



Columnar Basalt

## A Refuge Formed by Fire, Ice, Flood, and Volcano

Columbia Refuge is in the middle of Washington's famous Channelled Scablands and has a rich geologic history highlighted by periods of extreme violence. Fire, ice, flood, and volcano all played major roles in shaping the area, and the process goes on today!

### Ancient Lava Flows

All of the native rock in the refuge area is basalt, a dense crystalline lava that covers more than 100,000 square miles in Washington, Oregon, and Idaho. Most of this lava erupted between 30 million and 10 million years ago. At times one flow followed another at short intervals, but at other times, tens of thousands of years intervened between flows. Erupting from long, wide fissures, early flows filled the valleys and subsequent flows covered most of the high hills as layer upon layer eventually formed a solid sea of basalt, in places more than 10,000 feet thick. Slowly a covering of windblown silt or loess and ash from Cascade volcanoes built up over the basalt, eventually producing fertile soils covered with grasses that nurtured the wildlife of the times.

### Rivers Blocked by Ice

Beginning 100,000 years ago, glaciers crept south from British Columbia into northern Washington, Idaho, and Montana. Many times the advances of glacial ice blocked the Clark Fork River near the Idaho-Montana border and water backed up behind the ice dam.

The lake that was formed (Glacial Lake Missoula) at its highest level covered an area of about 3,000 square miles and contained an estimated 500 cubic miles of water. Its maximum depth of nearly 2,000 feet was more than twice the depth of Lake Superior!

### Flood Waters Carved the Scablands

Eventually, the rising water began to overflow its ice dam. The flowing water eroded the dam within a very short time—perhaps no more than a day or two—releasing the tremendous volume of the lake. As the lake drained, the maximum rate of flow is estimated to have been 9-1/2 cubic miles per hour—a rate of 386 million cubic feet per second, or about 10 times the combined flow of all the rivers on Earth!

Evidence indicates that glaciers advanced and blocked the Clark Fork River as many as 85 times in the last 16,000 years. Although there were many episodes of glacial flooding, so far as geologists can tell, the largest lake was formed 12,000 years ago and its sudden draining produced the last and greatest flood.

When the flood reached the Columbia Basin, the enormous volume, velocity, and turbulence of the water eroded away the surface soils and exposed the basalt underneath. Deep canyons were eroded into the basalt forming the Channelled Scabland terrain of which the refuge is a part. The northern half of the refuge south of Potholes Reservoir is a rugged jumble of cliffs, canyons, lakes, and remnants of lava flows. This part of the Scablands, called the Drumheller Channels, is the most spectacularly eroded area of its size in the region and was designated a National Natural Landmark in 1986.

### Mount Saint Helens Contributes

Not all notable geologic changes happened thousands or millions of years ago. On May 18, 1980, Mount St. Helens, 150 miles southwest of the refuge, erupted violently and sent a cloud of volcanic ash over eastern Washington that turned day into night. A heavy layer of powdery ash, up to 2 inches thick at the north end of the refuge, buried vegetation, disrupted wildlife and generally made life miserable. The compacted ash layer is still very evident but is eroding from high spots and elsewhere is being incorporated into the soil through natural processes.



Blooming Phlox (late April)

## Recreation Opportunities Abound

Today visitors are drawn to Columbia National Wildlife Refuge for the scenic and recreational opportunities available. Take an auto tour of the refuge. Visit the Drumheller Channels National Natural Landmark interpretive site commemorating the glacial floods. Go for a walk and photograph flowers or identify birds. Paddle a canoe from Hutchinson Lake to Shiner Lake and enjoy solitude and the antics of swallows building cliffside nests. Hike one of three different interpretive trails that highlight three different habitats.

Visitors to Columbia have a wide variety of wildlands-oriented activities from which to choose: Wildlife observation, birding, photography, hiking and canoeing, as well as hunting and fishing.

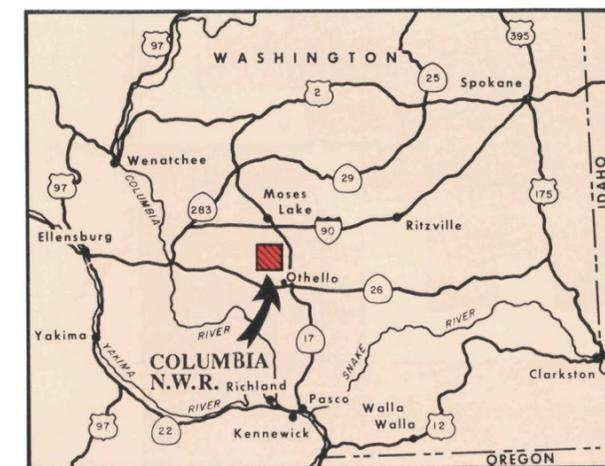
Specific hunting and fishing information and regulations are available at information points on the refuge and at refuge headquarters at 7th and Main Streets in Othello. General refuge regulations are listed on the map portion of this leaflet.



