
* Chukar	o	o	o	o
* Ring-necked Pheasant	c	c	c	u
* California Quail	u	c	c	c
RAILS				
* Virginia Rail	u	u	u	u
* Sora	u	u	u	o
* American Coot	a	c	a	c
CRANES				
Sandhill Crane	u		u	
PLOVERS				
Black-bellied Plover	r		r	
Lesser Golden-Plover			r	
Semipalmated Plover	o		o	
* Killdeer	a	a	c	u
STILTS AND AVOCETS				
* Black-necked Stilt	u	u		
* American Avocet	c	c		
SHOREBIRDS				
Greater Yellowlegs	u	u	u	
Lesser Yellowlegs	o	u	u	
Solitary Sandpiper	u	u	o	
* Spotted Sandpiper	u	u	o	
* Long-billed Curlew	u	u	o	
Marbled Godwit	r			
Semipalmated Sandpiper	o		u	
Western Sandpiper	u	u	u	
Least Sandpiper	c	u	u	
Baird's Sandpiper	o		o	

	Sp	S	F	W
Pectoral Sandpiper	o	o	u	
Dunlin	o			
Short-billed Dowitcher	o		u	
Long-billed Dowitcher	u	u	u	
SNIPE				
* Common Snipe	c	u	u	o
PHALAROPES				
* Wilson's Phalarope	u	u		
Red-necked Phalarope	u		u	
GULLS AND TERNS				
Franklin's Gull			o	
Bonaparte's Gull	o	u	u	
Ring-billed Gull	a	a	a	c
California Gull	u	a	u	u
Herring Gull	u		o	u
Glaucous-winged Gull			r	
Caspian Tern	c	c	u	
* Forster's Tern	c	c	o	
* Black Tern	o	o		
DOVES				
* Rock Dove	u	u	o	o
* Mourning Dove	c	c	c	o
OWLS				
* Common Barn-Owl	u	u	o	
* Great Horned Owl	u	u	u	u
Snowy Owl				r
* Burrowing Owl	o	o	o	
* Long-eared Owl	o	o	o	
* Short-eared Owl	o	o	o	o
GOATSUCKERS				
* Common Nighthawk		u	o	
* Common Poorwill	r	r		
SWIFTS				
White-throated Swift	r	r		
HUMMINGBIRDS				
Rufous Hummingbird		o	o	
KINGFISHERS				
* Belted Kingfisher	u	o	o	o
WOODPECKERS				
Lewis' Woodpecker	o	o		
Downy Woodpecker	o	o	o	o
Hairy Woodpecker	o			o
* Northern Flicker	c	c	u	c
FLYCATCHERS				
* Western Wood-Pewee	u	o		
Willow Flycatcher		o	o	
Hammond's Flycatcher			u	
Dusky Flycatcher	u	u	u	
Western Flycatcher			o	
* Say's Phoebe	u	u	u	o
* Ash-throated Flycatcher	o	o		
* Western Kingbird	o	u	o	
* Eastern Kingbird	u	u	o	

	Sp	S	F	W
LARKS				
* Horned Lark	u	u	u	u
SWALLOWS				
Tree Swallow	u	o		
Violet-green Swallow	o	o	o	
* Northern Rough-winged Swallow	u	u	o	
* Bank Swallow	c	u	u	
* Cliff Swallow	a	a	o	
* Barn Swallow	c	c	a	
JAYS, MAGPIES AND CROWS				
* Black-billed Magpie	c	c	c	c
American Crow	r			
* Common Raven	u	u	u	o
CHICKADEES AND TITMICE				
Black-capped Chickadee	r	r	r	r
NUTHATCHES				
Red-breasted Nuthatch	r	r	o	
CREEPERS				
Brown Creeper			o	
WRENS				
* Rock Wren	u	u	u	o
* Canyon Wren	u	o	u	o
House Wren			o	
Winter Wren			u	o
* Marsh Wren	c	u	u	u
KINGLETS, BLUEBIRDS AND THRUSHES				
Golden-crowned Kinglet	o		o	
Ruby-crowned Kinglet	u	o	u	
Western Bluebird	r			
Mountain Bluebird	r			
Townsend's Solitaire	u	u	o	o
Swainson's Thrush			r	
Hermit Thrush	r		o	
* American Robin	u	u	u	u
Varied Thrush	o		o	
MOCKINGBIRDS AND THRASHERS				
Gray Catbird	r	r		
* Sage Thrasher	o	o	o	
WAGTAILS AND PIPITS				
Water Pipit	u		o	u
WAXWINGS				
Bohemian Waxwing				o
Cedar Waxwing	r	o		
SHRIKES				
Northern Shrike	r	r	o	o
* Loggerhead Shrike	u	u	o	o
STARLINGS AND MYNAS				
* European Starling	c	c	c	c
VIREOS				
Solitary Vireo	r	o	o	
Warbling Vireo	o	o	o	

