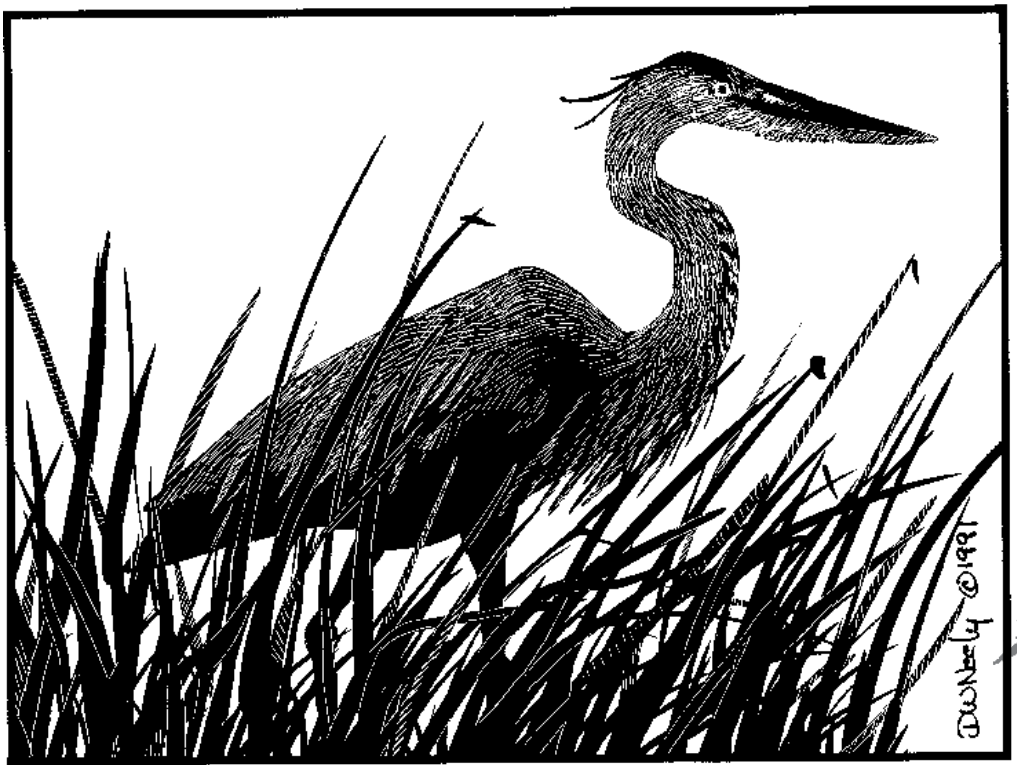
An Educators Guide to

Ridgefield National Wildlife Refuge



Introduction

1984
Kendal Morris

The U.S. Fish and Wildlife Service manages national fish hatcheries and national wildlife refuges throughout the country for the continued conservation, protection, and enhancement of our fish and wildlife resources and their habitats.

For more information contact:

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To the Educator

A child's world is fresh and new and beautiful, full of wonder and excitement. It is our misfortune that for most of us that clear-eyed vision, that true instinct for what is beautiful and awe-inspiring, is dimmed and even lost before we reach adulthood. If I had influence with the good fairy who is supposed to preside over the christening of all children I should ask that her gift to each child in the world be a sense of wonder so indestructible that it would last throughout life, as an unfailing antidote against the boredom and disenchantments of later years, the sterile preoccupation with things that are artificial, the alienation from the sources of our strength.

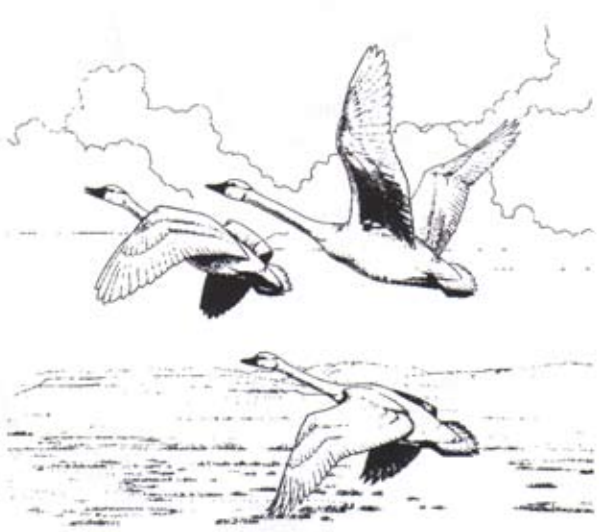
—Rachel Carson
A Sense of Wonder

Thank you for selecting Ridgefield National Wildlife Refuge for your group's field trip!

We are delighted that you are taking the opportunity to use the refuge's resources to enhance your classroom learning experience. Our hope is that this Educator's Guide facilitates the process of discovery, learning, and enjoyment. The guide includes information about the refuge's history, habitats, and wildlife, field trip planning and preparation, and classroom and outdoor activities for grades 4 to 6. The activities presented focus on four major themes: birds, migration, habitats, and the Cathlapotle Plankhouse. A glossary and some additional resource information are also included.

If this guide fulfills its purpose, your field trip will result in big smiles, windblown hair, dirty hands, and happy memories. Hopefully, it will also result in a better understanding of and a sense of wonder about the natural world around us.

We hope you and your students enjoy your visit to Ridgefield National Wildlife Refuge. Please do not hesitate to call the refuge staff at (360) 887-4106 if you need assistance.



Tundra swans

Acknowledgments

This Educator's Guide is the result of the work of many people, and many spirited discussions during evening meetings by the members of the Refuge Teacher Workshop Committee. We'd like to extend our gratitude and thanks to the following people who contributed time and skills to this project. A special thanks goes to Debby Neely, who graciously donated her artwork of the great blue heron for the cover.

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Introduction

The U.S. Fish and Wildlife Service

The Fish and Wildlife Service (FWS), within the U.S. Department of the Interior, is the principal agency through which the U.S. Government carries out its responsibilities to care for the country's wildlife and their habitats. Migratory birds, endangered species, certain marine mammals, and freshwater and anadromous fish are all wildlife resources managed by the FWS. Some of the natural resource programs within the FWS include:

Endangered Species
The FWS leads the federal effort to protect and restore animals and plants that are in danger of extinction both in the United States and worldwide. Using the best scientific evidence available, FWS biologists identify species that appear to be endangered or threatened. After review, species may be placed on the Interior Department's official "List of Endangered and Threatened Wildlife and Plants." FWS biologists, along with other partners, then develop recovery plans for the species that include research, habitat preservation and management, and other recovery activities.

Migratory Birds
Because many bird species fly thousands of miles in their annual migrations, conservation by any single state or nation alone is not enough; cooperative efforts by each are required. The U.S. Federal Government is responsible for leading migratory bird conservation under several laws and international treaties with Canada, Mexico, Japan, and the Soviet Union. The FWS is responsible for conservation of more than 800 species of migratory birds. It regulates hunting, studies bird populations, and acquires and manages many national wildlife refuges to provide secure habitat for migratory birds.

Fisheries
Restoring nationally significant fisheries that have been depleted by over fishing, pollution, or other habitat damage is a major effort of the FWS. Research laboratories study fish health, genetics, ecology,

The U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service's mission is to work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

nutrition, and other topics to provide the information needed to raise fish in hatcheries and to restore wild fish populations. As part of this program, nearly 80 national fish hatcheries produce some 50 species of fish. The FWS stocks more than 160 million fish annually.

Federal Aid

Through a system of excise taxes on fishing and hunting equipment, more than $50 million per year is distributed to states for fish and wildlife management. Grants to states fund the purchase and development of critical habitat and research on endangered species.

Law Enforcement

The FWS enforces federal laws that protect endangered species, migratory birds, marine mammals, and fisheries. The FWS carries out U.S. enforcement obligations under international agreements. Special agents work to prevent exploitation of game and non game species and the interstate transportation of illegally taken wildlife. Wildlife inspector stations at major ports of entry check the legality of documents and permits, and inspect shipments of live animals and wildlife products to ensure that protected species are not imported or exported illegally.

National Wildlife Refuge System

The National Wildlife Refuge System is the world's largest and most diverse collection of lands and waterways set aside specifically for wildlife. Over 540 refuges stretch across the continent and over to the Pacific Islands. They range in size from Minnesota's tiny Mille Lacs (less than 1 acre) to Alaska's sprawling Yukon Delta (app.. 20 million acres). Many early refuges were created for herons, egrets, and other water birds. Others were set aside for large mammals like elk and bison. But by far the most have been created to protect migratory waterfowl. Today, national wildlife refuges play a vital role in preserving endangered and threatened species. They provide secure habitat for native plants and many species of resident mammals, fish, insects, amphibians, and reptiles. National wildlife refuges offer a wide variety of recreational opportunities, and many refuges have visitor centers, nature trails, and environmental education programs. Small or large, each refuge provides vital habitat for at least a portion of America's wildlife populations.

Ridgefield National Wildlife Refuge

Ridgefield National Wildlife Refuge (Ridgefield, Washington) is one of over 540 national wildlife refuges found across the United States. Ridgefield Refuge is located on the Columbia River floodplain approximately 20 miles north of Portland, Oregon.

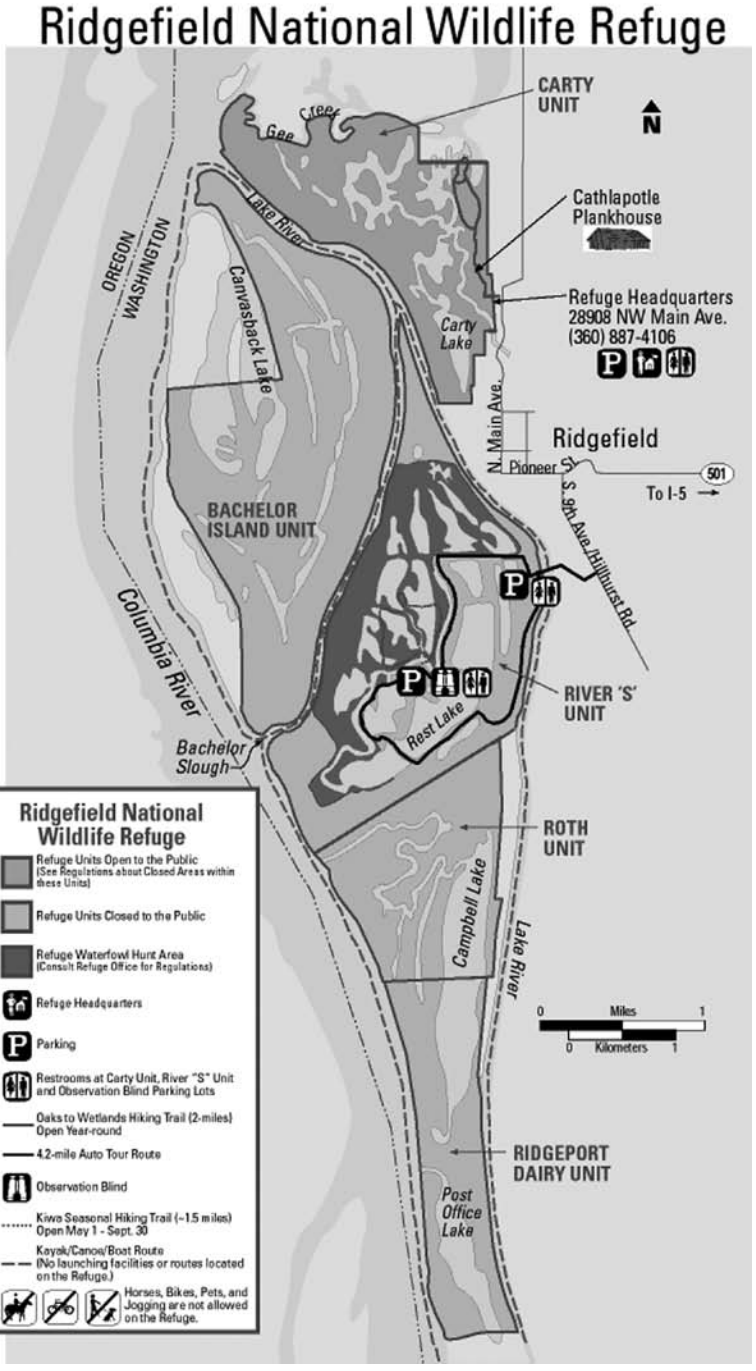
The refuge is one of only a few natural areas left on the Columbia River and provides more than 5,000 acres of vital migration and wintering habitat for Pacific flyway waterfowl. The mild, rainy climate and refuge wetlands along the Columbia River create ideal resting and feeding areas for ducks, geese, and swans. The refuge provides marshes, grasslands, and woodlands for a variety of other animals, birds, and plants. More than 250 species of birds, mammals, fish, reptiles, and amphibians make their homes on the refuge, providing an excellent place to study and observe wildlife.

One of the primary goals for creating the refuge in 1965 was to provide a wintering area for waterfowl, with a special emphasis on dusky Canada geese. The 1964 Alaska earthquake lifted the duskys' nesting grounds on the Copper River delta about 6 feet, altering their nesting habitat, which has resulted in a declining population. For duskys, this refuge and other key wintering areas along the Lower Columbia and Willamette river valleys are especially important.

Ridgefield National Wildlife Refuge (NWR) is a complex of four refuges (see map on page 5). Ridgefield NWR, Steigerwald Lake NWR, Franz Lake NWR, and Pierce NWR are located along the Columbia River floodplain. Each refuge supports unique habitat that provides migration stopover points or wintering homes for migratory birds.

Dusky Canada goose

Map of the Refuge



The five units of Ridgefield National Wildlife Refuge

Locations of the four National Wildlife Refuges that make up the Ridgefield Refuge Complex.

Seasons at the Refuge

Although Ridgefield National Wildlife Refuge is a good place to visit at all times of the year, you are likely to see different kinds of wildlife in different seasons.

Spring (March through May)

Visits at this time of the year usually provide good weather, although many of the ducks, geese, and swans have already migrated north to their nesting grounds. Large numbers of migrating birds move through the refuge during the spring: goldfinches, red-winged blackbirds, warblers, sandhill cranes, and swallows are a few examples. Watch for ducks, geese, red-tailed hawks, great blue herons, bald eagles, and great horned owls, which all nest on the refuge. Along the trails, watch for cottontail rabbits and garter snakes. Painted turtles and nutria are frequently seen on the River "S" Unit. Spring is a great time for wildflowers blooming on the Carty Unit.

Summer (June through August)

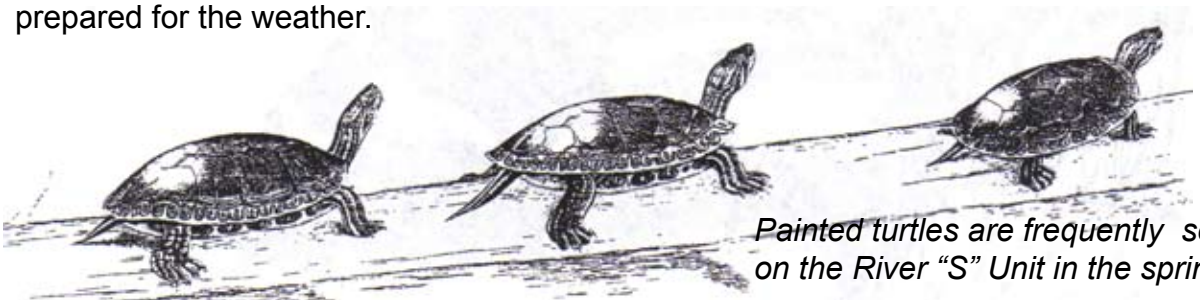
Summer is a good time to conduct studies on vegetation and water quality. The best summer wildlife viewing is early morning or evening. Many wildlife that arrived for spring nesting remain on the refuge through summer. Watch for great blue herons, ducks, geese, red-tailed hawks, and many songbirds.

Fall (September through November)

By scheduling field trips in September or October, educators will find fewer conflicts with other school groups than they would experience in May and June. Songbirds migrate through the refuge during September. Sandhill cranes arrive in late September and can be seen until early November before they continue their southward migration. Fall arrivals also include Canada geese and a variety of ducks including mallards, shovelers, American wigeon, gadwall, pintail, and green-winged teal.

Winter (December through February)

Winter field trips can be a wonderful experience for groups, allowing them to combine environmental education activities with the opportunity to see large numbers of canada geese, tundra swans, and a variety of ducks. Bald eagles are more abundant during winter months. Even in the rain or cold, the opportunity to see large flocks of waterfowl can make a field trip very enjoyable. Groups should come adequately prepared for the weather.