Trout Fishing on Upper Hampton Lake

## Take Pride in America

Public lands are a valued resource entrusted to us by our forefathers. They had the wisdom to recognize that the greatness of this nation lies not only in its diverse human resources, but also in the richness of its natural resources—its wildlands. They saw fit to ensure these resources would not be squandered. Can we do less for our children? Litter and vandalism communicate disrespect and apathy. Please respect YOUR public lands. TAKE PRIDE IN AMERICA!



0 10 20 30 MILES  
0 16 32 48 KILOMETERS

### Location Map

The headquarters for Columbia National Wildlife Refuge is located in Othello, 6 miles southeast of the refuge. For more information contact:

Refuge Manager  
Columbia National Wildlife Refuge  
735 East Main Street  
PO Drawer F  
Othello, Washington 99344  
Phone: (509) 488-2668

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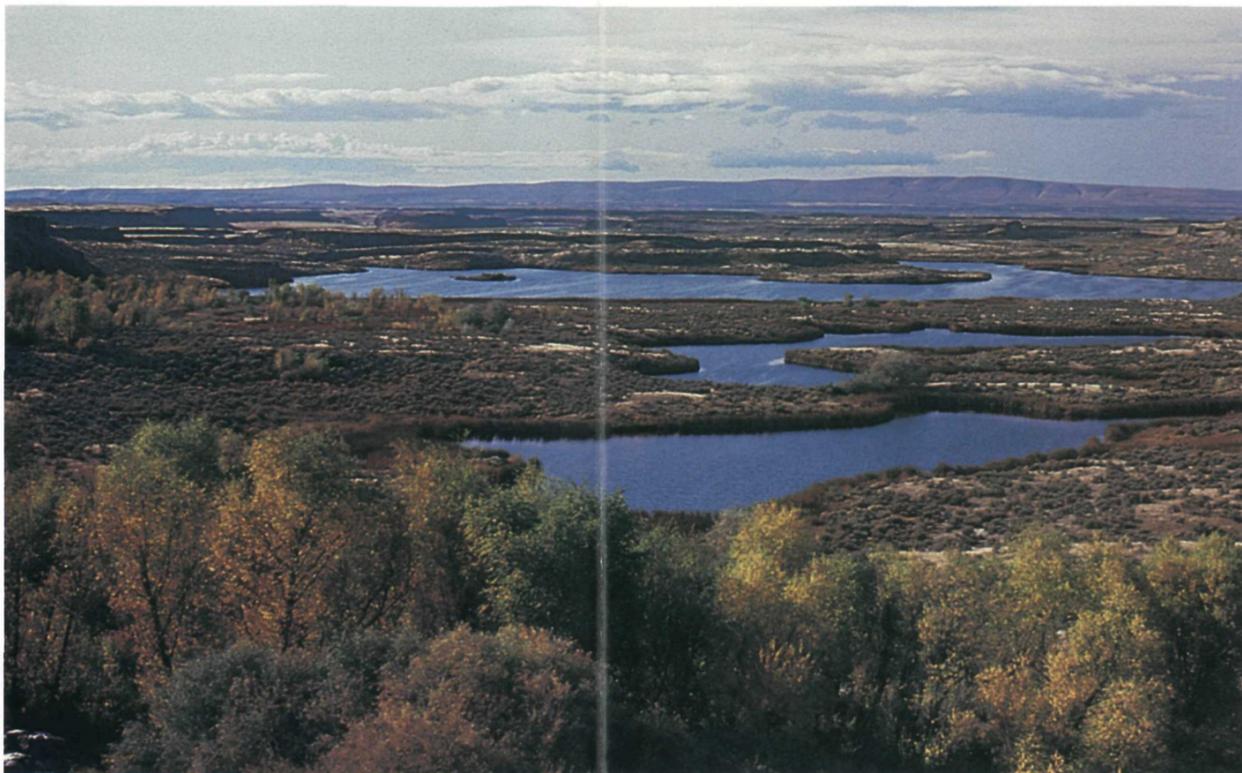


U.S. Department of the Interior  
Fish and Wildlife Service

July 1992 RF 13580

# COLUMBIA

National Wildlife Refuge  
WASHINGTON



*South over Sago, Wigeon, and Upper Hampton Lakes*

## Columbia National Wildlife Refuge—Wildlife and Scenic Beauty

Columbia is a scenic mixture of rugged cliffs, canyons, lakes and arid sagebrush grasslands. The favorable mixture of lakes and surrounding irrigated croplands, combined with generally mild winters and protection provided by the refuge, attracts large numbers of migrating and wintering mallard ducks, Canada geese, and other waterfowl, including tundra swans.