WARBLERS	Sp	S	F	W
Orange-crowned Warbler	o	o	u	
Nashville Warbler	o	o	o	
* Yellow Warbler	o	o	u	
Yellow-rumped Warbler	u	o	c	
Townsend's Warbler	u	u	o	
MacGillivray's Warbler	u	o	u	
* Common Yellowthroat	o	o		
* Wilson's Warbler	u	u	o	
* Yellow-breasted Chat	u	u	o	
TANAGERS				
Western Tanager		o	o	
GROSBEAKS AND BUNTINGS				
* Lazuli Bunting	o	o		
TOWHEES AND SPARROWS				
Rufous-sided Towhee	o		o	
American Tree Sparrow	u		u	u
Chipping Sparrow	u		u	
* Brewer's Sparrow	o	o	o	
* Vesper Sparrow	o	o	o	
* Lark Sparrow	o	u	o	
* Sage Sparrow	o	o	o	
* Savannah Sparrow	c	o	c	
* Grasshopper Sparrow	c	o	c	
Fox Sparrow	o		o	
* Song Sparrow	u	u	u	u
Lincoln's Sparrow	r		o	
Golden-crowned Sparrow	u		u	
White-crowned Sparrow	a		a	c
Dark-eyed Junco	c		c	c
BLACKBIRDS, MEADOWLARKS AND ORIOLES				
* Red-winged Blackbird	a	a	c	c
* Western Meadowlark	c	c	c	u
* Yellow-headed Blackbird	c	c	u	u
* Brewer's Blackbird	c	u	u	c
* Brown-headed Cowbird	c	c	c	c
* Northern Oriole		u	u	
FINCHES				
Rosy Finch				r
House Finch	u	o	o	u
Red Crossbill	r		r	
Pine Siskin	r	o		
* American Goldfinch	o	o	o	u
Evening Grosbeak	r			r
OLD WORLD SPARROWS				
* House Sparrow	c	u	c	u

ACCIDENTALS
Arctic Loon
White-faced Ibis
Brant
Harlequin Duck
Willet
Whimbrel
Long-tailed Jaegar
Mew Gull
Northern Saw-whet Owl
Chestnut-sided Warbler
Harris' Sparrow

Mammals

All mammals listed are considered resident species with the exception of bats which migrate out of the area during winter, much like some of the birds. Other mammal populations fluctuate on a seasonal basis due to hibernation, migrations between summer and winter ranges, and cyclical population fluctuations such as observed in rodents and predators.

The following animals, listed by family, have been observed on the refuge. It is quite possible that others (such as bat species) use the refuge but have not yet been documented. The names and order follow the "Revised Checklist of North American Mammals North of Mexico, 1982" written by Jones, Carter, Genoways, Hoffman, and Rice (Occasional Paper Number 80, The Museum, Texas Tech University).

SHREWS
Vagrant Shrew

BATS
Small-footed Myotis

HARES AND RABBITS
Nuttall's Cottontail
Black-tailed Jack Rabbit

SQUIRRELS
Yellow-bellied Marmot
Washington Ground Squirrel

POCKET GOPHERS
Northern Pocket Gopher

HETEROMYIDS (POCKET MICE AND RELATIVES)
Great Basin Pocket Mouse

BEAVERS
Beaver

CRICETIDS (NEW WORLD RATS AND MICE)
Western Harvest Mouse
Deer Mouse
Bushy-tailed Woodrat
Montane Vole
Sagebrush Vole
Muskrat