Painted turtles are frequently seen on the River "S" Unit in the spring

Habitats of the Refuge

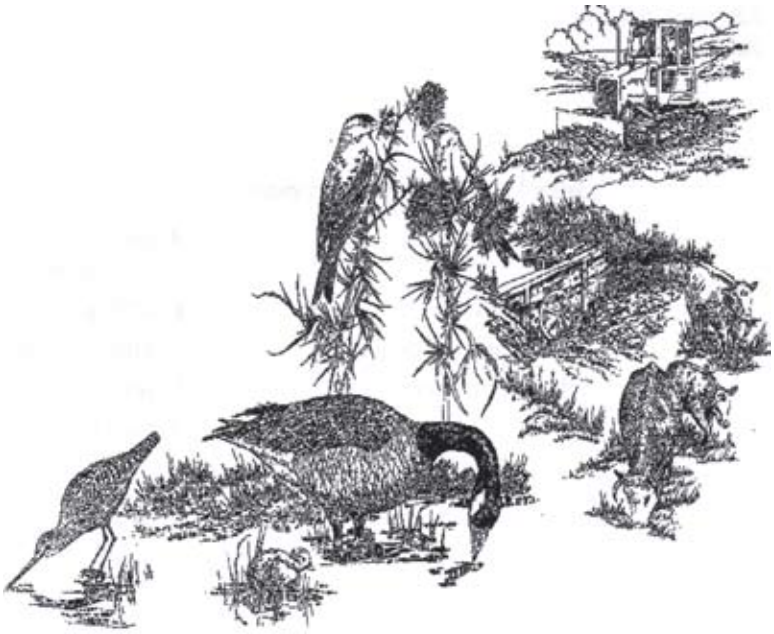
The habitat of an organism is defined as “the place where it lives, or the place occupied by an entire community.” Thus the habitat of an organism includes the other plants, animals, and inorganic materials in its community. The variety of habitats at Ridgefield National Wildlife Refuge provide for a variety of animal and plant life.

For management purposes, the refuge is divided up into five units: 1) Carty, 2) Roth, 3) Bachelor Island, 4) River “S”, and 5) Ridgeport Dairy (see map page 5). To provide the best wildlife habitat, both natural and agricultural habitat management philosophies and techniques are followed on these units.

The Carty and Roth Units are managed to preserve the natural Columbia River floodplain. Basalt outcroppings on the Carty Unit stand above the high water level. They are wooded with ash, oak, and Douglas-fir trees, and exhibit a brilliant spring wildflower display. The Roth Unit is more level, supporting cottonwood, ash, and willow interspersed with grasslands. Cattle graze on parts of these units to maintain the grasslands that provide winter food for waterfowl, especially Canada geese.

Much of the Bachelor Island and River “S” Units are protected from flooding by dikes around their perimeters. These units and the Ridgeport Dairy Unit (which is higher in elevation and is not subject to flooding) are used for growing food crops such as corn, ryegrass, clover and alfalfa for wintering waterfowl. Interspersed with the managed croplands are managed wetlands and remnants of natural habitats that historically existed on a more extensive Columbia River floodplain, such as sloughs, cottonwood, ash, and willow forests.

The next several pages describe the habitats found on the refuge — open-water, freshwater wetlands, fields, riparian woodlands, and upland woodlands.



A variety of management techniques are used to ensure productive wildlife habitat

Habitats of the Refuge

Open Water Habitat

The open waters of the refuge are varied. They include Carty, Campbell, and Post Office lakes, open portions of several River "S" impoundments, the Columbia River and two associated watercourses, Lake River and Bachelor Slough. Although submergent vegetation (aquatic vegetation growing underwater) may be present, especially along the shorelines, these habitats are characterized by the absence of emergent vegetation (aquatic vegetation rooted underwater but growing above the surface of the water).

Carty Lake, located in the Carty Unit, fills each winter when the Columbia River rises and backs water into the lake. Although the river levels drop in the summer months causing Carty Lake to evaporate, the lake seldom dries up completely before the next winter recharge.

Campbell Lake, located in the Roth Unit, is connected to the Columbia River by Campbell Slough. This lake is tidally influenced by the Columbia River throughout the year. Because of its connection to the river, it is refilled every spring when Columbia River water levels rise and then slowly recedes as the river drops in the summer.

Several impoundments on the River "S" Unit contain open water areas. Deep Lake and Rest Lake contain deeper water, providing habitat for diving ducks such as ring-necked ducks and lesser scaup.

The Columbia River and associated waters, Lake River and Bachelor Slough, are riverine. Although not part of the refuge, these bodies of water attract deep water avian users onto refuge lands.

Open Water Animals

Fish

Carp
Cutthroat Trout
Threespine Stickleback
Yellow Bullhead

Birds

American Wigeon
Bald Eagle
Northern Pintail
Tundra Swan

Mammals

River Otter
Beaver
Nutria
Muskrat

Habitats of the Refuge

Freshwater Wetland Habitat

Historically, the Columbia River flooded areas along its shores during periods of heavy rainfall and during May and June when mountain snows would melt and enlarge the river. This flooding created a vast mosaic of seasonal wetlands along the entire course of the river. Most of the natural wetland areas along the Columbia River have been destroyed by 1) the development of hydroelectric dams, 2) the filling of wetlands along river shorelines for industrial and other development, and 3) the construction of bank stabilization structures to prevent streambank erosion. The wetlands on the refuge are a small remnant of the once vast wetland system.

Two types of wetland vegetative communities can be found on the refuge — natural and managed. Wetlands on the Carty and Roth Units are not actively managed but are exposed to the natural spring flooding of the Columbia River. Wetlands on the River "S" and Bachelor Island Units, however, are protected from flooding by perimeter dikes. To encourage the germination of native plant seeds, pumps are used to remove water from the wetlands in these two units to expose the pond bottoms. Dewatering also allows the planting of wildlife food crops closer to the wetland shorelines. Water is left in several of the marshes throughout the summer to provide habitat for waterfowl broods and other marsh wildlife. The wetlands on the River "S" Unit are recharged by pumping in water from Bachelor Slough during early fall before the arrival of wintering waterfowl.

Some of the wetlands are managed to provide natural vegetation such as pondweed, coontail, smartweed, beggar's tick, and cattail. The seeds from these aquatic plants provide valuable winter food.

Reed canary grass, a marsh grass introduced early in this century, has invaded many of the wetlands in the Pacific Northwest, including those on the refuge. This plant is an aggressive invader, out competing most of the natural vegetative communities in which it becomes established. A perennial grass, it grows into stands so dense that wildlife cannot use it. In the spring it collapses to the ground, making it poor nesting cover. The small seeds, although numerous, are an insignificant portion of waterfowl's diet.

Reed canary grass

Habitats of the Refuge

Freshwater Wetland Habitat, cont.

Although it is nearly impossible to eliminate, mowing the canary grass during late summer and early fall does provide short, green vegetation preferred by Canada geese and wigeon ducks when they arrive in the fall. Canary grass research designed to expand options for conducting moist soil management (the flooding and removal of water from wetland areas) is being conducted on the refuge. It is hoped that by reducing canary grass higher quality waterfowl food can be produced.

Like most wetlands, refuge marshes provide habitat for many wildlife species. The refuge was established primarily as a wintering area for waterfowl, with an emphasis on dusky Canada geese. With the loss of many wetlands along the Columbia River, refuge management to improve wetland quality on its lands has become even more important

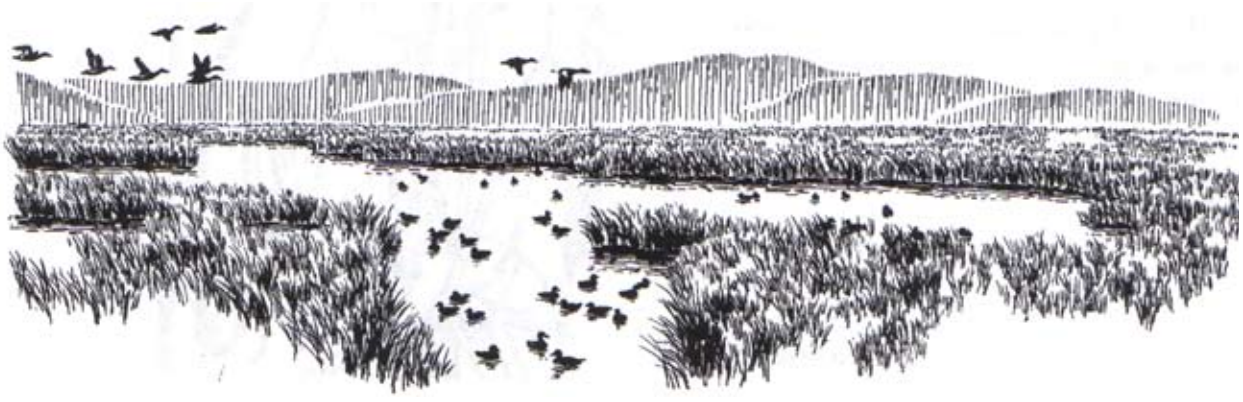
Freshwater Wetland Plants and Animals

Plants

Beggar's Tick
Cattail
Coontail
Pondweed
Reed Canary grass
Smartweed
Smooth Rush

Animals

Beaver
Bullfrog
Cinnamon Teal
Great Egret
Mallard
Mink
Nutria
Pacific Tree frog
Muskrat



Habitats of the Refuge

Field Habitat

Although refuge fields may be composed of different types of vegetation, they all lack shrubs and trees. Some are composed of natural plants and can be found along the edges of agricultural fields or in small open patches of habitat not farmed or grazed.

Most refuge fields, however, are in agricultural production and provide winter food for wildlife. Improved pastures planted to a variety of grasses and legumes (tall fescue, perennial ryegrass, orchardgrass, red and white clover) are located on the Carty, River "S," Roth, and Ridgeport Dairy Units. These pastures are grazed by cattle owned by refuge "cooperators," and they are clipped in the fall to provide short, succulent green browse for Canada geese and wigeon ducks. Crops such as alfalfa, clover, wheat, barley, and corn are grown on the River "S," Bachelor Island, and Ridgeport Dairy Units. Sandhill cranes feed in the harvested corn fields and pastures during spring and fall migrations. Canada geese are commonly seen in flocks of several thousand on the croplands. These fields are also heavily used by wigeons, mallards, pintails, and other grain and green forage-eating waterfowl.

Wildlife such as coyotes, hawks, and rabbits make use of the edges of the fields for hunting or cover. Small mammals such as mice and shrews also venture into the croplands from adjacent natural habitat.

Field Plants and Animals

Plants — Natural

Bluegrass
Bromegrass
Ryegrass
Velvetgrass

Plants — Agricultural

Alfalfa
Barley
Clover
Corn
Orchardgrass
Ryegrass
Wheat

Animals

American Goldfinch
Black-tailed Deer
Canada Goose
Coyote
Deer Mouse
Eastern Cottontail
Northern Harrier
Northwestern Garter Snake
Sandhill Crane

Habitats of the Refuge

Riparian Woodland Habitat

Riparian woodlands (woodlands associated with watercourses such as streams and rivers) comprise an important component of refuge vegetative communities.

Dense stands of Pacific willow grow along the shorelines of islands and ponds subject to annual flooding, especially in the Carty Unit. Historically, stands of willow were established on many sand and gravel bars along the Columbia River after periods of high water. These dense stands trapped additional sediments, raising the bars' elevation to allow the establishment of other wetland species less tolerant of water than willow.

Oregon ash and black cottonwood woodlands, established in the past when the Columbia River floodwaters inundated the area, are found in numerous locations throughout the refuge. Although these species are commonly found in soils usually moist throughout the year, they do not tolerate flooding for extended periods. In some locations they form mixed forests, and on the River “S” Unit much of the overstory is composed only of Oregon ash. Understory species include blackberry, red elderberry, red-osier dogwood, snowberry, and stinging nettle.

These riparian forests are located along the Columbia River shoreline in all of the refuge units, and along Gee Creek (Carty Unit), Bower Slough (River “S” Unit), and Campbell Slough (Roth Unit). They are especially valuable to wood ducks, hooded mergansers, screech and great horned owls, tree and violet-green swallows, and raccoons, which nest and raise young in natural cavities. Additional artificial nesting structures have been erected and maintained by refuge volunteers.

Riparian Woodland Plants and Animals

Plants

Black Cottonwood
Himalayan Blackberry
Oregon Ash
Pacific Willow
Reed Canary grass
Stinging Nettle

Animals

Downy Woodpecker
Long-toed Salamander
Painted Turtle
Raccoon
Striped Skunk
White-breasted Nuthatch
Wood Duck

Habitats of the Refuge

Upland Woodland Habitat

Two types of upland woodlands on the Carty Unit, Oregon white oak and Douglas-fir, represent unique examples of communities not commonly found along the lower Columbia River.

The Oregon white oak community occupies basalt knolls and ridges above the flood zone. The oaks are found in closed-canopy stands interspersed with open grassland. Most of these trees are mature specimens, with some exceeding 30 inches in diameter. Understory shrubs include serviceberry, snowberry, and ocean spray. The open grasslands are frequently composed of bromegrass and orchardgrass with vividly colored displays of wildflowers in the spring. The basalt outcroppings are of special interest, because the rock quarried from these areas during 1880 through 1910 was transported by barge to Portland for use as cobble paving stones.

There are several communities of Douglas-fir, the most notable being the ones through which the Oaks to Wetlands Trail passes. These stands are found in the highest areas on the refuge, because they, like the oaks, do not tolerate wet soil conditions. Common understory plants include salal, vine maple, ocean spray, and Indian plum, with a ground layer of Oregon grape and sword and bracken ferns.

Upland Woodland Plants and Animals

Plants

Bromegrass
Fawn Lily
Oregon White Oak
Serviceberry
Bracken and Sword Ferns
Douglas-fir
Indian Plum
Ocean Spray
Oregon Grape
Trillium

Animals

Black-capped Chickadee
Coyote
Eastern Cottontail
Eastern Gray Squirrel
Rufous-sided Towhee
Song Sparrow
Townsend's Chipmunk

Birds of the Refuge

The following list, although not complete, describes some of the birds most commonly seen in each of the refuge habitats. Drawings are not to scale.

Open Water Habitat

American Wigeon (*Anas americana*)
The wigeon is a surface feeding duck that eats mostly aquatic plants. In flight, wigeons form tight flocks, unlike most ducks that form a V pattern. Wigeons are mostly brown with a white wing patch. The males have green and white on top of their heads.

Bald Eagle (*Haliaeetus leucocephalus*)
Adult bald eagles are readily identified by a white head and tail and huge yellow bill. Immature bald eagles are mostly dark brown; it takes four or five years for bald eagles to reach full adult plumage.
They feed mainly on fish. The bald eagle is an endangered species; however, because of intense recovery programs, populations are increasing.

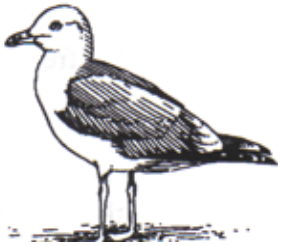
Double-Crested Cormorant (*Phalacrocorax auritus*)
The cormorant is a resident along coast, lakes, and estuaries. Its body is black throughout. The large, rounded throat pouch is orange year round; double crests are seldom visible; kinked neck is distinctive in flight. It flies with a rapid wing beat.

Northern Pintail (*Anas acuta*)
When feeding, this duck “tips over” and dabbles for its meal (plant matter and seeds), showing off its long tail feathers. The male has a chocolate brown head and white neck with a dark stripe down the back. Black central tail feathers extend to form a “pintail.”

Birds of the Refuge

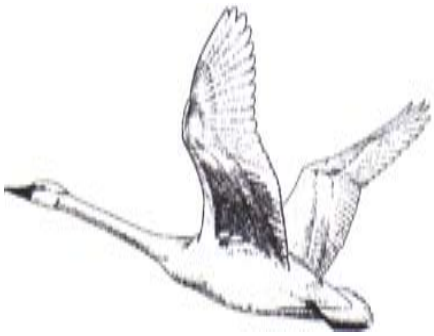
Open Water Habitat, cont.

Ring-Billed Gull (*Larus delawarensis*)
Adults have black ring around yellow bill, greenish-yellow legs, pale-grey mantle, white head and underparts, black primary feathers tipped with white spots. Their heads are streaked with brown in winter. These gulls mature in 3 years and acquire new and different plumage in each of the first three winters.



Ruddy Duck (*Oxyura jamaicensis*)
A chunky, thick-necked duck with large white cheek areas and a stiff upturned tail. Males have rusty sides and a light blue bill during the breeding season (April to August). Females are mottled brown. Ruddy ducks nest in dense vegetation of freshwater marshes, lakes, and ponds.

Tundra Swan (*Cygnus columbianus*)
This large, white, long-necked swan used to be called Whistling swan. The adult's black bill often shows a bright yellow spot. They dip head and neck into the water to feed on bottom vegetation, and also browse on shore grasses. They fly in V-formation or in lines. Tundras winter in large flocks in shallow fresh or brackish water.



Birds of the Refuge

Freshwater Wetland Habitat

American Coot (*Fulica americana*)
Coots are dark grey and black duck-like birds with a white bill and lobed toes. They feed on the shore and on the surface of the water or under it, diving with an upward jump before submerging. Coots, often called mud hens, are found in freshwater ponds and in sloughs.

Belted Kingfisher (*Ceryle alcyon*)
The kingfisher dives from the air, head first, into the water to catch fish with its long beak. It nests in tunnels dug into the banks of rivers and lakes. The kingfisher is gray on its head and back,with a gray band across its white breast. The female also has a rusty colored belly band.

Cinnamon Teal (*Anas cyanoptera*)
Male cinnamon teals have cinnamon heads, necks, and underparts. The female is brown. Males older than 8 weeks have red-orange eyes, yellowish legs, and bright blue on their wings. They are common in marshes, ponds, and lakes.

Common Snipe (*Gallinago gallinago*)
This inland sandpiper is the size and shape of a dowitcher, but browner with a more streaked head and back. In flight its brown rump and orange tail are visible. The common snipe has short legs and neck, and the bill is extremely long. It is common in marshes and along riverbanks and generally stays close to cover.