With its location in the rain shadow of the Cascade Mountains, annual precipitation on the refuge averages less than 8 inches, creating an arid, desert environment. Most precipitation is received during the late fall, winter, and early spring when weather is generally cloudy and often foggy. When spring moisture is sufficient, refuge uplands bloom with a multitude of wildflowers. Spring days are frequently windy and are sometimes punctuated with blinding dust storms. Summers are generally sunny, hot, and very dry.

Located within the Columbia Basin of east-central Washington, Columbia is one of more than 465 national wildlife refuges in the nation's system, which totals more than 90 million acres of land and water. This refuge includes approximately 23,200 acres.

### Wildlife of Many Kinds

Columbia National Wildlife Refuge provides the sanctuary areas necessary to protect wintering mallard ducks and, to a smaller extent, lesser, and Columbia Basin Canada geese. In addition, many other species of wildlife are year-round residents or use the refuge during various seasons. Waterfowl populations are highest during the fall when peaks of over 100,000 birds can occur.

### Migrating Waterfowl Abundant

Unfortunately for visitors wishing to see large numbers of waterfowl, 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. Good viewing, however, of the thousands of ducks and geese using Royal Lake is available from the overlook at the south end of Byers Road.

During the spring and summer almost the entire refuge is open to the public and wildlife viewing is best. Mallards, gadwalls, cinnamon teal, redheads, and ruddy ducks are the most common warm weather ducks and nest on the refuge. American coots, though not waterfowl, are also abundant nesters and are often mistaken for ducks. The pugnacious behavior of nesting coots and the antics of the brightly colored red and black chicks keep the summer marsh lively.



*Fledgling Great Horned Owl*

### Many Other Bird Species

In addition to waterfowl, many other wildlife species are found on the refuge. The ledges, cracks, and holes which abound in the numerous basalt cliffs provide important nesting habitat for many red-tailed hawks, American kestrels, great-horned owls, barn owls, and a few ravens. The cliffs are also used by large colonies of cliff swallows to hold and shelter their mud nests. Great blue herons are frequently seen standing like sentinels at the top of cliffs and rock outcrops near water. Increasing numbers of sandhill cranes visit the refuge during spring and fall migrations. Northern harriers are common, as are magpies, pheasants, California quail, and black-crowned night herons.

Long-billed curlews and American avocets are less common but nest on the refuge. A checklist of the many other species of refuge birds and wildlife is available at the refuge office.



*Mule Deer*

### Mammals Also Seen

Coyotes are relatively abundant but, like the few mule deer on the refuge, are secretive and not often seen by visitors. Tracks of both species are frequently found in the gray ash from Mount St. Helens. Muskrats are common and surprisingly, considering the absence of trees, so are beaver. Bobcats and badgers are present but scarce.



*Western Rattlesnake*

### Be Alert for Rattlesnakes

Five species of snakes are found on the refuge including the western rattlesnake which is fairly common. Visitors should be alert for rattlesnakes but must remember that they, like all other species of wildlife on the refuge, are protected. Rattlesnakes might be found anywhere on the refuge during warm weather but are most abundant in rocky areas and in heavy vegetation.



*Mallards on Upper Hampton Lake (December)*

## Recent Lakes Support Wildlife

### Indians Found Arid Land Here

There was only an intermittent creek when the Columbia Salish Indians first used this area. While the seasonal scarcity of game in the desert environment discouraged them from establishing permanent camps, they did travel through the area as they followed Crab Creek to their fishing areas along the Columbia River. Waterfowl use was also confined to areas along the Columbia River.

### Early Grazing Impacted Wildlife

During the 1860s cattle were brought into the area and the land was soon overgrazed. When the grass condition became too poor for cattle, sheep were introduced. By the turn of the century, the sheep, plus the 3,000 feral (wild) horses which ranged along Crab Creek from off the Saddle Mountains, had taken a heavy toll on the land. Still more land was laid waste through unsuccessful farming attempts by early settlers.