MURIDS (OLD WORLD RATS AND MICE)
Norway Rat
House Mouse

NEW WORLD PORCUPINES
Porcupine

CANIDS
Coyote

PROCYONIDS
Raccoon

MUSTELIDS (WEASELS AND RELATIVES)
Long-tailed Weasel
Mink
Badger
Striped Skunk

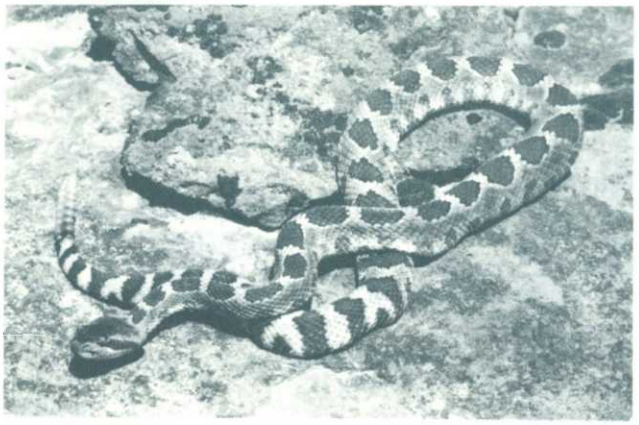
CATS
Bobcat

CERVIDS
Mule Deer
White-tailed Deer (1986 record)

Reptiles and Amphibians

Because of its location so far north, relatively few species of amphibians and reptiles live on the refuge. Reptiles, other than turtles, are usually found in upland areas, while amphibians prefer marshes, lakes and streams. These animals are generally secretive and are seen only from spring through fall, because they hibernate during the winter. The western rattlesnake and night snake are the only venomous reptiles present on the refuge. Night snakes are rarely found and stay hidden during the day. Rattlesnakes, though common, pose little threat if you use reasonable care. You should be alert for their presence during warm weather, particularly in rocky areas and heavy vegetation, and remember that they are protected on the refuge. Bullfrogs have rapidly become the refuge's most common amphibian since first being found south of Migraine Lake in 1983. The following list is in accordance with "A Field Guide to Western Reptiles and Amphibians" by Robert C. Stebbins.

Western Rattlesnake



REPTILES

- Painted Turtle
- Side-blotched Lizard
- Pygmy Horned Lizard
- Western Skink
- Racer
- Gopher Snake
- Western Terrestrial Garter Snake
- Night Snake
- Western Rattlesnake

AMPHIBIANS

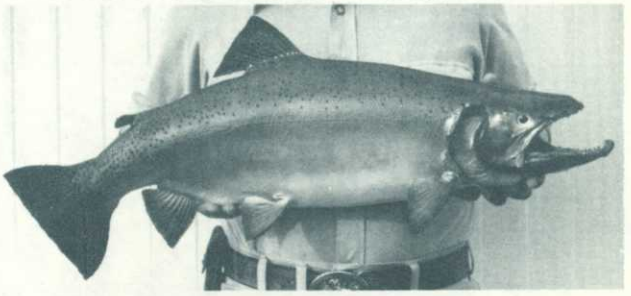
- Great Basin Spadefoot Toad
- Pacific Treefrog
- Leopard Frog
- Bullfrog

Fishes

A wide variety of fish species live in waters on and adjacent to Columbia Refuge. The greatest variety is found in waters connected directly to the Columbia Basin Irrigation Project (Potholes Reservoir and waters connected by Potholes Canal) and in waters associated with Lower Crab Creek. Most refuge waters are managed for and open to sport fishing subject to state seasons.

The following list, divided by families, is of fish species found in the Columbia Basin and is taken from the "Columbia Basin Wildlife/Irrigation Development Study;" written by Foster, Tillett, Myers and Hoag (Report No. REC-ERC-83-6, U.S. Department of the Interior, Bureau of Reclamation, 1984).

Mounted 11 lb. 8 oz. Rainbow from Lower Hampton Lake



TROUT, SALMON AND WHITEFISH

- Rainbow Trout
- Brown Trout
- Cutthroat Trout
- Brook Trout
- Dolly Varden Trout
- Chinook Salmon
- Sockeye Salmon (Kokanee)
- Lake Whitefish
- Mountain Whitefish

SUNFISH

- Smallmouth Bass
- Largemouth Bass
- Bluegill
- Pumpkinseed Sunfish
- Black Crappie