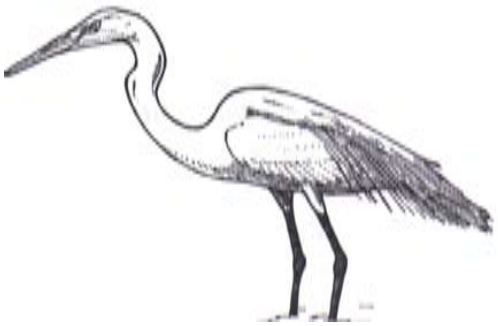
Birds of the Refuge

Freshwater Wetland Habitat, cont.

Common Yellowthroat (*Geothlypis trichas*)
The male common yellowthroat has a broad black mask and a bright yellow throat and breast. The female lacks the black mask and is more olive color. It can be found in grassy fields, shrubs, and marshes; it nests on the ground. It often holds its tail cocked like a wren. Its song is a loud, rolling *wichity wichity wichity wich.*

Great Blue Heron (*Ardea herodias*)
One of the larger wading birds, the great blue heron stands 4 feet tall. It is slate blue with a white head, a black stripe above the eyes, and a white fore neck streaked with black. A resident of freshwater marshes, it eats fish, frogs, and mice.

Great Egret (*Ardea alba*)
The great egret is a large white heron with yellow bill and blackish legs and feet. It stalks prey slowly and methodically. Populations were greatly reduced by feather plume hunters (for hats) at the turn of the century, when these feathers were twice as valuable as gold. Populations are now recovering. Formerly called common egret and American egret, it is common in marshes and mudflats.



Long-Billed Dowitcher (*Limnodromus scolopaceus*)
This shorebird's nickname is the "sewing machine bird" because of its feeding technique of probing in the mud with its long straight bill. Its winter plumage is grayish, with a white rump patch. In summer the underparts are reddish.

Birds of the Refuge

Freshwater Wetland Habitat, cont.

Mallard (*Anas platyrhynchos*)
The male is identified by his metallic green head and neck, yellow bill, narrow white collar, and chestnut breast. Black tail feathers curl up. A "puddle duck" that feeds with its tail in the air and head underwater, the mallard can be observed in a variety of wetland habitats.

Marsh Wren (*Cistothorus palustris*)
This small brown bird has a brown crown, bold white eye line, black triangle on upper back streaked with white, and underparts that are mostly white. The marsh wren's call sounds like a lawn sprinkler (*whish, whish*). It is found in reedy freshwater marshes.

Northern Shoveler (*Anas clypeata*)
The shoveler has a large, spatula-like bill that is longer than its head. The male has a green head, white breast, and brown sides; females have a grayish bill tinged with orange. It is found in ponds, marshes, and bays.

Pied-Billed Grebe (*Podilymbus podiceps*)
The pied-billed grebe is a small, stocky, brown bird with a black ring around its stout, whitish bill. It has a black chin and throat, and pale belly. It nests around marshy ponds and sloughs and tends to hide from intruders by sinking like a submarine until only its head shows. Grebes spit up pellets of indigestible materials, such as bones, like owls do.

Birds of the Refuge

Field Habitat

American Goldfinch (*Carduelis tristis*)
This is a bright yellow bird with black cap and wings. It is common in flocks in weedy fields, bushes and roadsides, and in seed-bearing trees.

American Kestrel (*Falco sparverius*)
The kestrel is the smallest member of the falcon family. It is often seen on telephone wires near open fields where it hunts for insects and small rodents. The kestrel is reddish-brown with a white face and black lines near the eyes. The male has blue-gray wings.

Barn Swallow (*Hirundo rustica*)
This swallow has an iridescent blue back and a cinnamon-colored belly and throat. Most distinctive is its long, deeply forked tail. It makes open cup-shaped mud nests. If it can't find any mud, it makes its own by walking in water and then soil. It eats insects while flying.

Canada Goose (*Branta canadensis*)
The Canada goose is the most common and best-known goose. It is identified by the black head and neck, broad white cheek,, and characteristic honking. It can be seen in large flocks, grazing in open fields within commuting distance of water. The refuge is used by seven recognized subspecies which differ greatly in size and slightly in color.

Killdeer (*Charadrius vociferus*)
The killdeer has two black stripes across a white breast. It is common in fields and pastures as well as on shores and riverbanks. The killdeer eats insects, worms, and grubs, and is a skilled actor, feigning injury near its nest to distract intruders.

Birds of the Refuge

Field Habitat, cont.

Northern Harrier (*Circus cyaneus*)
Both sexes of the harrier have a distinct white area between the lower back and tail. Females are brown above and white below with dark streaks. Males are gray above and white underneath. They fly close to the ground searching for frogs, mice, birds, and small prey.

Red-Tailed Hawk (*Buteo jamaicensis*)
A skilled glider, the red-tailed hawk has broad and fairly rounded wings. Although its plumage can be extremely variable, its reddish upper tail and paler red under-tail are distinctive. It preys on rodents in fields.

Ring Necked Pheasant (*Phasianus colchicus*)
This large, flashy game bird, introduced from Asia, is iridescent bronze overall, mottled with brown, black, and green. It has bright red eye patches and iridescent ear tufts. A broad white neck ring is often visible. Females are much smaller and duller than the male.

Sandhill Crane (*Grus canadensis*)
Both the gray adult and the brown immature sandhill cranes can be recognized by their very large size and uniform color. Adults have a dull red cap. They are often seen in flocks in open fields feeding on rodents, frogs, and insects.

Turkey Vulture (*Cathartes aura*)
The wings of this large, dark, red-headed bird look two-toned from below. In flight, wings are often held in an upward, shallow "V", seldom flapping, rocking from side to side. Turkey vultures feed on carrion and refuse in dry, open country.

Birds of the Refuge

Woodland Habitat

Black-Capped Chickadee (*Parus atricapillus*)
This is a small bird with a black cap and bib, rusty sides, and a white cheek patch. Chickadees nest in cavities in trees and nest boxes, and are easily attracted to feeding stations. Its whistled song is easily imitated.

Northern Flicker (*Colaptes auratus*)
Flickers are jay-sized woodpeckers with a brown back, no white on wings, and a black breast crescent. In flight, the white rump and salmon under wings and tail are visible. Often seen on the ground eating ants, they are common in open country near large trees. The call is a loud repeated *flick* or *flicker.*

Dark-Eyed Junco (*Junco hyemalis*)
Juncos are rather tame brown sparrows with light pink bills, gray or black hoods, white bellies, and white outer tail feathers that can be seen when they fly. Often seen in flocks, they hop on the ground and pick up small seeds. In winter, juncos are easily attracted to feeding stations.

Downy Woodpecker (*Picoides pubescens*)
This is a small black and white woodpecker with a short, slender bill, red head patch, and barred outer tail feathers. It is seen in suburbs, orchards, shade trees, and woods.

Birds of the Refuge

Woodland Habitat, cont.

Great Horned Owl (*Bubo virginianus*)
This large, nocturnal owl is distinguished by its large ear tufts. The great horned owl will take prey as large as skunks. Its call is a series of three to eight loud, deep hoots.

Spotted Towhee (*Pipilo maculatus*)
This large, ground feeding sparrow has a dark back, white wing markings, rufous sides, a white belly, and a long rounded tail with large white spots. Commonly seen in brush, heavy undergrowth, and wood margins, they hop with both feet together, and usually fly close to the ground.

Song Sparrow (*Melospiza melodia*)
It has a long, rounded tail pumped in flight; broad, grayish eyebrow; and broad, dark stripe bordering a whitish throat. Its upper parts are usually streaked; also the breast, with lines converging at a central spot. The legs and feet are pinkish. The song sparrow is found in dense, brushy areas.

White-Breasted Nuthatch (*Sitta carolinensis*)
A small acrobatic bird that climbs up, around, or down a trunk head first, its white face and solid black cap are distinctive. The call is a low *yank-yank*. It is common in deciduous woodlands.

Wood Duck (*Aix sponsa*)
The large head, short neck, and long square tail are good field marks. No other duck has the long, slicked-back crest. They feed on plant materials, from duckweed to acorns, and some insects. Nesting is in tree cavities or nest boxes.

Notes

Notes

Chapter 2

Pre-Visit Preparation

Environmental Education

The activities presented in the Educator's Guide are designed to teach various environmental concepts in fun and interactive ways. These activities are based on what can be seen at Ridgefield National Wildlife Refuge. They are also based on the premise that you and your students have a vital interest in learning about the earth as a home for people and wildlife. With today's pressures on the quality and preservation of life on earth, there is a great need for people to become responsible members of the ecosystem. A concern for the land and its resources is basic to our survival since environmental quality and human health and well-being are all interdependent.

Environmental Education Goals

Goal 1

To foster a clear awareness of and concern about ecological, economic, social, and political interdependencies.

Goal 2

To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to improve and protect the environment.

Goal 3

To give a sense of responsibility to individuals, groups, and society as a whole for saving our environment from extinction.

Environmental Education Objectives

Awareness

To help individuals and groups acquire an awareness of and sensitivity to the ecosystem — the total environment and its interactions.

Knowledge

To help individuals and social groups gain a variety of experiences in and acquire a basic understanding of the environment and its problems.

Attitudes

To help individuals and groups acquire a set of values and feelings of concern for the environment, and to help motivate them toward active participation in environmental improvement and protection.

Skills

To help individuals and social groups acquire the tools for identifying and solving environmental problems.

Participation

To provide individuals and groups with an opportunity to be actively involved in all levels of working toward the resolution of environmental problems.

Some Basic Ecological Concepts

A prior review of these concepts will enhance your group's understanding of what they see and do on the field trip.

Everything Has a Home
During your field trip, you will be walking in, around, and through several animals' living rooms, dining rooms, kitchens, bedrooms, and bathrooms. We call these homes habitats, ranges, and ecological niches. Ecology (from the Greek "oikus" which means house) is the study of the interactions of living organisms with each other and their common environment — the earth.

Everything is Becoming Something Else
All plants and animals undergo evolutionary changes and adaptations. When things die, they are broken down, decomposed, recycled, and used by other living things.

Every Living Thing Eats and Some are Eaten
Three categories of life forms are in the basic food cycle of life: plants, animals, and decomposers.

Everything Depends on Something Else
Interaction and interdependence occur among living and nonliving things and their environment. A change in one strand of the food cycle of life affects the entire web. Nothing exists in isolation.

There are Basic Necessities for Life
Food, water, shelter, and space are the basic necessities for life. These necessities are found in the atmosphere (air), the hydrosphere (water), and the earth's crust (soil). The biosphere is the thin skin of the planet where these zones collectively support life on earth.

Diversity is Essential for Life
Many similarities and differences occur among living and nonliving things. This variation is essential for maintaining a healthy community and ensuring that plants and animals survive and reproduce in spite of changing situations.

Humans are Capable of Changing the Balance of Nature
We are rational, thinking beings that have changed and continue to alter the environment of the earth in many profound ways. As such, we have a responsibility to all living things.

Refuge Assistance and Facilities

In order for students to have the most productive educational experience, and due to limited staff availability, teachers are expected to plan and lead their own field trips to the refuge. However, the following assistance is available.

Assistance

Lesson Planning Assistance

Refuge staff are available to meet with teachers and group leaders to help plan field trips. They can recommend activities and places to go on the refuge that will help you achieve learning objectives that are appropriate for the grade level you teach.

Volunteer Orientation Talks

We encourage you to request the assistance of a refuge volunteer to give a brief (15 to 20 minute) orientation program. The volunteers are usually able to adapt their programs to address your goals and to provide information appropriate for your group. Please express your group's needs so our volunteers can better accommodate you.

Library of Learning Materials

To assist teachers and group leaders in developing more effective field trips, the refuge has created a library of slide shows, videos, films, and other learning materials. These materials may be checked out to use in the classroom before or after your field trip. Contact the refuge office for a catalog of available learning materials.

Facilities

Parking

There is a parking lot at the entrance of the Carty Unit, and a parking area at the entrance of the River "S" Unit (see refuge map on page 5). Several turnouts are located on the auto tour route for viewing wildlife without blocking traffic. Parking is also available at the observation blind and at the trailhead for the Kiwa Trail.

Restrooms

Restrooms are located at the parking lot of the Carty Unit. Another restroom is located at the entrance of the River S Unit and at the observation blind on the River "S" Unit.

Drinking Water

There is no drinking water on the refuge. Please bring your own.

Garbage

There are no garbage cans on the refuge. Groups should remove (and recycle!) their garbage.

Study Areas on the Refuge

Carty Unit
The Carty Unit has a diverse assemblage of habitats in close proximity to each other, and therefore, has been designated the primary environmental education site for groups visiting the refuge. Groups using this unit will have a great opportunity to study and compare differences and similarities of habitats including rocky basalt knolls with oaks, Douglas-fir and ash woodlands, grasslands, willow and shallow wetlands, ponds, and streams. The Oaks to Wetlands Trail is a 2-mile loop that takes you along wetlands and through woodlands. Allow at least an hour to walk the trail at a leisurely pace. The north end of the trail loops onto private property. This section is open to the public from March 1 through September 30. During the remainder of the year, a detour prevents conflicts between the trail users and the owner's management activities. The detour is marked by signs on the trail.

River "S" Unit
From May 1 to September 30, the Kiwa Trail on the River "S" Unit is open to public foot traffic and is available for school visits. This trail is recommended to groups who want to observe and discuss active refuge management activities such as farming, grazing, water level control, and/or the large populations of wintering waterfowl.

In addition to the Kiwa Trail, the River "S" Unit is also the location of a 4.2 mile auto tour route with several vehicle turnout areas for viewing wildlife. An observation blind is also available for watching wildlife on Rest Lake.

Seasonal Closures

Carty Unit: The northern end of the Oaks to Wetlands Trail is closed from October 1 to February 28. Detour signs are provided on the trail.

River "S" Unit: From October 1 through April 30, visitors must remain in their vehicles while on the auto tour route except while at the entrance kiosk and restroom or at the observation blind. This is to protect wintering waterfowl from disturbance. The Kiwa Trail is also closed during this period.

Roth, Bachelor Island, and Ridgeport Dairy Units: These areas are closed to public access all year.

Making Reservations

In order to accommodate as many groups as possible, advanced registration is strongly recommended for all school groups visiting Ridgefield National Wildlife Refuge.

To Register You Will Need to:

- Call the refuge and ask to schedule a field trip and let the refuge staff know you will be coming.
- Reservations will be made on a "first-come-first-served" basis.

Why is Registration Recommended?

Ridgefield National Wildlife Refuge is a popular place with limited facilities. By having teachers register their classes we can:

- Distribute classes so they do not use the same refuge unit at the same time. This reduces overcrowding of refuge facilities, minimizes wildlife disturbance, and provides a better opportunity for wildlife observation.
- Coordinate volunteers who provide orientations to groups.
- Provide better interpretive and educational programs to a greater number of people.
- Determine the number of people participating in various activities on the refuge. This information may be used to obtain funding for future improvements to our public use programs.

How Many Groups May Visit Daily?

The number of groups may vary, but we usually try to schedule only one group per day on the Carty Unit. A second group can be scheduled for a trip to the River "S" Unit if desired, and extra groups can sometimes be scheduled for early morning or evening visits.

Does Registration Guarantee a Visiting Date?

Yes, if you have obtained a confirmation over the telephone or in writing.

Planning a Field Trip

The difference between your field trip being just another fun day outside the classroom or being a powerful learning experience in the field depends on how well you and your students are prepared.

Be Familiar With the Site
You, and as many of your adult leaders as possible, should visit and explore the site prior to the field trip. Remember, places change over time and with the seasons, therefore you should visit during the season of your scheduled field trip. The refuge trails are open during daylight hours.

Field Trip Themes and Goals — Plan Ahead
Know the concepts you want to teach, and select or design field trip activities, as well as pre- and post-trip activities, to teach those ideas. (Washington Sate EALR correlations have been identified for each activity in this guide.) It may not be so important that you follow your schedule exactly, but do have a conceptual map of the goals and objectives of your field trip. Be flexible to deal with, or take advantage of, unpredictable events or changes.

Student Suggestions
Involve your students in the planning process. This is their field trip, and if they help design it and have an investment in it, their visit to the refuge will be more memorable. Follow up on any sparks of interest you noticed during pre-trip activities or as you explained the upcoming trip. Ask your students to answer the following questions in writing. Use their responses in your planning.

What do you know about the wildlife refuge?

What do you expect to see at the wildlife refuge?

What do you expect to do at the wildlife refuge?

What do you think you learn about at a wildlife refuge?

Adult Leaders and Group Size
A ratio of one adult to five students is recommended for a field trip.

Class Groups
If your students will be working in small groups, divide your class into the groups before arriving at the refuge. Plant-, animal-, or color-coded name tags are successful examples of grouping techniques.

After the Trip
Continue the field trip experience in your classroom. Summarize the events and conduct follow-up activities. Relate back to the field trip throughout the school year. Consider returning to see the refuge in a different season, or to follow up on past activities.