### Grand Coulee Dam Diverted Water Here

Early irrigation efforts in the refuge area encouraged some farmers but failed when local water supplies proved inadequate. Serious planning to irrigate the Columbia Basin on a large scale began in 1918 and hinged on construction of a dam on the Columbia River at Grand Coulee. After years of study and debate, the

Columbia Basin Project was approved and construction of Grand Coulee Dam began in 1934. On August 10, 1951, the first irrigation water began flowing to Columbia Basin farmlands. Columbia National Wildlife Refuge was established in conjunction with the irrigation project in 1944 and has been actively managed since 1955.

### Lakes Appeared!

With the availability of a reliable supply of abundant water, the project area changed quickly and dramatically. The water table rose as predicted and lakes appeared in former canyons and low spots throughout the refuge and surrounding areas. In many places on the refuge additional lakes and ponds were created by damming spring and seepage flows. All the present refuge lakes and impoundments are the result, directly or indirectly, of irrigation water.

### Farm Food for Ducks and Geese

Around the refuge, dryland wheat areas and many acres of sagebrush grasslands were soon converted to a wide variety of irrigated crops. Many of these crops, particularly corn, provided abundant food for ducks and geese. The agricultural development, together with the numerous water areas, combined each year to provide ideal feeding and resting areas for many thousands of migrating and wintering waterfowl.

# Enjoying Columbia National Wildlife Refuge

Thousands of visitors enjoy Columbia National Wildlife Refuge every year. The wide variety of recreational activities they pursue will continue to be enjoyed as long as everyone follows a few simple regulations.

## SPECIAL REGULATIONS

-  **BOATS** or other flotation devices are not allowed on impoundments on and along Crab Creek in Marsh Units I and II. Both powered and nonpowered 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.
-  **PARKING** is permitted only in designated areas 1 hour before legal sunrise until 1 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 IS PROHIBITED.**
-  **FIRES** are allowed in **CAMP STOVES ONLY. NO OTHER FIRES ALLOWED.**
-  **VEHICLES** (licensed motorized) and bicycles are permitted on gravel roads only. All gravel 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-wheeled all terrain vehicles, and snowmobiles are not allowed on the refuge for any purpose.

-  **HORSEBACK RIDING** is allowed only on gravel roads open to vehicle use.
-  **FIREARMS**—All firearms are prohibited, except shotguns which are allowed in public hunting areas only during the hunting season.
-  **DOGS** and other pets are not allowed to run at large. They 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. See refuge hunting or fishing leaflet for details.
-  **SWIMMING** is prohibited in all waters on the refuge.
-  **LITTERING** is unlawful. Take your trash home with you.
-  **ARTIFACTS**—*searching for and removing objects of antiquity are prohibited.*