PERCH

- Yellow Perch
- Walleye

CATFISH

- Brown Bullhead
- Yellow Bullhead

SUCKERS

- Longnose Sucker
- Largescale Sucker
- Bridgelip Sucker

MINNOWS AND CARP

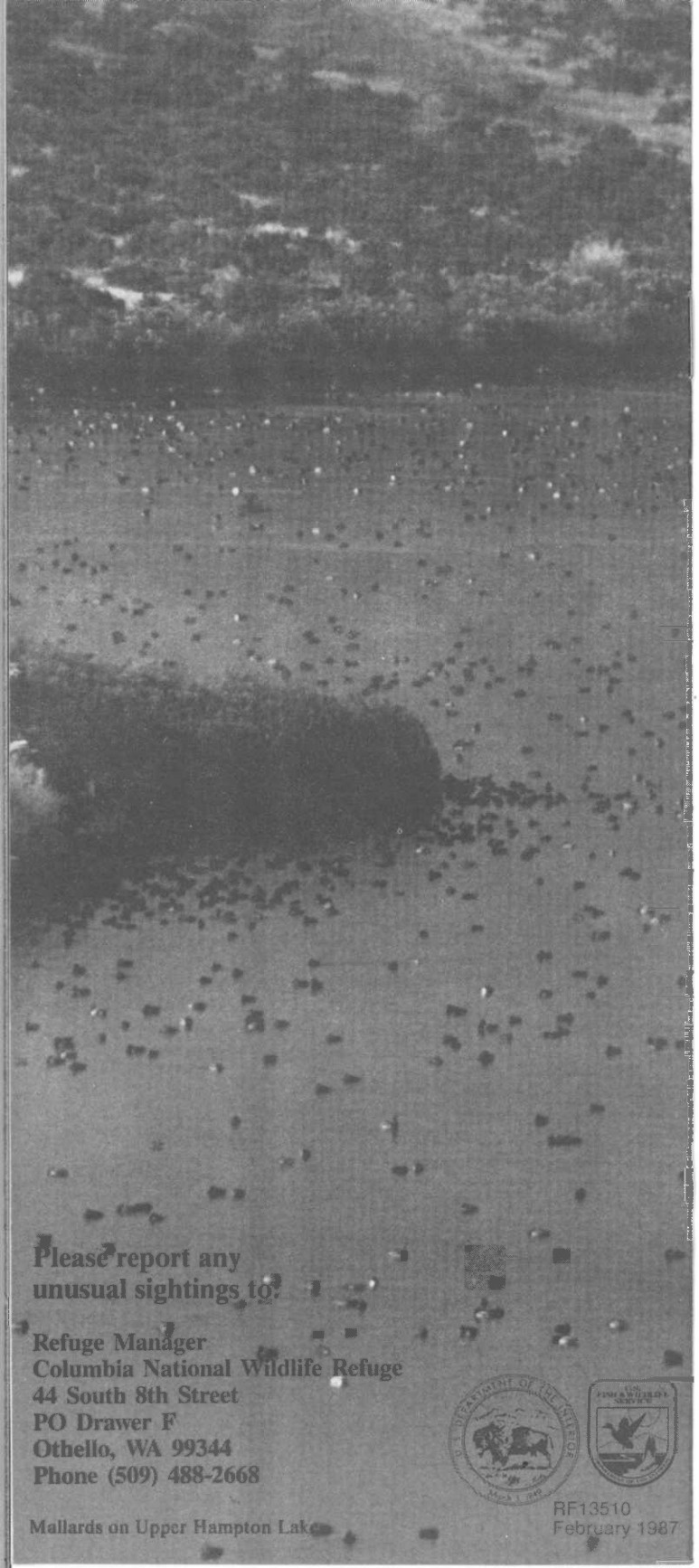
- Carp
- Peamouth Chub
- Northern Squawfish
- Speckled Dace
- Longnose Dace
- Redside Shiner
- Roach (Tui Chub)

SCULPINS

- Sculpin

CODFISH

- Burbot



Please report any unusual sightings to:

Refuge Manager
Columbia National Wildlife Refuge
44 South 8th Street
PO Drawer F
Othello, WA 99344
Phone (509) 488-2668