Checklist for a Successful Field Trip

- [ ] 1. Be familiar with the site and background information.
- [ ] 2. Review the information in the Educator's Guide.
- [ ] 3. Arrange transportation.
- [ ] 4. Develop lesson plans and activities that fit into your curriculum and take advantage of students' interests. Design worksheets for your students to use during their field trip to enhance learning (optional).
- [ ] 5. Have your schedule well thought out and coordinated with refuge staff. Consider small group divisions, distribution of equipment, travel time, timing of activities, and rainy day alternative activities.
- [ ] 6. Recruit adult leaders who can assist with your field trip. A 1:5 ratio of adults to students is recommended. Emphasize this is to be a fun-filled learning experience.
- [ ] 7. Have students' parents visit the refuge or arrange an informational meeting at your school.
- [ ] 8. Proper dress is important. Ask students to bring a warm jacket or rain gear (if necessary) and to wear clothes they won't mind getting dirty. Students should wear sturdy walking shoes. If they need to bring a bag, a backpack frees hands to write, point out interesting animals, and use binoculars.
- [ ] 9. Don't forget lunches. Bring a bag for collecting lunch garbage. There are no trash cans at the refuge.
- [ ] 10. Name tags help students to identify their groups, and leaders and staff to identify the students.
- [ ] 11. Prepare students for their field trip. Let them know where they are going and the behavior expected of them. See page 35 for refuge field trip behavior guide lines

Group Management Hints

If you have apprehensions about leading a group of children away from the four-walled constraints of a classroom, relax! There are several techniques you can use to help keep the group's attention and maintain the feeling of freedom and open exploration. try the following:

Be Prepared
Read over the activities and visit the refuge yourself before bringing your class. The more comfortable you are, the more comfortable the students will be.

Be Enthusiastic
Enthusiasm is a greater catalyst than knowing a bunch of names. Whatever you are doing, do it with gusto! Get down on your hands and knees to look at the plants. Study an animal by "being" it (move as it does, sound like it, etc.), especially if you don't get to see the animal. You are the leader and you set the tone for the experience.

Have a Focus
When you stop to look at something, focus on something concrete. Gather the group in a semicircle with everyone facing toward the object of attention.

Speak With the Group
Speak loudly and clearly, facing the group. Talk with the group, not at it.

Make Eye Contact
Make eye contact with your students. If necessary, you should face the sun, rather than having the students look into the sun.

Ask Questions
Encourage thinking and group interaction by asking questions. For example, "Why is there a hole in the ground here?" "How did it get here?" "What would you need to live here if you were a _____?" Whenever possible, ask questions instead of giving information.

Be Patient With Answers
Give students time to think and answer questions. Count to 10 before revealing the answer.

Group Management Hints

Stimulate Imagination
Stimulate imagination and excitement while you are delivering factual information or asking questions about the plant or animal.

Be Versatile
Recognize the magic of the moment. If you are talking about plants and a northern harrier swoops by, watch the harrier. The harrier will probably leave within a couple of minutes; the plants will still be there.

Demonstrate
Keep it simple. Demonstrate an activity as you explain it.

Encourage Curiosity
Encourage your students to pursue their natural curiosity. Any observation they make is a good one. If they come up with questions you cannot answer, have them write them down; they can look up the answer or ask a staff member later.

Guidelines for Refuge Field Trips

Certain rules are necessary to help protect the wildlife and facilities at Ridgefield National Wildlife Refuge. Please make up rules with your group before the field trip. Have your students describe what behavior they think will be appropriate, then fill in the points they miss. This way, they will be "coming up with" the rules and will be more likely to follow them. Help them understand this is a protected area and a special place for plants and animals; it is different from a park or playground. Emphasize they are visitors and should act as if they were in someone else's home. Be sure to include these rules:

Take Away Only Memories
All plants (including edible ones), animals, and artifacts are protected. Students can only take drawings, pictures, rubbings, and memories.

Replace What You Pick Up
If you move any rocks, sticks, or logs, please put them back as you found them. Otherwise, you would be rearranging the "furniture" of many animals' and plants' homes.

Walk and Talk Quietly
Walk and talk quietly. This increases your chances to observe the wildlife.

Stay With Your Group
Stay with your group. Each group must be accompanied by an adult at all times.

Be Aware of Trash
Avoid leaving any litter. Please bring litter and recycling bags, and, if you are willing, pick up any trash you find.

Help Protect Wildlife
Do not harass or scare the animals. Stay on trails to avoid trampling vegetation. Obey refuge signs. To prevent disturbing wildlife, buses and private vehicles are not allowed on refuge maintenance roads and trails.

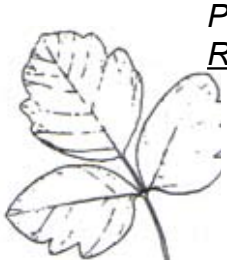
Enjoy Yourselves!
Go exploring and use all of your senses.

Cattail

Medical Considerations

Poisonous Plants
Most plants on the refuge are harmless, however, there are a few that can present problems to visitors. Teachers should know what these poisonous plants look like. Remind your students: please leave the plants and berries for the animals and birds of the refuge.

Poison oak can be found in some areas, particularly along the Oaks to Wetlands Trail. The leaves of this shrub are in groups of three, shallowly lobed, and rounded at the tip. The flowers are small, green, and clustered. The fruits are shiny yellow or white. Remember, "leaflets three, let it be." Poison oak produces a toxic oil that can cause a burning or itching rash on people who are allergic to it.



Poison Oak
Rhus diversiloba

Nettles can be a nuisance to students if they touch the plant, resulting in an itching, burning sensation for several hours or longer. This plant grows in single stalks from the ground, 3 to 7 ft. tall, with long-stemmed leaves branching off the stalk in pairs. The leaves are saw-toothed, oval to lance-shaped, with prominent veins. Tiny green flowers hang in clusters from the base of leaf stems.

Stinging Nettle
Urtica dioica

Poison hemlock is extremely deadly if eaten or chewed. This plant can grow to be more than 6 feet. The hollow, erect stem branches extensively and has purple-red splotches. The leaves look very similar to parsley or fern, and the flowers are very small, white, and numerous. If found, please notify the refuge office, as we are trying to eliminate this noxious weed.

Poison Hemlock
Conium maculatum

Bittersweet Nightshade
Solanum dulcamara

Bittersweet nightshade, a sprawling or climbing vine, can be found along some ponds and streams and is poisonous. The leaves of this plant vary in shape but have two ear-like lobes at the base of the blade. The blue-violet flowers grow on branches from a short stalk that extends out from the stem. The berries are bright red.

Medical Considerations

Insect Stings
Educators should be prepared to deal with insect stings and bites. Teachers and group leaders should be aware if any students are allergic to insect stings, and those with allergies should bring their own medications. Mosquitoes can be abundant during warmer months, so bring insect repellent.

Avoiding Problems

One way to avoid contact with poisonous plants and insects is to wear long pants and long-sleeved shirts.

Hay Fever and Asthma
Those with respiratory problems or allergies to pollens should bring medication. Wearing a respiratory mask may be helpful.

Emergencies
Refuge office staff can be reached at (360) 887-4106. The refuge office, located at the Carty Unit Parking lot, 28908 NW Main Street in Ridgefield, is open Monday through Friday from 7:30 a.m. to 4:00 p.m. Ridgefield Police can be reached by dialing 911, or going to the office located at 116 North Main Avenue. The fire station is located behind the police station, on North Third Avenue. A pay phone is available outside the Ridgefield Food Center at Main Street and Pioneer Avenue.

Pied-billed grebe

Notes

Chapter Three

Bird Studies

Bird Studies Overview

Theme

Ridgefield National Wildlife Refuge provides a variety of habitats for many species of birds.

Thousands of breeding birds rely on the resources of the refuge to rest, eat, and raise their young. In addition, the refuge supports wetlands that are vital to the survival of migratory birds. The activities that follow offer an excellent opportunity for students to learn about and to observe the different species of birds — their behaviors and adaptations to the habitats on the refuge.

Background

The actively managed refuge wetlands and croplands, when combined with the natural floodplain vegetative communities, provide habitat that supports over 220 species of birds. Hundreds of thousands of birds migrate along the lower Columbia River every year. The refuge hosts thousands of migratory birds that fly thousands of miles from their breeding grounds in Arctic Canada and Alaska to their wintering grounds in Baja California or South America, a route known as the Pacific Flyway. The few remaining areas of wetland habitat along the lower Columbia River are vital to the flyway. Some birds spend their winter on refuge wetlands, returning north to nest; some nest here but migrate to milder climates in the south for the winter; and some do not migrate at all but remain in the area as permanent residents.

Birds using the refuge are specifically adapted to the type of food they eat and the type of habitat they occupy (open water, freshwater wetland, field, riparian woodland, or upland woodland). Many of these adaptations take the form of beak and feet modifications. The beak and feet pictures on page 41 will give you an idea of the variety of these adaptations.

Different species of birds usually do not compete for the same food. Birds in wetland habitats, though often feeding together, are not looking for the same food. One species may have a long bill that probes deep into the mud, while another species may have long legs that allow it to feed in deeper water. Wetland birds can be loosely divided into four groups based on their food preferences:

Fish eaters — great blue heron, pied-billed grebe, belted kingfisher, great egret

Invertebrate eaters — long-billed dowitcher, spotted sandpiper

Filter feeders — Northern shoveler, mallard, cinnamon teal

Seed eaters — marsh wren, red-winged blackbird

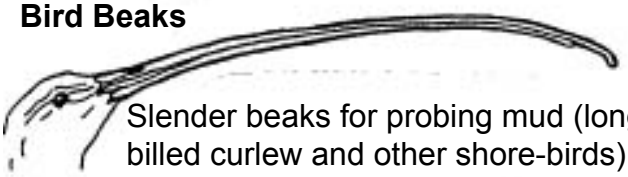
As lakes and ponds dry out in late summer, longer-legged birds such as great blue herons and great egrets are seen in groups feeding on fish, frogs, snails, and invertebrates that are concentrated in the shrinking bodies of water. At the same time, long-billed dowitchers and yellowlegs make use of the shallower water along the

Bird Studies Overview

shoreline. Their long legs keep them above the water, while their long beaks probe for food in the mud.

On higher land among grassy vegetation, nests of mallards and cinnamon teal are found. Great blue herons make their nests in trees on Bachelor Island, and wood ducks and hooded mergansers nest in tree cavities along the sloughs. The refuge supports a wide variety of birds, all of which need the precious habitats the refuge manages and protects.

Bird Beaks



Slender beaks for probing mud (long-billed curlew and other shore-birds)

Slim, sharp beak for catching insects (swallows, fly catchers)

Sharp, hooked beak for tearing meat (northern harrier)

Short, thick beak for crushing seeds (finch)

Long, broad beak for spearing prey (egrets, herons)

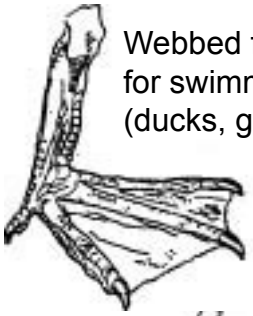
Broad beak for scooping plants and straining water (ducks)

Long, hooked beak for catching fish (cormorant, pelican)

Bird Feet

Two toes in front and two in back for climbing (downy woodpecker)

Sharp-clawed feet for grasping (hawk, owl)



Webbed feet for swimming (ducks, geese)

Long-toed feet for wading (egrets, herons

Three toes in front and one in back for perching (sparrows, wrens, black-birds)

Calling All Birds

Classroom
Grades: K-7

Objective
Students will understand how birds call to sound alarms, establish territory, and attract mates. Students challenge their hearing by listening for their partner's matching call.

Materials
Pairs of opaque film containers with different contents (one pair each with the same object.) Possible contents: paper clips, stones, rice, pasta, sand.

EALRs
Communication: 1.1, 1.2
Science: PC 03 1.1.5, 2.1

Background

How do birds find a mate of the same species? Birds identify each other through their songs. A keen sense of hearing is critical for the survival of their species. If birds cannot find a mate, no young birds are produced to replace the old birds that die or are eaten by predators.

Methods

Before passing out the canisters, discuss the following question: Why do birds sing or call? (to attract mates, to alarm others about danger, and to establish territory)

After the question has been thoroughly discussed, give each student a canister. Explain that this is their song, and they are to find another bird with the same song by shaking their canister. For a group of 10 to 20 students, allow 5 minutes to find each other. For a larger group, allow 7 to 8 minutes.

When students think they found their partner, have them stand together. When time is called have them open their canisters to see if they found their partner. Count the number of correct pairs. Collect the canisters and pass them out again; decrease the amount of time they have to find a partner.

You can play several rounds making each one shorter as the students improve at differentiating the sounds. At the end of the activity, collect the canisters and discuss the questions below. Stop and listen for birds whenever you are outside!

Discussion

Conclude the activity with a discussion about the following questions:

Q: What problems did they experience while trying to find their partners.
A: Too much noise or not enough time.

Q: Do wild birds have the same problems?
A: If there is noise that sounds similar to their call, the birds may have trouble finding a mate.

Calling All Birds

Q: How do unnatural sounds affect bird calls?
A: They have to adapt to the interfering sounds or move to a different area.

Q: What unnatural sounds do you hear?
A: Planes, cars, trains, horns, etc.

Q: Why are birds so good at singing and calling?
A: They start at birth and have to rely upon oral communication for much of their survival.

Extension

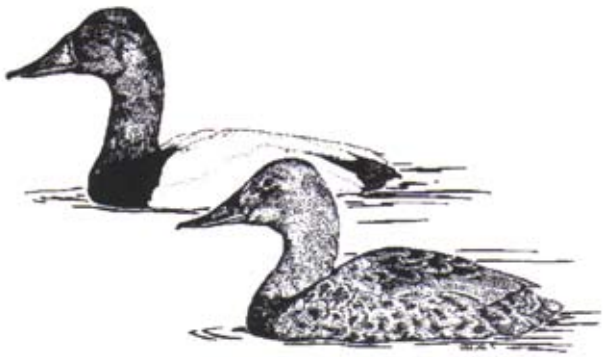
Have students choose a partner. As in the first part, have a discussion on bird calls. Why do birds sing?

- To identify the species.
- To proclaim their territory.
- To attract a mate.
- To distinguish between strangers and neighbors.
- To sound an alarm of danger.

Birds need a keen sense of hearing. This is a sense we do not use as much as other senses. We are going to practice listening for bird calls by learning a call and using it to find another bird with the same call. Have each pair practice their call together. Mix everyone up; put a paper bag over their heads, and start calling. End the exercise when all pairs have found each other.

Sample calls

Chickadee — *chick a dee dee dee*
Bob white — *bob white, bob white*
Towhee — *towee towee*
Barn owl — *hoo hoo hoo, hoo hoo hoo*
Flicker — *wick, wick, wick, wick*
Stellar's jay — *squawk squawk*
Killdeer — *killdeer, killdeer*



Male and female canvasback

Discussion

Q: Did you experience problems?
Q: Do wild birds have similar problems?

Adapted from "Sound Off" Outdoor Biological Instructional Series, University of California, Berkeley Hall of Science

Calling All Birds

Outdoors
Grades: 3-8

Try to answer the questions for bingo. If you do not know a bird's name, give it a new one.

Find and draw a bird soaring high in the sky	Name a bird grazing in a field.	Find and draw a bird that is feeding.	Find a bird feeding in the woods. What is it doing?
Name a bird walking or standing in the marsh.	Name an animal that birds would catch in the marsh.	Find a bird with a long skinny beak. Draw the beak.	Find bird tracks and draw them.
Find and name a bird with a long neck.	Draw a bird that is flying low to the ground.	Find and draw a bird that is diving underwater or swimming above water.	Listen for a bird that is singing. What does it sound like? Write it out.
Find a bird in a tree. What is it doing?	Find a bird with long legs. Draw the legs.	Find a bird hiding in the shrubs. What color is it?	Find evidence of a bird's visit. What is the evidence?

Adapted from ***Salt Marsh Manual,*** U.S. Fish and Wildlife Service

What Can I Eat With this Beak?

Classroom
Grades: K-8

Objective
Students will learn how different adaptations and feeding habits allow several types of birds to live in the same habitat at the same time.

Materials
1 small paper cup per student (bird stomach)

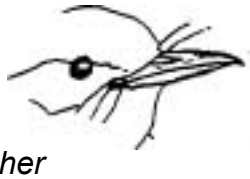
Chalk board or easel paper for data chart

Food: provide an adequate food supply for all students, i.e., marbles (snails), cut up pipe cleaners (worms), 3/16 metal washers (beetles)

Beak types: spoons, scissors, tweezers, and clothespins (one beak per student)

EALRs

Communication: 1.1, 3.2 Math: C1.1.1, S1.4.1, 4.3.2 Science: PC03 1.1.5, SI03 1.2.8, CH03 1.3.7, IQ01 2.1.2



Flycatcher

Background

Ridgefield National Wildlife Refuge provides many birds with homes (habitat). They are all able to live here because their beaks are adapted for different feeding techniques. Hundreds of organisms (worms, clams, snails, crustaceans) that birds eat live in the habitats on the refuge.