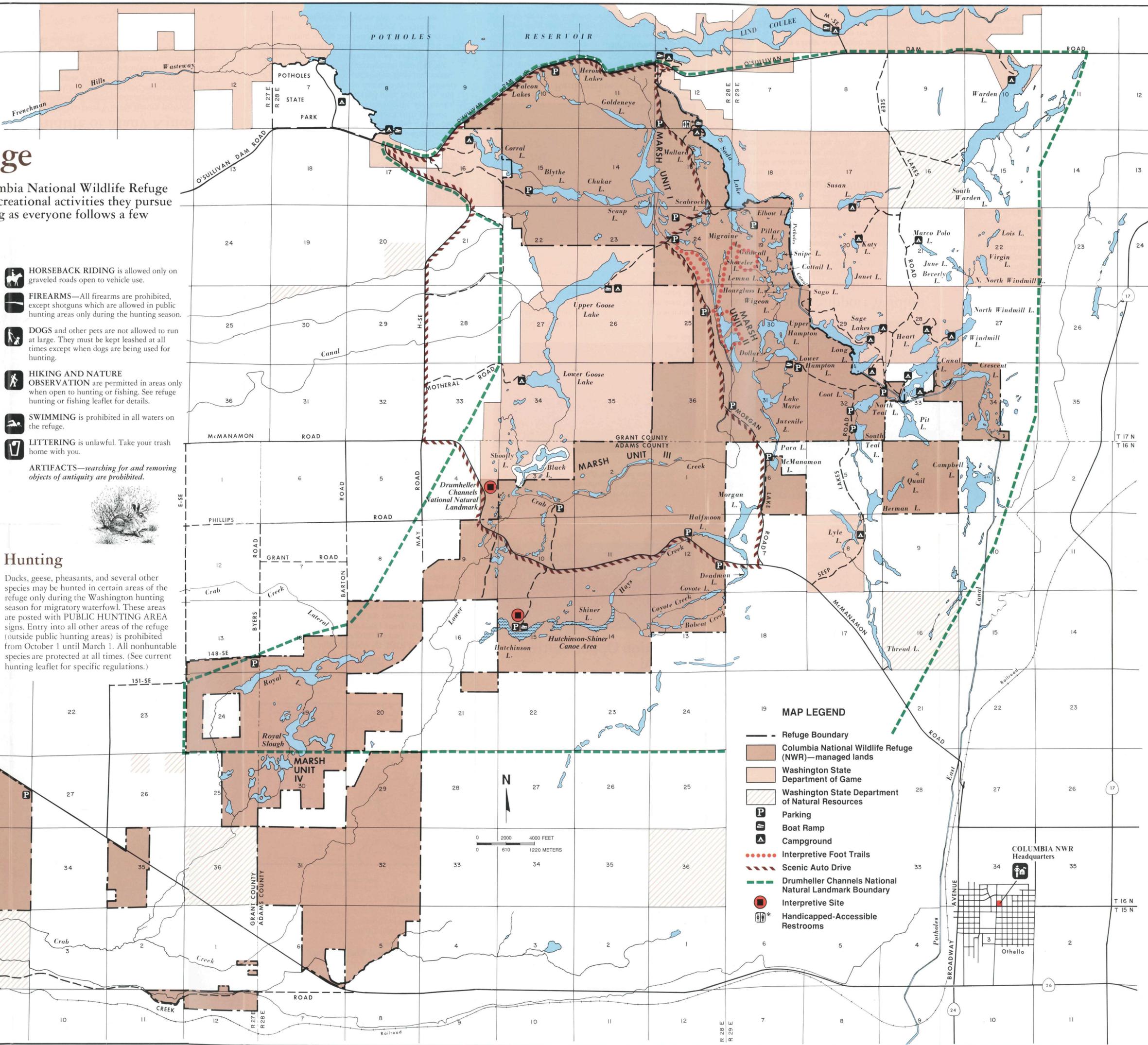
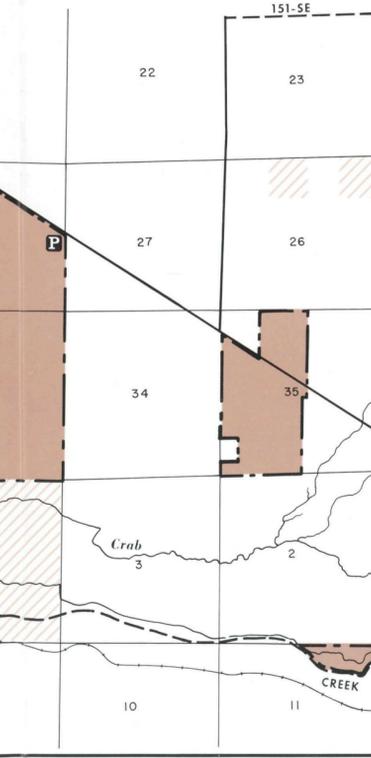


## Fishing

The Columbia National Wildlife Refuge offers varied fishing opportunities for anglers of all ages. Over 50 deep 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. (See fishing leaflet for specific regulations.)

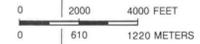
## Hunting

Ducks, geese, pheasants, and several other species may be hunted in certain areas of the refuge only during the Washington hunting season for migratory waterfowl. These areas are posted with **PUBLIC HUNTING AREA** signs. Entry into all other areas of the refuge (outside public hunting areas) is prohibited from October 1 until March 1. All nonhunting species are protected at all times. (See current hunting leaflet for specific regulations.)



## MAP LEGEND

-  Refuge Boundary
-  Columbia National Wildlife Refuge (NWR)—managed lands
-  Washington State Department of Game
-  Washington State Department of Natural Resources
-  Parking
-  Boat Ramp
-  Campground
-  Interpretive Foot Trails
-  Scenic Auto Drive
-  Drumheller Channels National Natural Landmark Boundary
-  Interpretive Site
-  Handicapped-Accessible Restrooms



COLUMBIA NWR Headquarters

Othello

Broadway Avenue

Broadway Avenue East

Potholes

Canal

McManamon

Seep

Lake

Paral

McManamon