Mallards on Upper Hampton Lake

RF13510
February 1987

Hunting

Columbia National Wildlife Refuge

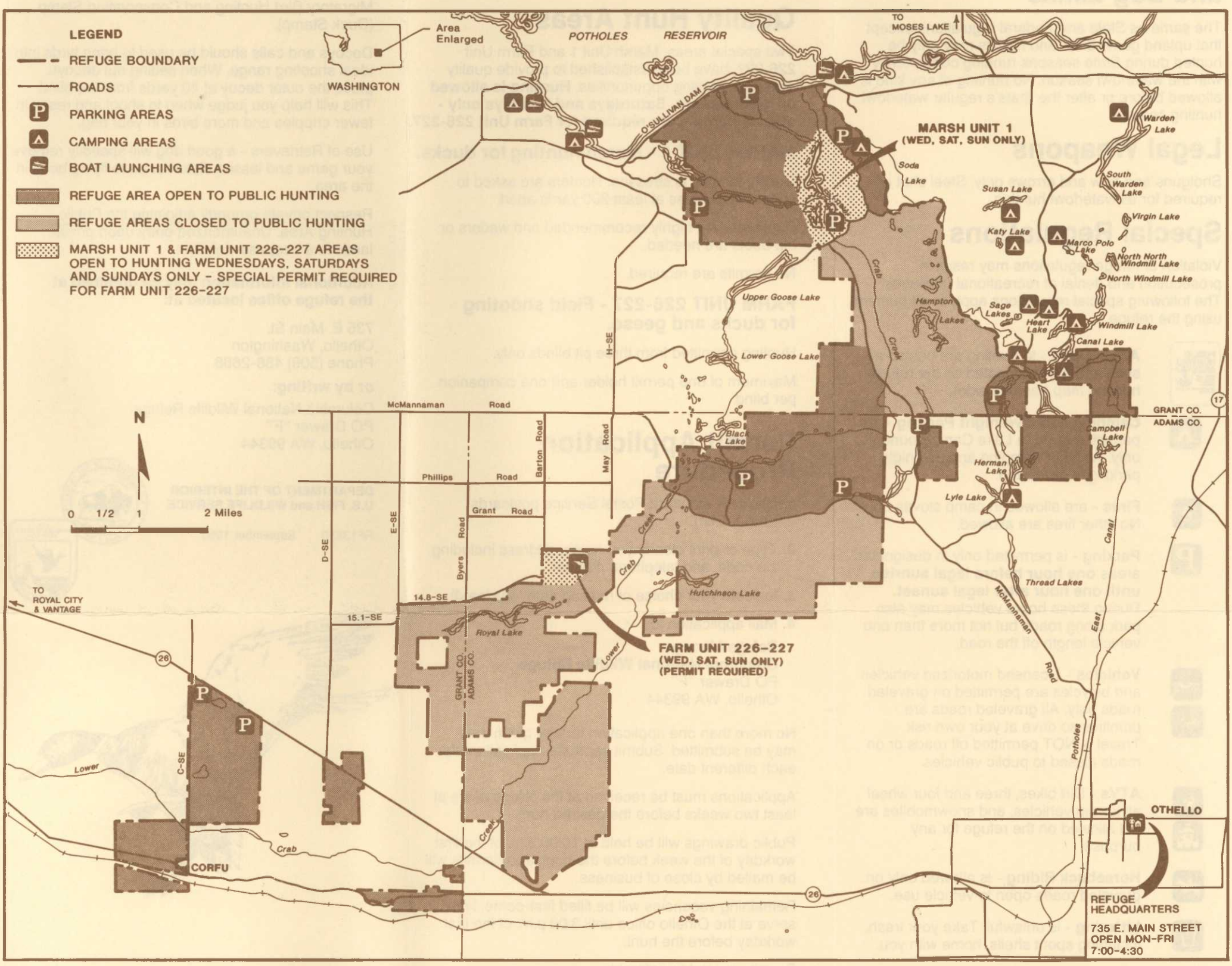
WASHINGTON

Signs to Follow

Millions of people visit National Wildlife Refuges every year. The impact of humanity descending upon refuges, if not regulated in part, can degrade these wildlands. Signs grant or restrict certain activities to provide optimum freedom for visitors while also protecting refuge elements from undue human abuse. Please respect the following signs:

This sign delineates the refuge boundary. You may enter the area only on designated access routes.

This area is closed to ALL entry. No hunting, fishing or sightseeing is permitted. No roads or trails are open to the public.



Hunting Regulations

Columbia National Wildlife Refuge

Hunting Area and Legal Game

Ducks, geese, coots, snipe, quail, pheasant, chukar, rabbit and deer may be hunted in the areas shown on the map and posted with **PUBLIC HUNTING AREA** signs. Entry into all other areas of the refuge (outside public hunting areas) is prohibited during waterfowl hunting season. **All species not listed above are protected.**

Seasons, Hunting Hours and Bag Limits

The same as State and Federal regulations except that upland game birds and rabbits may only be hunted during State seasons running concurrently with the waterfowl season. No hunting of any kind is allowed before or after the State's regular waterfowl hunting season.