Methods

Ask the students to sit in a circle or two lines facing each other. Begin the activity with a general discussion about bird beak types. What kind of beaks have they seen? (long, pointy, short, wide, etc.) Explain that bird beaks are adapted to match the type of food they eat. For example, many birds have tweezer-like beaks. A bird with a short "tweezer" beak eats animals near the surface of the ground, whereas a bird with a long "tweezer" beak can reach animals that burrow deeper. Some birds have scissor-like beaks that rip their food apart into bite-sized pieces while other birds have clothespin-shape beaks that are excellent for crushing the hard covering of seeds. Lastly, birds may have spoon-like beaks that can scoop up large numbers of small fish or strain plant material from mud. The different diets of birds allow them to live in the same area at the same time (coexist). This is why you may see many types of birds feeding together in one area.

Hold up the beak utensils one at a time and ask the students for examples of birds with a beak similar to the utensil. Some potential answers are in the chart on the page 47.

After your bird beak discussion, introduce the students to the activity by having them imagine that they are a flock of birds (think about your wings, feet, beak, etc.). Explain that the area between them represents their habitat. Ask them to choose what type of habitat they will feed in (marsh, slough, lake).

Hand a stomach (cup) and one bird beak to each bird (student). Explain the following rules: 1) Birds must pick up their food, using only their beaks, and put it into

What Can I Eat With this Beak?

their stomachs, 2) Food may not be scooped or thrown into the stomach — the stomach must be held upright, 3) Birds can only feed when given permission to do so.

Distribute one type of food evenly within the habitat. Give the birds permission to leave their nests and feed. Allow the birds to feed for 1 to 2 minutes and then tell them to stop feeding and return to their nests. Have similar type beaks get together to count the total amount of food they collected; record their results on the data sheet. If possible, use lights to designate day (feeding time) and night (resting time).

Repeat the feeding steps for each food item. For a more natural situation, mix all three food items; an area seldom has only one type of food. Before feeding ask the birds what they will be eating. You may facilitate this discussion by sharing the following idea: birds should first eat the food they can gather the easiest (as they found out in the earlier rounds) and then switch to a secondary food item as it gets harder to find their first choice. Record the data. Try to correlate the simulation with real world examples.

The teacher is a hawk that eats birds. Unusual behavior of a bird draws attention so a predator will notice the bird and eat it. Unruly behavior or violations of the rules result in the hawk capturing the conspicuous bird and making it sit out for one round. After recording all the data, collect the beaks and food.

Discussion

Q: Are some beaks better at eating a particular food item than other beaks?

A: Yes, look at the data chart and compare the numbers of each food eaten to determine what each beak type eats the best.

Q: What other parts of a bird are important to its feeding success?

A: A bird's legs and feet are adapted for living and feeding in a specific habitat. Some birds have long legs and wide feet for wading and searching for fish while others have webbed feet for swimming and diving or sharp clawed feet for catching prey.

Q: In which habitat does each beak type forage for its food?

A: Tweezers — mud (shorebirds) or field (hummingbirds); scissors — field (raptors); spoon — slough or pond (ducks, pelican); and clothespin — upland or marsh (wren).

Q: What differences did you notice in feeding behavior when all food items were passed out?

A: More relaxed, less fighting for food because their was enough for all birds.

What Can I Eat with this Beak

Examples of birds to match beak types

Spoon beak	*Scissor beak*	*Clothespin beak*	*Tweezer beak*
Blue-winged teal	Perching birds	American goldfinch	Great egret
Northern shoveler	Northern harrier	Marsh wren	Kingfisher
Mallard	Caspian tern	House finch	Great blue heron
White pelican	Kestrel	Scrub jay	Hummingbird
Roseate spoonbill	Owl	Chickadee	Dowitcher

Adapted from an activity funded by the Environmental License Plate Fund, California Department of Education.

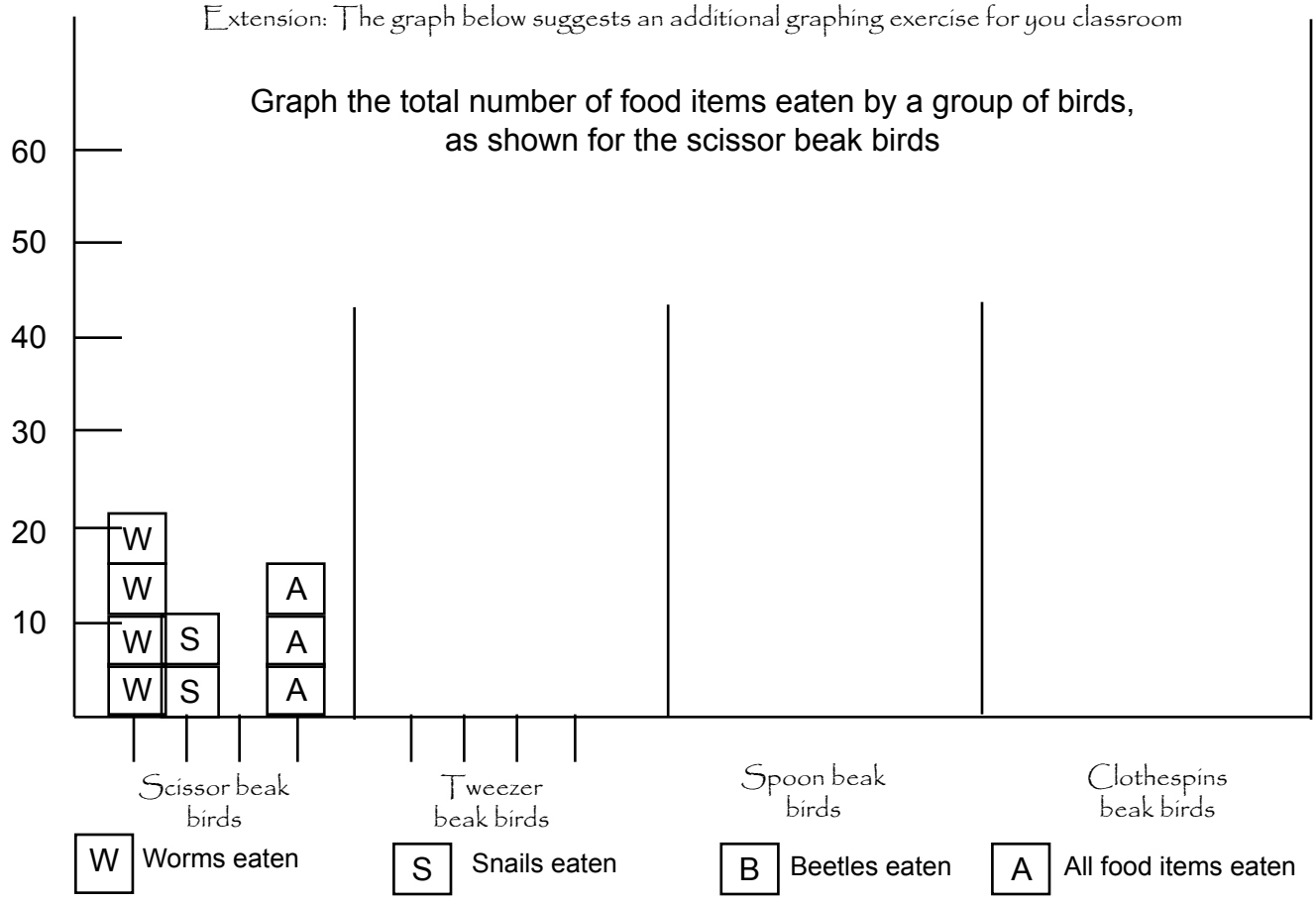
What Can I Eat with this Beak

Data Sheet

Food / Beak Type	Worms	Snails	Beetles	All food types
Scissors				
Tweezers				
Spoons				
Clothespins				

Extension: The graph below suggests an additional graphing exercise for you classroom

Graph the total number of food items eaten by a group of birds, as shown for the scissor beak birds



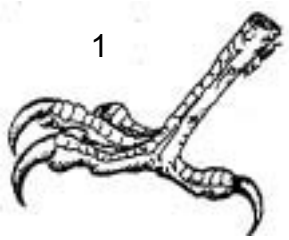
Beaks and Feet Challenge

Classroom
Grades: k-6

The pictures below represent the beaks and feet of four different types of birds. Each bird has specially adapted a beak and feet that allow it to feed in a specific habitat (e.g., wetland, woods, lakes, etc.). Using the clues provided for each bird, match the beak to the correct foot. After matching the beak and foot, in the space provided, write down the name of the habitat where you think this bird lives.

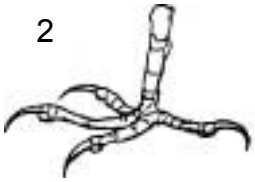
The flycatcher perches in trees and catches insects; its foot is adapted to clutch branches.

The flycatcher's foot is number___
Habitat: _____



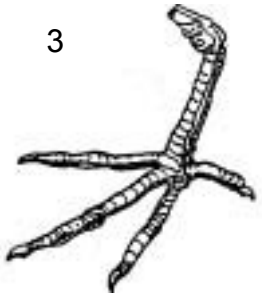
The mallard has a special flat beak that strains small plants and animals from the water as it swims.

The mallards foot is number _____
Habitat: _____

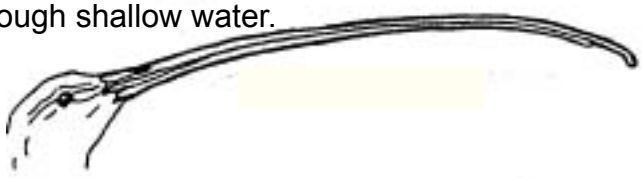


A hawk captures prey with its long, sharp claws (talons) and tears meat with its beak.

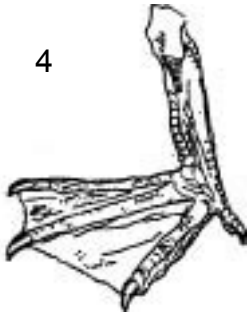
The hawk's foot is number _____
Habitat: _____



The long-billed curlew probes mudflats with its long beak in search of small animals. Its long legs and toes help it maintain its balance as it wades through shallow water.



The curlew's foot is number _____
Habitat: _____



Adapted from *Salt Marsh Manua*l, U.S. Fish and Wildlife Service

Answers: 1. Hawk 2. Flycatcher 3. Long-billed curlew 4. Mallard

Sharp Eyes

Classroom
Grades: K-8

Objective
Students will prepare for watching wildlife by improving their observation skills.

EALRs
Communication: 1.1, 1.2
Math: 1.1
Science: PC03 1.1.5

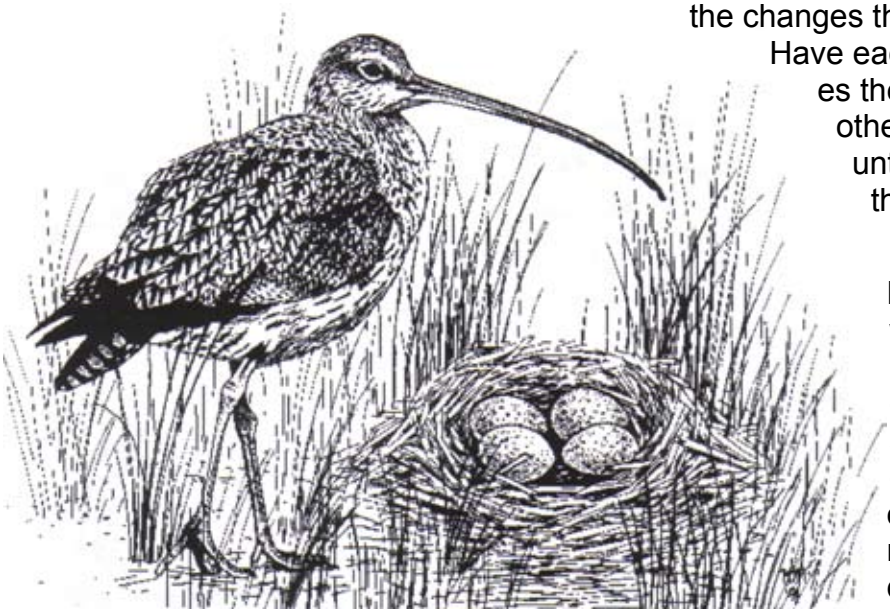
Methods

This is a preparatory observation skills exercise. Divide the group into two lines facing each other; make sure each person has a partner. Ask each person to look very carefully at the person facing him or her (i.e., buttons, shoe laces, zipper, etc.).

When the leader gives a signal, the lines turn their backs to each other (no peeking!) and each person changes one thing about the way he or she looks. He or she might turn up their collar, unbutton a button, make cuffs on their pants, roll up a sleeve, take off glasses, etc.

When the leader gives a second signal, both lines turn around and each person tries to figure out the changes the other person made. Have each pair share the changes they observed about each other. Repeat this activity until everyone has gained their "sharp eyes."

Now that students are warmed-up, have them count how many different items they can observe in the classroom during a given period of time; compare their numbers. Did they see differences where everything looked the same before? Now go outdoors and discover how different an area really is by using your "sharp eyes!"



Long-billed Curlew

Adapted from *Salt Marsh Manua*l, U.S. Fish and Wildlife Service

Bird Silhouettes

Classroom
Grades: k-6

When studying migratory birds, it is important to be able to identify them in flight. Here are the outlines of seven migratory birds from southwest Washington. Can you identify them?

Answers: 1. Northern harrier 2. Northern shoveler 3. Pintail 4. Canada goose 5. Kingfisher 6. Mallard 7. Sandhill crane

Adaptation Artistry

Classroom
Grades: 4-9

Objective
Students will be able to:

1) Identify and describe the advantages of bird adaptations.
2) Evaluate the importance of adaptations to birds.

Materials
Drawing, painting, clay sculpture, or paper mache' materials, construction paper and glue, recycled and household materials such as pipe cleaners, buttons, toothpicks, yarn, straws.

Pencil and paper

EALRs
Writing: 1.1, 1.3, 2.3
Science: PC03 1.1.5, Ch 03 1.3.9
Art: 2.1, 3.1, 3.2, 4.2
Geography: 2.1, 2.3

Background

Birds have a variety of adaptations, including characteristics of beaks, feet, legs, wings, and color. These adaptations have evolved so that the bird is better suited to its environment and lifestyle. The purpose of this activity is for students to realize 1) there are advantages for birds in looking how they do and 2) recognizing some of the ways in which birds are physically adapted to their environments.

Methods

1) Discuss with the students the various adaptations given in the background section of this activity. Or, brainstorm a list of bird characteristics, then describe the advantage of the adaptation represented by the characteristic.

2) Tell the students they will each have a chance to design their own original bird — one well adapted to its habitat. Each student should decide:

- Where the bird will live? • What it will eat?
- Its type of mobility? • Its sex?

3) Based on these choices, the students will decide what adaptations are necessary for their bird and write them down before proceeding further.

4) Using their list of adaptations, each student will create his or her own original bird; for example, by drawing or sculpting it.

5) In conjunction with each drawing or sculpture, each student should write a short report which includes the name of the bird and its food sources, habitat, and lifestyle. Students should also include their lists of adaptations, the reasons for the adaptations, and the advantages provided by the adaptations.

6) Completed projects may be submitted to the teacher, presented to the class, or displayed in the classroom.

Optional: Go outside and identify adaptations on real birds!

Adaptation Artistry

Extensions

Make mobiles of the completed birds.

Prepare a slide presentation on an overhead projector showing different types of bird adaptations.

The teacher could give the students examples of bird adaptations on the overhead projector or a ditto sheet and the student could explain the reasons for these adaptations.

Collect pictures of birds to develop a bulletin board showing some of the adaptations discussed. Look for pictures showing bird parts compatible with the "invented" birds. Display the invented birds. Use the bulletin board during parent conferences.

Evaluation

Name two bird adaptations for each of the following body parts, listing their advantages: beaks, feet, legs, wings, color.

Adaptation Artistry

Bird adaptations for different body parts

	Adaptation	Bird	Advantage
Beaks	Pouch-like	Pelican	Can hold fish.
	Long, thin	Avocet	Can probe shallow water for insects.
	Pointed	Woodpecker	Can break and probe bark of trees, for insects.
	Curved	Hawk	Can tear solid tissue, like meat.
	Short, stout	Finches	Can crack seeds and nuts.
	Slender, long	Hummingbird	Can probe flowers for nectar.
Feet	Webbed	Duck	Aids in walking on mud.
	Long toes	Crane, heron	Aids in walking on mud.
	Clawed	Hawk, eagle	Can grasp food when hunting prey.
	Grasping	Chicken	Aids in sitting on branches, roosting.
Legs	Flexor tendons	Chicken	Aid in perching, grasping
	Long, powerful	Ostrich	Aids in running.
	Long, slender	Crane, heron	Aids wading.
	Muscular	Eagle, hawk	Aids lifting, carrying prey.
Wings	Large	Eagle	Aids flying with prey, soaring while hunting
	Paddle-like	Penguin	Aids in swimming under water
Coloration	Bright plumage	Male birds	Attraction in courtship. Mating rituals
	Dull, mottled plumage	Female birds	Aids in camouflage while nesting. Protection in shelter
	Change of plumage	Owl, ptarmigan	Camouflage protection, (brown in summer, white in winter). Protection in shelter

Adapted from the Western Regional Environmental Education Council. 1983, 1985.

Binocular Warm-Up

Classroom or Outdoors
Grades: 4-6

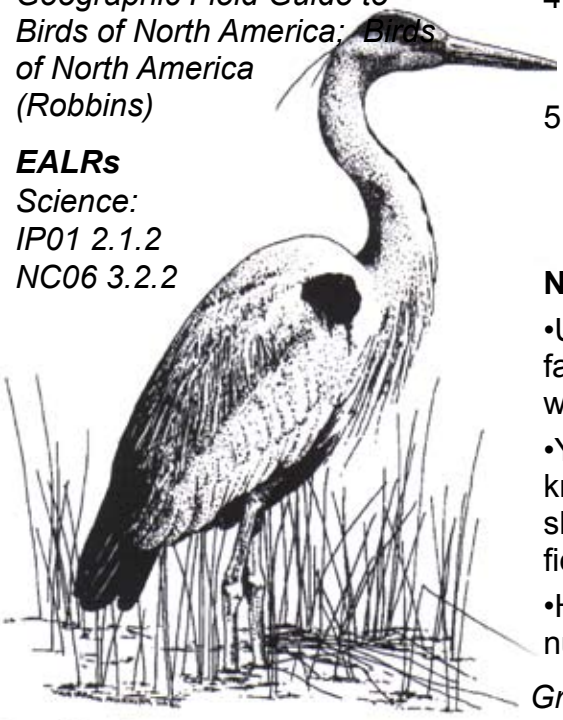
Objective
To promote successful use of binoculars and field guides as a tool to identify birds in the field.

Length of Activity
10 to 15 minutes

Materials
Binoculars and one bird field guide per team of two students.

Suggested Guides
Field Guide to Western Birds (Peterson); National Geographic Field Guide to Birds of North America; Birds of North America (Robbins)

EALRs
Science:
IP01 2.1.2
NC06 3.2.2



Great blue heron

Methods

1. Divide students into teams of two or three depending on availability of binoculars and field guides.
2. Have students stand abreast in lines of two with their partner behind them. They should face the instructor. Instructor explains the use of focus ring or bar on the binoculars.
3. Instructor holds up an opened field guide and asks the first person in each line to:
   a. Look at the opened page first without binoculars.
   b. Without losing sight of the book, quickly put their binoculars up to find the field guide and focus.
   c. When student can identify the bird on the upper right-hand corner of the right page, they should hold up their hand quietly.
4. Have students pass binoculars to their partners, who will repeat the process, using a different page of the field guide.
5. Do this several times until each person in the group has successfully figured out the use of the focus bar or ring on the binoculars.

Notes

•Use pages in the field guide that have fairly common birds, e.g., robin, goose, owl, woodpecker, swan.

•You can help students use the field guide by knowing page numbers for waterfowl and by showing them how the index at the back of the field guide works.

•Have each team record the bird species and numbers seen outside and compile a class total.

Adapted from Teton Science School by Lora Gale.

Fledging Young Birders

Classroom and Outdoors
Grades: 4-9

Objective
Through a series of simple, foolproof steps, students are taught the field marks and characteristic behaviors of common local birds.

Materials
Slide projector for set of 35 mm bird slides, or VCR for VHS tape version

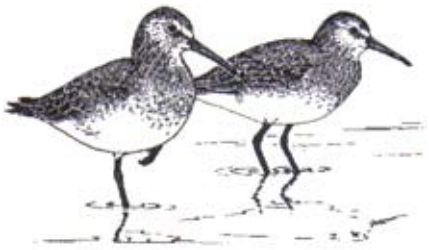
One of the various field guides to birds of the area

EALRs

Communication: 1.2
Science: CH03 1.3.9, PC03 1.1.5

Geography: 2.3

Art 2.1, 3.1



Dunlins

Background

Bird watching is a very popular activity. Birders spend many enjoyable hours in the wild and in their backyards looking for, identifying, and observing the behavior of birds. This activity will teach students some of the key identification skills needed to learn to identify birds common to the Ridgefield National Wildlife Refuge.

In addition to learning to identify birds through the use of field marks (such as body shapes and feather colors), students will learn that different species live in different habitats. For instance, birding in wetland areas will locate species adapted to feeding on aquatic plants or seeds (e.g., mallards, American coots, or northern shovelers) or species adapted to feeding on fish (e.g., belted kingfisher, great blue heron, or pied-billed grebe). Birding in woodlands, however, will result in observing birds adapted to feeding on seeds of terrestrial trees or shrubs (dark-eyed junco, spotted towhee, song sparrow), insects (American robin, downy woodpecker, white-breasted nuthatch), or on other birds or mammals (great horned owl).

Another important factor when looking for birds is the time of the year. Many birds migrate between their summer breeding grounds and wintering grounds, and therefore are present only during certain times of the year. For instance, most Canada geese nest in Canada and Alaska, but spend their winters here along the Lower Columbia River. Purple martins, on the other hand, nest in this area during the summer but migrate to Mexico to spend their winters. Some species, such as black-capped chickadees and Stellar's jays, are here throughout the entire year.

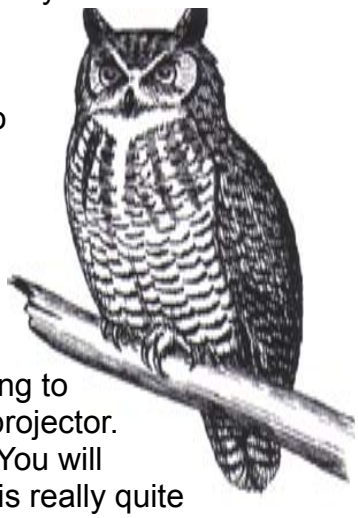
When you discuss the identifying characteristics of the birds, introduce the importance of the habitat and season of year when trying to locate different species of birds.

Fledging Young Birders

Methods

Order Materials

Decide how many birds you would like your class to learn about. Learning fifty birds is not a difficult task for third or fourth graders, but you can certainly begin with fewer if you would like. Acquire slides or VHS tape of the birds you'd like to teach (see page 60 for acquiring slides). Next, borrow a bird field guide from a friend, check one out from the library, or purchase one of your own at a bookstore. Once you begin learning the birds, it is very handy to have a bird field guide in the room. Your students will always be looking through it. The book will come in handy for helping students identify birds they haven't learned yet. A Field Guide to Western Birds, by Roger Tory Peterson, and Birds of North America, by Robbins, Bruun, and Zim are two classics — but there are several other excellent new guides. The best way to discover one you like is to look over the selections in the bookstore.



Plan your lesson

Once your slides or VHS tape have arrived, organize them into habitat (see the list at the end of this activity description). You will find that the habitats are represented by different numbers of species. Separate them into small groups of slides representing birds from the same habitat for each presentation of new slides.

For the first lesson, chose five to ten slides from one habitat type. We recommend starting with open water, then progressing to wetlands, fields, and woodlands. Load these slides into your projector. Have the list of names at your side while looking at the birds. You will probably discover that remembering the names of these birds is really quite easy. Then, look up each of the birds in your field guide. Read the text about the bird and look carefully at the drawing or photo of each. Note whether there are any differences in appearance between the males and females.

Choose two field marks (identifying visual characteristics) that you can talk about with students to help them remember the bird. Keep the field marks simple. For example, for a Stellar's jay you can use:

1. Dark blue-black color
2. Crest of feathers on head

See if you can find one piece of information in the text about each bird that you think might be interesting for students to remember. It might be a description of the way the bird flies or the kind of sound it makes. As you become an experienced birder yourself, you will acquire stories about places and times you have seen particular birds that will be fun to tell your class.

Fledging Young Birders

Teach the lesson

You can use whatever schedule you like for teaching these lessons. One plan that works well is to introduce the birds on Monday, do a quick review on Wednesday (and Thursday, if needed), and give a quiz on Friday. Students will need a notebook, folder, or some other permanent place to keep the information you present in class. Here's a sample of how a typical week might go:

Monday. Show the first of five new slides. Ask whether anyone knows the name of the bird. Write the name of the bird on the board. Have students copy the name of the bird into their notebooks. Ask students to help point out field marks that could be used to identify the bird. On the board, write the two field marks you have chosen to emphasize with the bird. Have students write these field marks in their notebooks. Follow the same procedure with the remaining four birds. Show the slides of the five new birds three or four times in succession, having student volunteers identify them.

Wednesday. Go through the slides of the birds you learned Monday, as well as any others that you have already covered. Once you have learned at least 10 or 15, it is easy to just keep the projector clicking and go around the room, calling out the names of students so every child gets a chance to identify at least one bird. This activity doesn't need to take more than 5 minutes.

Thursday. If necessary, the birds can be reviewed again.

Friday. Give students a quiz on the birds they have learned that week plus all the other birds learned so far. Depending on the number of birds your class knows, this can take anywhere from 5 minutes to 25 minutes. Test students on the most recent birds plus only the last 20 of the birds they have learned. Otherwise, the tests of 30 or 40 birds can get rather long. However, a comprehensive bird test could be given once students have learned 50 birds. It's a good chance for them to show off how knowledgeable they have become!

Extensions

Once you begin learning the birds, your students will be telling you about birds they have seen. Part of the thrill for them is that most of them will know more about bird identification than their parents! Use some of the following activities to build on their enthusiasm:

Go on a field trip

Schedule a field trip to Ridgefield National Wildlife Refuge. Ask students to bring binoculars from home. Sign up lots of parent volunteers, divide your class into groups of four or five, and remind them that quiet birders see the most wildlife. Giving kids checklists of the birds they are most likely to see helps make the day more enjoyable for students and keeps them on task.

Fledging Young Birders

Build a birdhouse
Books available from libraries, bookstores, U.S. Fish and Wildlife, and State Departments of Fish and Game have plans for a variety of bird houses.

Put up a bird feeder
If your classroom has a window with a spot where you can hang a bird feeder or set one on a post, you can watch birds from your own room. There are many kinds of math activities that could be developed from observations your students make and data they collect.

Learn to recognize birds by their songs
Many birders can identify dozens of birds simply by hearing their songs. The experts can recognize hundreds. Telling the difference between a red-breasted nuthatch song and that of a white crowned sparrow is even easier than telling them apart by sight! The key is having a chance to hear which song goes with which bird. Once you know what a red-breasted nuthatch sounds like, you will be able to make the sound for your class. (The best way to imitate it is to pinch your nose shut and say *"Yaaaaank, Yaaaaaaan, Yaaaaaaannnnkkkk"* in your most nasal sounding voice). And once the class tries it together, they will never forget the sound of the red-breasted nuthatch!

There are several sources of bird songs which can be found at the Portland Audubon Society Bookstore in Portland, Oregon. A set of cassette tapes or compact discs goes along with Roger Tory Peterson's *Field Guide to Western Birds*. The Portland Audubon Society has also published a book entitled *Familiar Birds of the Pacific Northwest* and a complementary cassette tape of songs.

Applications for Subject Areas

Math
Graphing results of simple bird censuses taken at school or at students home feeders.

Art
Making drawings, paintings, or sculpture of local species.

Language
Story- or poetry-writing activities involving birds, creation of pop-up books with bird themes, etc.

Science
Possibilities for a variety of discussions about ecology, based on the taught and observed behaviors and body types of birds.

Fledging Young Birders

To Acquire Slides

To teach the birds listed in this lesson, request slides or the VHS programs from the refuge office. There are other places to acquire slides, however. You can write to the Buena Vista Audubon Nature Center and ask for the most current catalog of North American Slides. Their address is: Buena Vista Audubon Nature Center, P.O. Box 480, Oceanside, California 92049.

Tips for Bird watching

• Keep your eyes and ears open at all times. You will have the best chance of seeing a great blue heron or red-tailed hawk if you sometimes look far away as well as nearby.

• Walk quietly and slowly. Remember that birds like boundary areas between trees and fields or the edges of ponds and lakes. When you are approaching water or any open area, move slowly and deliberately. Walking and talking quietly will allow you to see more and will disturb the wildlife less. Sometimes the best way to see birds is to sit quietly in one spot for a few minutes.

• Use hand signals and quiet voices to clearly tell others in your group when you have spotted an interesting bird. Don't just say "It's over there." Describe a specific landmark others can use to spot the bird. For example, you might point and say,

•Look for the dead tree straight across the pond. Just to the left of that dead tree is a small bush. There is a yellow bird singing from the top of the bush.

• Look at an unknown bird as long and carefully as you can before you try to look it up in your field guide and before it flies away.

Note to yourself the bird's body shape, size, coloration, and any markings on head, body, wings, or tail. These details will help you when you finally open your field guide.

• Use your ears as well as your eyes. Listen for bird songs to help you know where to look.

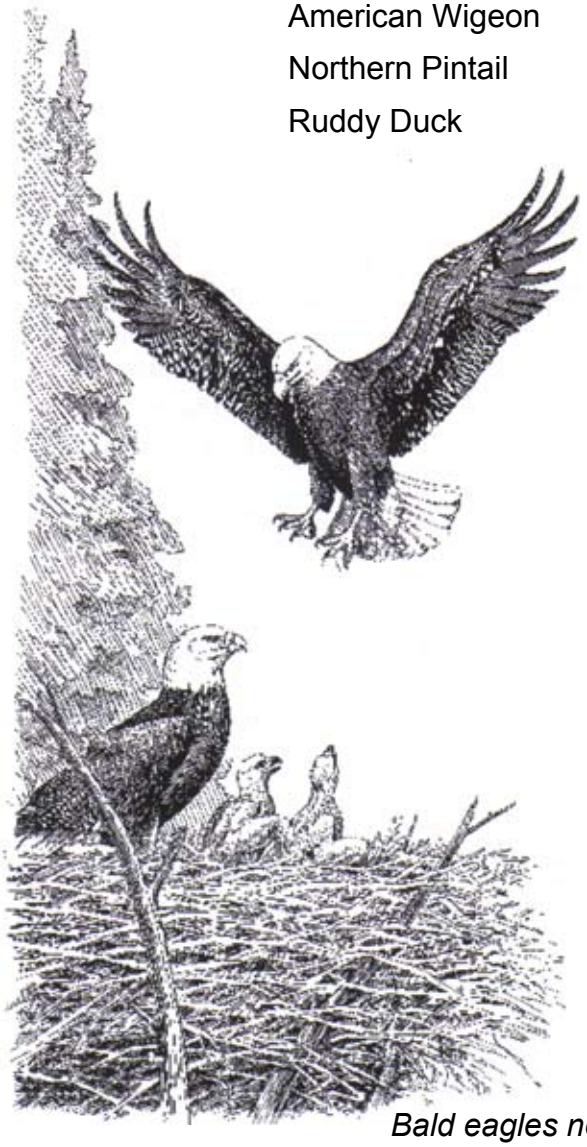
Adapted with permission from Spawning Junior Naturalists, Stephen Kramer, Hockinson Intermediate School

Fledging Young Birders

The following local birds are listed as commonly seen in their feeding habitat.

Open-Water

Bald Eagle
Purple Martin
Ring-Billed Gull
Tundra Swan
American Wigeon
Northern Pintail
Ruddy Duck



Bald eagles nesting

Freshwater Wetlands

American Coot
Belted Kingfisher
Cinnamon Teal
Common Snipe
Common Yellowthroat
Great Blue Heron
Great Egret
Long-Billed Dowitcher
Mallard
Marsh Wren
Northern Shoveler
Pied-Billed Grebe
Wood Duck

Fields

American Crow
American Goldfinch
American Kestrel
Barn Swallow
Brewer's Blackbird
Canada Goose
Killdeer
Mourning Dove
Northern Harrier
Red-Tailed Hawk
Red-Winged Blackbird
Rock Dove
Sandhill Crane
Savannah Sparrow
Starling
Turkey Vulture
Western Meadowlark

Woodlands

American Robin
Bewick's Wren
Black-capped Chickadee
Cedar Waxwing
Common Bushtit
Dark-Eyed Junco
Downy Woodpecker
Great Horned Owl
House Finch
Northern Flicker
Rufous Hummingbird
Rufous-Sided Towhee
Scrub Jay
Song Sparrow
Stellar's Jay
White-breasted Nuthatch

Notes

Chapter 4

Migration Studies - Outdoor and Classroom Activities

Migration Studies Overview

Theme

The Pacific Flyway is a route taken by migratory birds during flights between breeding grounds in the north and wintering grounds in the south. Ridgefield National Wildlife Refuge plays an important role in migration by providing birds with a protected resting area during their arduous journey. Migration makes it possible for birds to benefit the most from favorable weather conditions; they breed and feed in the north during the summer and rest and feed in the warmer south during the winter. This pattern is called return migration — the most common type of migration by birds. Through a variety of activities, students will learn about the factors and hazards of bird migration on the Pacific Flyway.

Pacific Flyway

Background

The migration of birds usually refers to their regular flights between summer and winter homes. Some birds migrate thousands of miles, while others may travel less than a hundred miles. This seasonal movement has long been a mystery to humans. Aristotle, the naturalist and philosopher of ancient Greece, noticed that cranes, pelicans, geese, swans, doves, and many other birds moved to warmer places for the winter. Like others of times past, he proposed theories that were widely accepted for hundreds of years. One of his theories was that many birds spent the winter sleeping in hollow trees, caves, or beneath the mud in marshes.

Migration Studies Overview

Through natural selection, migration evolved as an advantageous behavior. Birds migrate north to nest and breed because the competition for food and space is substantially lower there. In addition, during the summer months the food supply is considerably better in many northern climates (e.g., Arctic regions). Over much of the world, bird migration has become the rule rather than the exception. Various species of mammals, insects, fish, reptiles, and amphibians also migrate. In the spring, some of these species migrate to regions that were uninhabitable earlier in the year. Migrant species are usually assured of adequate space and ample food upon arrival at their summer habitat. Nonmigratory species, ones that stay behind to nest, benefit from the migration of other species because it reduces competition.