Legal Weapons

Shotguns and bow and arrows only. Steel shot is required for all waterfowl hunting.

Special Regulations

Violation of refuge regulations may result in prosecution and denial of recreational privileges. The following special regulations apply to all hunters using the refuge.

Areas Open - to hunting are posted as such and are designated on the refuge hunting map (reserve side).

Camping and Overnight Parking - are permitted in Soda Lake Campground only. All other camping and overnight parking is prohibited.

Fires - are allowed in camp stoves only. No other fires are allowed.

Parking - is permitted only in designated areas **one hour before legal sunrise until one hour after legal sunset.** During these hours vehicles may also park along roads but not more than one vehicle length off the road.

Vehicles - Licensed motorized vehicles and bicycles are permitted on graveled roads only. All graveled roads are primitive so drive at your own risk. Travel is NOT permitted off roads or on roads closed to public vehicles.

ATVs - Dirt bikes, three and four wheel all terrain vehicles, and snowmobiles are not allowed on the refuge for any purpose.

Horseback Riding - is allowed only on graveled roads open to vehicle use.

Littering - is unlawful. Take your trash, including spent shells, home with you.

Dogs - may be used to retrieve birds but must be kept leashed when not hunting.

Temporary Blinds - may be constructed but must be available for general use on a first-come, first-serve basis.

Decoys - may not be left, set up for hunting, on the refuge overnight.

Boats - are permitted in areas open to hunting during the regular waterfowl hunting season.

Quality Hunt Areas

Two special areas, Marsh Unit 1 and Farm Unit 226-227, have been established to provide quality waterfowl hunting opportunities. **Hunting is allowed on Wednesdays, Saturdays and Sundays only - special permits are required for Farm Unit 226-227.**

MARSH UNIT 1 - Marsh hunting for ducks.

Quality hunting is stressed. Hunters are asked to space themselves at least 200 yards apart.

Retrievers are highly recommended and waders or hip boots are needed.

No permits are required.

FARM UNIT 226-227 - Field shooting for ducks and geese.

Hunting permitted from three pit blinds only.

Maximum of one permit holder and one companion per blind.

Permit Application Procedure

1. Use only standard Postal Service postcards (3½" X 5½").
2. Type or print clearly you name, address including zip code, and telephone number.
3. Indicate your choice of hunting date (one/card).
4. Mail application to:

   Refuge Manager
   Columbia National Wildlife Refuge
   PO Drawer "F"
   Othello, WA 99344

No more than one application for any given date may be submitted. Submit separate applications for each different date.

Applications must be received at the refuge office at least two weeks before the desired hunt.

Public drawings will be held at 10:00 a.m. of the first workday of the week before the hunt, and permits will be mailed by close of business.

Remaining vacancies will be filled first-come, first-serve at the Othello office until 3:00 p.m. of the last workday before the hunt.

Permits are not transferable.

General Information

Hunters should examine their own abilities and limitations before using the refuge. Handicapped persons should hunt with a partner and consult the refuge manager for suggestions for hunting the area safely.

Beware of thin ice before venturing out onto the ice to hunt or retrieve downed birds.

All hunters must possess a valid Washington State hunting license. All waterfowl hunters must also possess a current Washington Waterfowl Stamp, and if 16 years of age or over, a valid Federal Migratory Bird Hunting and Conservation Stamp (Duck Stamp).

Decoys and calls should be used to bring birds into ideal shooting range. When setting out decoys, place the outer decoy at 40 yards from the blind. This will help you judge when to shoot and result in fewer cripples and more birds in your bag.

Use of Retrievers - a good dog will speedily retrieve your game and lessen disturbance to flying birds in the area.

Respect private property adjoining the Public Hunting Area. Unauthorized entry upon private lands is a trespass violation.

Additional information may be obtained at the refuge office located at:

735 E. Main St.
Othello, Washington
Phone (509) 488-2668

or by writing:

Columbia National Wildlife Refuge
PO Drawer "F"
Othello, WA 99344

DEPARTMENT OF THE INTERIOR
U.S. FISH and WILDLIFE SERVICE

RF13510 September 1990