How and When Birds Migrate

Several senses and adaptations enable birds to migrate. Most migratory birds have very powerful flight muscles. Like most birds, they also have a highly developed respiratory system, hollow bones, internal air sacs, and specialized body shapes. All of these features enable them to fly high, fast, and for long periods of time.

Times of annual migrations are not the same for all birds. Shorebirds begin their fall migration in early July, but other species, such as geese, do not begin until late fall. Some birds have a leisurely migration, while others fly swiftly to their destinations. Generally speaking, spring migrations are faster than fall migrations because of the stimulus to breed and nest. Migratory birds may travel during the day, night, or continuously, depending upon weather conditions and the bird species.

Our feathered friends do not recognize political boundaries, traveling across both international and state borders. Protection of these birds within the United States is in the hands of the Department of the Interior's U.S. Fish and Wildlife Service. Treaties with Canada and Mexico extend protection throughout the North American Continent. Protective laws regulating hunting of ducks and geese are established according to flyways. Depending on population sizes, the hunting of certain bird species may be restricted or banned.

Migratory Bird Data Center

Banding (the attachment of identification tags to individual birds and other kinds of wildlife) has facilitated the determination of many migration routes. Amateur naturalists in Europe pioneered bird banding, and biologists worldwide subsequently adopted the practice. There are several dozen banding centers throughout the world,

Migration Studies Overview

but we in North America are fortunate to have a facility where many of these activities are coordinated. This is the Department of the Interior's Bird Banding Laboratory in Maryland. In cooperation with the Canadian Wildlife Service, this center coordinates the banding activities of about 4,000 professional and amateur ornithologists throughout North America and several foreign countries.

Hunters and others send band numbers that they find on birds, and facts of their recovery, to the Bird Banding Laboratory. This information helps scientists to understand population dynamics and migration routes of birds. The center's scientists use computers to keep track of the thousands of recoveries sent in each year.

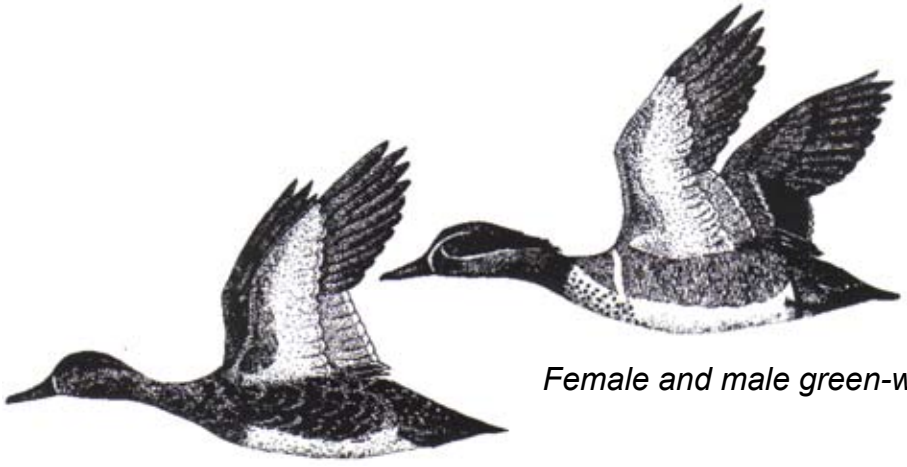
How Can You Help?

Most birds are banded on a leg with a metal band. If you see a bird with a bird band, record the numbers on the band as well as the date and location of the sighting. Send, or call in, this information to: U.S. Fish and Wildlife Service, Bird Banding Laboratory, Office of Migratory Bird Management, Laurel, Maryland 20708 (1-800-327-BAND). You will be sent a Certificate of Appreciation, and the person who banded the bird will be notified of your report.

EALRs

Geography: 2.1

History: 2.2



Female and male green-winged teal

Lucky Ducky

Outdoors
Grades: K-8

Objective
Students will learn about and experience the annual migration of waterfowl by becoming ducks. They will be introduced to a few of the hazards that migrating birds face.

Materials
Jump rope

2 cardboard boxes (represent boats)

Food tokens in four colors

Playing field

EALRs
Communication: 1.1

Writing: 2.2
Science: CH03 1.3.9, 1.3.10

Geography: 2.1, 3.1
History: 1.3

Health & Fitness: 1.1.1., 1.2.1

Background

Virtually all waterfowl migrate. In general, a migration pattern is from southern wintering grounds to northern nesting areas and back again in a year's time. There are several theories as to why waterfowl migrate, but the decreased availability of food and water as the seasons change is probably the most important reason. Birds use many techniques to guide them in the right direction during migration. They recognize landmarks, follow weather patterns, sense the magnetic field of the earth (for direction), and follow strong inherited instincts.

Along the lower Columbia River around Ridgefield National Wildlife Refuge, waterfowl begin to arrive in late September, with the overall peak of migration in November. The newly flooded wetlands, sloughs, and fields provide plenty of winter food, loafing areas, and protection for these migrating birds. Many of them, especially Canada geese, spend the winter here, while others simply pass through to winter in areas further south. Migration north begins in March as wintering birds begin to leave the refuge and are replaced by other birds moving through the refuge from their wintering areas to the south. Most geese are gone by mid-April; most of the ducks are gone a few weeks later. Some ducks such as mallards and cinnamon teal stay in the area during the summer to nest and rear their young.

North American waterfowl use four major migration routes --called flyways--for their travels between nesting grounds in the north and wintering grounds in the south: the Pacific, Central, Mississippi, and Atlantic Flyways. Waterfowl found on the refuge use the Pacific Flyway during their northern and southern migrations. Waterfowl face many hazards while migrating. Storms may blow them off course, cold weather may reduce the availability of food, and

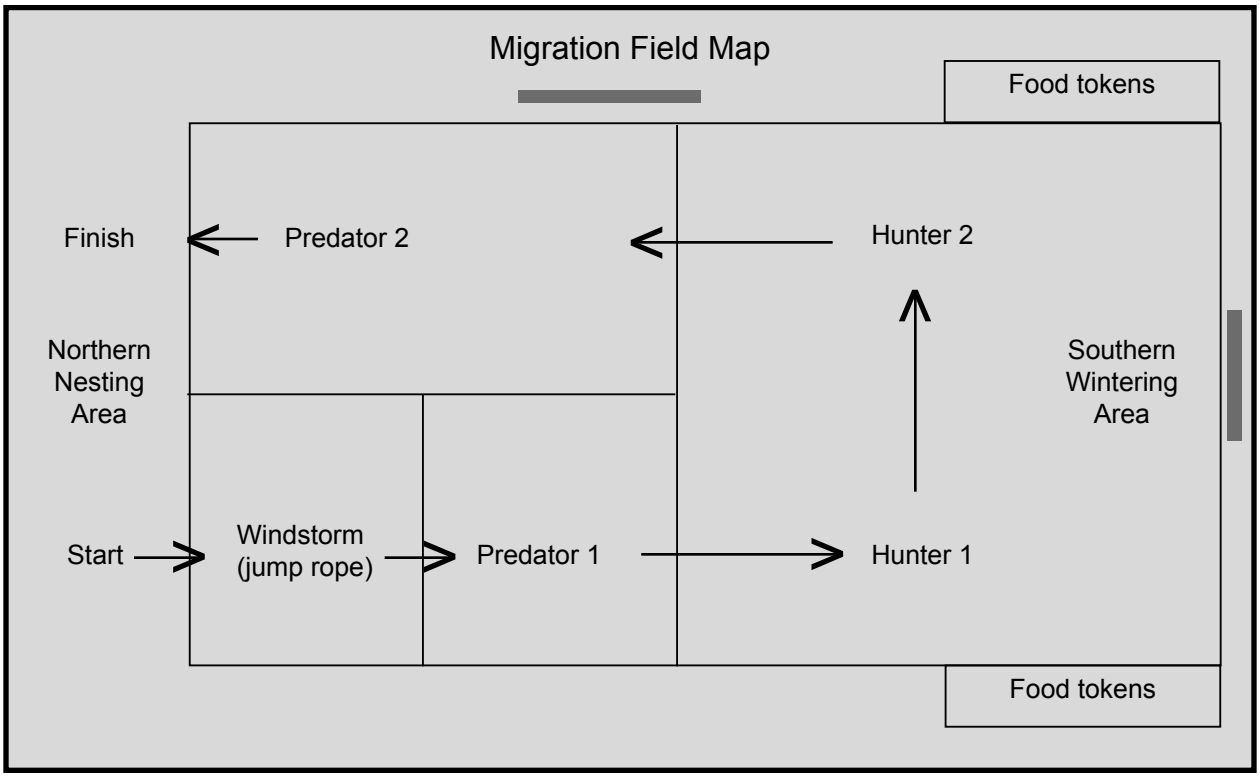
Lucky Ducky

disease outbreaks may occur when large numbers of waterfowl feed and rest in the same area.

Migratory birds face the risk of predation by hunters and predators such as the fox. Humans, too, have created obstacles for these birds. Collisions with power lines, radio towers, or even buildings often occur because most migration takes place at night. Much of the traditional habitat used by waterfowl has been lost to development or farming. Lastly, pesticides and pollutants may become concentrated in wetland areas, thereby threatening the health of migrating waterfowl. Despite all the hazards migrating birds encounter, many successfully migrate each year.

Methods

Students simulate waterfowl and the hazards they face in this highly active game that portrays an annual waterfowl migration cycle. Set up a playing field as shown in the diagram below. Begin the activity by asking the students what they know about the life cycle of ducks. Review an annual migration cycle and generate a list of potential hazards that birds may face during their trip. (See page 71 for lists of factors that limit or favor the survival of migrating birds.)



Lucky Ducky

Choose students to play these roles:

- two students to operate the jump rope (windstorm)
- two students to be predators (a fox, a hawk, etc.)
- two students to be hunters
- two students to hand out food tokens (different colors)
- the remainder are ducks

The challenge of this activity is to migrate from the nesting area to the wintering area and back again, without veering off course, falling prey to a predator, or being hunted. As students move through the playing field they must pass through a windstorm (jump rope) without being hit, avoid being eaten (tagged) by a predator, and avoid being shot (tagged) by a hunter.

The game begins with the “ducks” at their nesting area in the north. The first obstacle is the windstorm. The ducks must fly through the jump rope without being hit (hit = death). Next, the ducks must pass the first predator and enter the wintering grounds without being tagged (tagged = death). During their stay in the wintering grounds, the ducks must avoid being tagged by the hunters (tagged = death). The hunters may move around the area, but they must keep one foot inside a box at all times; the boxes are their boats. While in the wintering grounds, the ducks must travel east and west (back and forth) across the area to gather their food tokens. Food tokens should be different colors. Ducks must gather four food tokens of any color, but they can only receive one food token at a time. They are “safe” in the food token areas but not while moving between them. After the ducks successfully gather their food tokens, they must migrate back to the nesting area. In order to arrive safely at their nesting grounds, the ducks must avoid being tagged by the second predator, the last obstacle. When ducks are tagged or hit they “die” and go to the side of the playing area until the next round.

After all ducks have either successfully migrated or died, choose one color of the food tokens to represent toxic food. Any bird who ate them has just become very sick and dies. Usually few, if any, of the ducks will survive the first round.

Adjust the obstacles as necessary to allow some of the ducks to survive. Change roles and repeat the migration as long as interest is high. Conclude the activity with a review of waterfowl migration cycles and the hazards they may face. Ask the students how they felt during the migration. One possible extension is to have the students do a report on a bird and map out its migration route.

Migration Madness

Classroom
Grades: 3-8

Objective
Students will learn about the factors of survival for migratory shorebirds and waterfowl.

Materials
Strings (20 cm long)
Marking pens
Migration chart map (pg 72)

EALRs
Writing: 2.2
Math: C 1.1.2, 3.3.2, S 1.2.3, 1.4.2, 2.3.1, 4.3.1, 5.2.2
Science: CH03 1.3.7, 1.3.9, 1.3.10, IQ02 2.1.3
History: 3.2
Geography: 1.1.1, 2.3, 3.1.1

Long-billed dowitchers

Background

Migrating birds travel long distances between wintering and nesting areas. Timing of migration is correlated with seasonal temperature changes. During the spring, most birds do not migrate north faster than the 35° F isotherm (an imaginary line that represents 35° F across an area; north of this line is cooler than 35° F and south of this line is warmer than 35° F). This ensures that when the birds reach their nesting areas, the ground will not be frozen. In the fall, temperatures affect the amount of available food (i.e., insects and plants die off in cooler temperatures), so the birds keep moving south to places where food is abundant enough to sustain their migration to the wintering areas. Wetlands are important because they provide a place for migrating birds to feed and rest. Without these local wetland areas that supply food to sustain their energy, many birds would not be able to survive their migrations.

The Pacific Flyway is the migration route chosen for this activity. Many of the shorebirds and waterfowl seen at Ridgefield NWR migrate via this flyway between wintering areas in South America and nesting areas in the Arctic portions of Alaska and Canada. In the United States, 28 percent of total flyway wetlands are found in California, 15% in Oregon, and 10% in Washington. If a bird flies between Argentina and Alaska, it covers 7,000 to 8,000 air miles. Approximately 15% of migrating birds fly at elevations below 10,000 feet, however, many have been observed at elevations of 29,000 feet by airline pilots.

Most birds do not fly nonstop between these areas although they are capable of it. Generally, birds fly for a few hours and then rest and feed for 1 to 3 days before resuming migration. Birds fly faster as they approach their northern nesting grounds, because the time to nest and raise young before freezing weather comes is limited. Birds using the Central Flyway have been recorded flying 23 miles per day (mpd) up the

Migration Madness

Mississippi Valley, 40 mpd across southern Canada, 72 mpd to northern Canada, 116 mpd to Arctic Canada, and those going on to Alaska at 150 mpd. One duck was reported to have flown from Alberta, Canada to Venezuela, South American in 1 month (approximately 125 mpd); this trip usually takes 2 to 3 months!

Methods

Follow the instructions below:

1. Cut one piece of string that is 20 cm long. Hold an end of the string at the end of one of the migratory paths drawn on the migration map on page 63. Lay the string along the path so that it follows it exactly. Mark the end of the path on the string with a marking pen.
2. The string now represents the distance of the migratory path. Compare the string to the mileage scale located next to the map and calculate how many miles the bird traveled.
3. Repeat steps 1 and 2 for the other paths shown on the map, using a different pen color for each path. Write your answers in the spaces provided below the map.
4. After calculating the distance traveled by each bird, determine how long it would take each bird to reach its northern nesting grounds if it traveled at 40 mpd and at 72 mpd. Record your answers in the appropriate place below the map.

Discussion

Generate a list of factors that limit or favor the survival of migratory birds. (Use the following lists as supplements.) Discuss how the factors would affect a bird's migration success. Could some of them be avoided?

Extensions

Research the migration path of another bird that uses the Pacific Flyway. Draw its migration path on the migration map and label it with the bird's name.

Factors Limiting Survival	Factors Favoring Survival
•Wetland drainage	•Preservation of wetlands
•Drought	•High rainfall
•Pollution and contamination of water	•Restoration of habitat
•Urban expansion	•Balance with predators
•Conversion of wetlands to farm land	•Human action aimed at protecting and restoring wetlands
•Disease	
•Conversion of natural waterways to canals	•Regulation of hunting and human predation
•Illegal hunting, lead shot from hunting in food supply	

Adapted from Seasonal Wetlands, Santa Clara Audubon Society

Migration Madness – Migration Map

Record Your Calculations Below			
Bird	*Distance Travelled*	*How long at 40 mpd*	*How long at 72 mpd*
Dusky Canada Goose			
Long-billed Dowitcher			
Purple Martin			
Bird researched			

Migration Math Questions

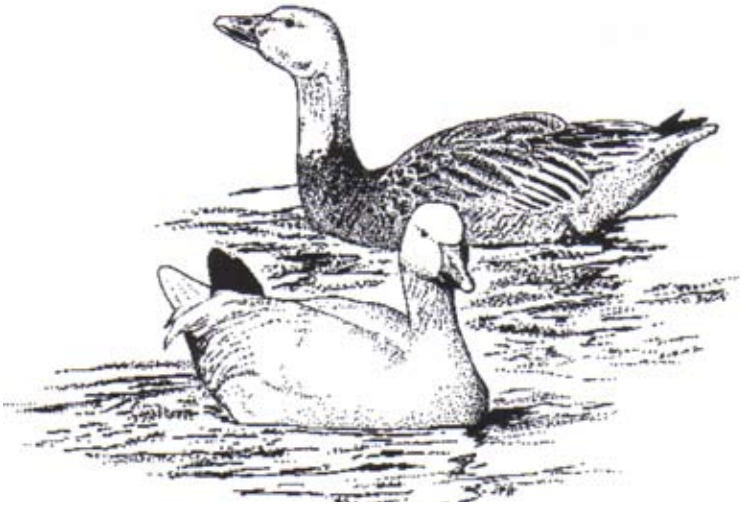
Classroom
Grades: 2-8

Objective
Students will be introduced to environmental and economic subjects while doing a math exercise.

EALRs
Writing: 2.2, 2.3
Communication: 2.1.1
Math: N 1.1.2, C 1.1.2; S 1.2.1, 1.2.2
Science: CH03 1.3.10
Economics: 1.3.1, 1.3.2

Methods

After planning your field trip, prepare the students for their migration to Ridgefield National Wildlife Refuge. The questions below are suggestions for a math exercise. Discuss the type of migration you and your students will be making (return migration--you will migrate to the refuge and then back to school). Bring math action into the field trip by preparing a page of Great Blue Heron Addition, Mallard Multiplication, Swan Subtraction, and Duck Division.



Snow geese

1) Estimate the number of miles between Ridgefield National Wildlife Refuge and your school. How many miles would a round trip be?
2) How many gallons of gas (a nonrenewable fuel) will be used?
3) At _____ dollars per mile for a car or _____ dollars per mile for a bus, how much will the trip cost?
4) Discuss how to make the trip “worth it.”

Adapted from Salt Marsh Manual, U.S. Fish and Wildlife Service

Paper Bag Mallards

Classroom
Grades: K-4

Objective
Students will learn about mallard ducks through the making of duck puppets. Students will also learn about their annual migration cycle by listening to a story.

Materials
Paper bags
Copy of duck's head
Scissors
Glue
Crayons

EALRs
Art: 1.4, 2.2, 3.2, 4.2

Methods

Read this story to your class.

Allow me to introduce Robbie and Rachael, my mallard duck friends. Rachael is a female mallard duck. Her bill is orange with black mottling and the feathers on her head and body are brown and white. When Rachael is flying, people can see that she has a patch of purple feathers between two white bands on her wings. Robbie is a male mallard duck. His bill is solid yellow, and his head and neck are shiny green. He has a white collar and a brown chest. His body feathers are greyish-brown. When Robbie is flying, people can see that he has a patch of blue feathers between two white bands on his wings, similar to Rachael.

During the year people live in their houses in _____ (your city or town). They might go to the beach during the summer, but mostly they stay at home. For ducks like Rachael and Robbie, life is very different. Using the Pacific Flyway, they leave Washington in the spring and fly north to the prairies and parklands of Alberta, Canada. Some mallards may fly as far north as Alaska, but most of them rest and breed in Canada. Rachael and Robbie enjoy living in Canada, because there is plenty of food and space for them and their friends.

In Canada, Rachael and Robbie will mate. Rachael will lay 8 to 10 olive green eggs; she will keep them warm by sitting on them. In approximately 27 days the mallard ducklings hatch! Before the ducklings hatch, however, Robbie needs to molt (replace old feathers with new ones). For 9 months he has been wearing colorful plumage to help him attract Rachael. Now that he has mated, he is ready to exchange his worn feathers for new ones. In order to do so he leaves Rachael and the eggs and goes to his favorite lake. First his body feathers fall out and are replaced, and then his wing feathers drop off. Until his new wing feathers grow back (in 3 to 4 weeks) he is unable to

Paper Bag Mallards

fly, so he hides among thick weeds in the water. The feathers that come in are a temporary set that is dull brown; these "eclipse" feathers are worn for a few months until another molt brings back his colorful plumage. Rachael molts too, but she waits until the ducklings can survive on their own. After the ducklings hatch, they grow and learn to fly throughout the summer. When the weather gets colder in the fall, Rachael and her ducklings fly south, back to Washington. Robbie also flies south for the winter, but he migrates on his own.

During their trip to Washington, Rachael and the growing ducklings rest and feed at wetlands found along the Pacific Flyway. While migrating, Rachael and her family use weather patterns, landmarks, stars, sounds, and natural instinct to successfully find their way to Washington. The locations of the ocean and mountains guide them throughout their journey. When they arrive in Washington, where it is nice and warm compared to Alberta, they rest and feed until winter is over and it is time to fly north again.

Students Make Their Puppets

Using the pattern on the following page, students cut out and color their mallard beaks. Encourage them to color as accurately as possible; they could be Rachael and Robbie. The bill with the eyes should be glued to the flap of the up-side-down bag, and the bottom bill should be glued underneath the flap. Students can color the bag to represent the body of their duck. Put your hand inside and you have a paper bag mallard hand puppet.

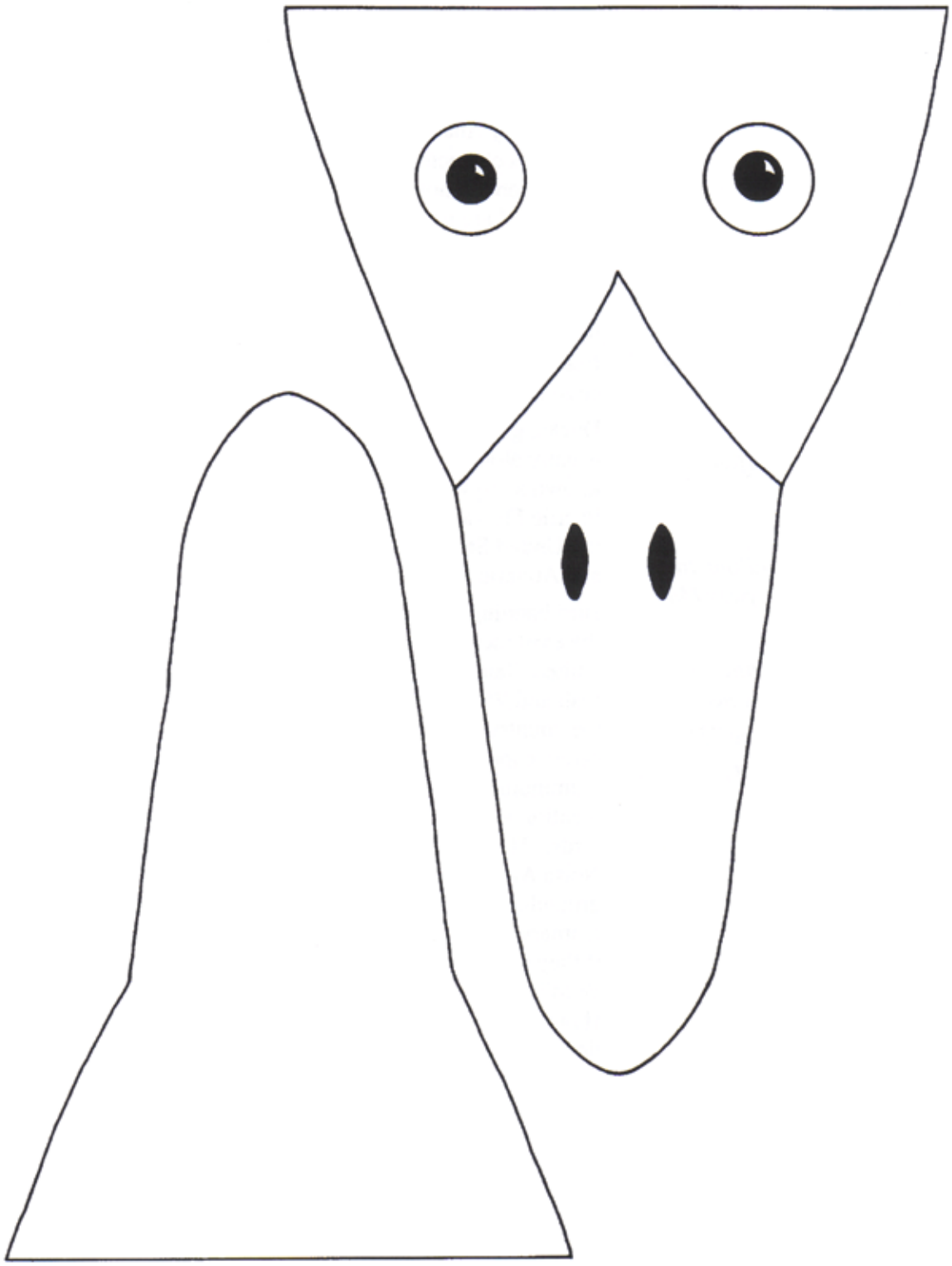
Additional Activity

Students may act out what happens during Rachael and Robbie's migration cycle with their puppets.

Female mallard with ducklings

Adapted from Central Valley Habitat Fun Pack, U.S. Fish and Wildlife Service

Paper Bag Mallards—Pattern



Migratory Mapping

Classroom
Grades: 4-7

Objective
Students will learn the migration route of a common migratory bird, the Canada goose. This will be done by compiling and mapping data from actual band records.

Materials (for the class)
Bird Banding Reports (five copies)

Paper bag or hat

Transparencies — Bird Banding Map (page 82)
Flyway Map (page 84)

Materials

(for each student)
Colored pencils/ crayons

Bird Banding Map

(page 82)

Reference Map

(page 83)

EALRs

Science: CH03 1.3.9, IQ03 2.1.3

Geography: 1.1.1, 1.1.2, 2.1.1

Background

The family Anatidae, composed of ducks, geese, and swans, is characterized by the behavioral and adaptive phenomenon known as migration. Only a few species of waterfowl are nonmigratory, and portions of some migratory species do not journey when they reside in the southern parts of their breeding ranges. Although still not completely understood by scientists, it seems that waterfowl migrate for survival; their wetland breeding habitat freezes over with the advent of winter, making food inaccessible.

Ducks, geese, and swans make long migratory flights, usually along one of four major North American corridors known as flyways. Ridgefield Refuge is located in the Pacific Flyway, which is located along the western coast of the United States. To its east are the Central, Mississippi and Atlantic Flyways. (See map on page 84.)

Bird banding activities conducted by biologists revealed the existence of these four migratory flyways. In the United States, bird banding is administered by the U.S. Fish and Wildlife Service. Licensed bird banders around the country operate stations where migratory birds are safely captured. After recording and applying numbered aluminum leg bands, the banders record information on location and date of capture, species, age, and sex of the birds. The birds are then released back into the wild. Most North American waterfowl are banded on their breeding grounds, where the juveniles and adults molting their flight feathers are easier to capture. When birds are recaptured, or if they die and their bands are recovered, the U.S. Fish and Wildlife Service uses the numbers from the bands to

Migratory Mapping

learn about migration routes. Band returns also yield information on areas of hunting pressure, annual reproductive success, and the longevity of individual species.

This activity will allow your students to use data from banded Canada geese to explore the concept of waterfowl migration.

Methods

1. The banding reports contain 30 banding results. Make seven copies of these reports (for a class of 30). Cut the copies into 210 strips and put these into two shoeboxes or paper bags, keeping sets A and B separate. Note: These band reports are simplified versions of real data that have been turned into the U.S. Fish and Wildlife Service.

2. Make overhead transparencies of the Bird Banding Map (page 82) and Flyway Map (page 75).

3. Lead the students in a discussion of bird banding. Banding is done to provide information about birds' migration routes. Through recovery of bands, data on direction and duration of migration is obtained. The Fish and Wildlife Service can also determine the success of goose reproduction and longevity and learn about areas of hunting pressure. This information is used to adjust the rules for the following hunting season.

4. Hand out copies of the Bird Banding Map (page 82) and Reference Map (page 83).

5. Tell the students they are wildlife biologists compiling banding returns. Data is being sent to them regarding true locations of banded Canada geese. Their job is to map Canada goose migration — spring and fall — based on the reports. Students will each receive data from seven bands. While bands are recovered throughout the year, the information students receive will be primarily from the summer breeding and fall migration periods. (Have the students suggest why more bands might be recovered at these times of the year. The primary banding period occurs during the summer when adults return to breeding grounds, and bands are returned by hunters from geese they harvest during the fall hunting season).

Students can tell the difference in seasons by the dates as identified in the chart below. Have the students use different colored crayons or felt markers as indicated for migration, breeding, and wintering periods.

Time of Year	Months	Color
Wintering Period	December, January, February	Blue
Spring Migration	March, April, May	Green
Breeding Season	June, July, August	Red
Fall Migration	September, October, November	Black

Migratory Mapping

6. Pass the boxes or bags around the classroom. Each student should take seven strips (representing band reports) from one of the containers. Have each student mark the locations of the reports on their Bird Banding Map with the appropriate color indicating the time of the return. If the students receive two of the same report, they should plot both.

7. Have the students form groups of four to compare data and map the banding reports of the other group members on their individual maps. Based on the additional information, the students should then draw a circle around the areas they think represent spring and fall migration routes, breeding grounds, and wintering areas. Their data will indicate that the Canada geese used in this activity breed mostly in Alaska or Canada, and migrate along either the Pacific or Mississippi Flyway.

8. Make an enlargement of the Bird Banding Map using a transparency and overhead projector, then plot the band reports from all the students. Have each group come up and plot their returns, with each student using a different color marker representing a different period in the bird's life. Continue collecting information from the class and plotting it until all reports have been shown. Like the students have done on their individual maps, draw a circle around the areas they think represent spring and fall migration routes, breeding grounds, and wintering areas. Discuss why there might be differences between the large map and the individual maps.

Discussion

After you have put all the data on your map, introduce the students to the idea of flyways, which are generalized migration corridors. Although species' actual migrations do not strictly conform with these flyways, they are a useful way of generalizing migration routes. Band recoveries help to indicate along which flyways species migrate (for instance, the dusky Canada goose which winters on Ridgefield Refuge uses only the Pacific flyway). Use the Flyway Map (page 84) transparency to illustrate the idea and locations of flyways.

Follow-up

1. Have students choose one of the four flyways and research its geography. Generate a class list of possible problem areas and favorable habitats (refuges, rivers, estuaries, etc.) that Canada geese might encounter on that route.

2. Through research and observations made throughout the school year, students can note the varying numbers, types, and/or species of birds in the area and determine which migrate and which do not.

They can then study one migratory species they have identified in the neighborhood and use a map and bird guides to examine where the species migrates. Research should include the route and timing of migration, obstacles encountered, and traditional habitats used during migration.

Adapted from Central Valley Habitat Fun Pack, U.S. Fish and Wildlife Service

Migratory Mapping

1. Goose caught by hand in northern Alaska, 8/6/91.
2. Neck-collared goose observed by person in northwestern Oregon, 2/28/91.
3. Goose found dead by hunter in Ridgefield, Washington, 10/16/91.
4. Band number of goose read from by a observer in northern Alaska, 7/9/91.
5. Hunter reports band from Central Valley, California, 11/12/91.
6. Goose caught after being forced down and weakened by bad weather in southeastern Oregon, 11/30/87.
7. Goose shot by hunter in northern California, 11/11/88.
8. Goose band sent in from south central Alaska with no information about recovery or cause of death, 8/4/91.
9. Hunter reports goose that was taken by his party in southwestern Washington, 10/13/91.
10. Goose banded in Oregon was identified and reported from southeastern Alaska by resident, 9/8/91.
11. Skeleton of banded goose found and reported from Aleutian Islands, Alaska, 9/8/91.
12. Goose recaptured almost a year later in the same place where banded in Alaska Peninsula, Alaska, 10/8/91.
13. Goose banded along west central Alaska coast killed by a hunter in central California, 10/31/91.
14. Goose inadvertently caught by fur trapper in western British Columbia, 10/10/91.
15. Goose banded in Yukon Territory shot by hunter in southeastern Oregon, 10/26/91.
16. Injured goose caught in Iowa, 2/28/91.
17. Goose banded 1/2/73 south of Portland, Oregon, and shot by hunter 18 years later in southwestern Washington, 11/22/91.
18. Goose banded in Manitoba shot three months later in Missouri, 11/8/91.
19. Goose banded in Manitoba 7/19/78 and recaptured near place of banding, 7/30/91.
20. Goose caught in southern Illinois after being hit by a vehicle, 2/29/91.
21. Goose banded in the eastern Northwest Territories, Canada, shot in Ohio three months later, 10/21/91.
22. Goose found dead near Portland, Oregon, 2/27/91.
23. Goose killed in WI. by hunter, 10/29/91.

Migratory Mapping

24. Goose banded in Ohio found injured in Michigan, 8/4/91.

25. Goose first banded 10/11/77 in Wisconsin, accidently killed when recaptured in banding operation in Illinois, 2/26/91.

26. Goose banded in Manitoba shot almost 13 years later along the Gulf Coast of Texas, 12/2/91.

27. Goose banded in Oregon identified by neck collar in central California, 2/5/91.

28. Goose found dead on highway in southern Ontario, 9/1/91.

29. Goose collected for scientific specimen in Ohio, 4/27/91.

30. Goose found dead in Illinois along Mississippi River, 3/17/81.

31. Goose banded in Arkansas shot almost 17 years later in South Dakota, 10/20/88.

32. Goose found entangled in fishing gear in Michigan, 1/5/89.

33. Goose recaptured at the place of banding one year and one day later in south central Alaska, 6/22/91.

34. Goose captured after it joined a flock of domestic birds in Portland, OR., 6/2/91.

35. Goose shot by hunter along the coast of British Columbia 40 days after it was banded, 9/3/91.

36. Band reported from western Manitoba with no information regarding bird circumstances, 6/15/91.

37. Goose found dead in Minnesota, 2/30/91.

38. Goose found as the result of death by an unknown animal in central Manitoba, 7/23/81.

39. Goose banded in Kansas 2/14/80 shot in Saskatchewan, 11/9/91.

40. Goose found injured near Boise, Idaho, 6/28/90.

41. Goose found dead in southwestern Washington almost seven years after banding, 5/27/80.

42. Two geese banded on the same day were found dead a year later near a highway in Wisconsin, 1/5/82.

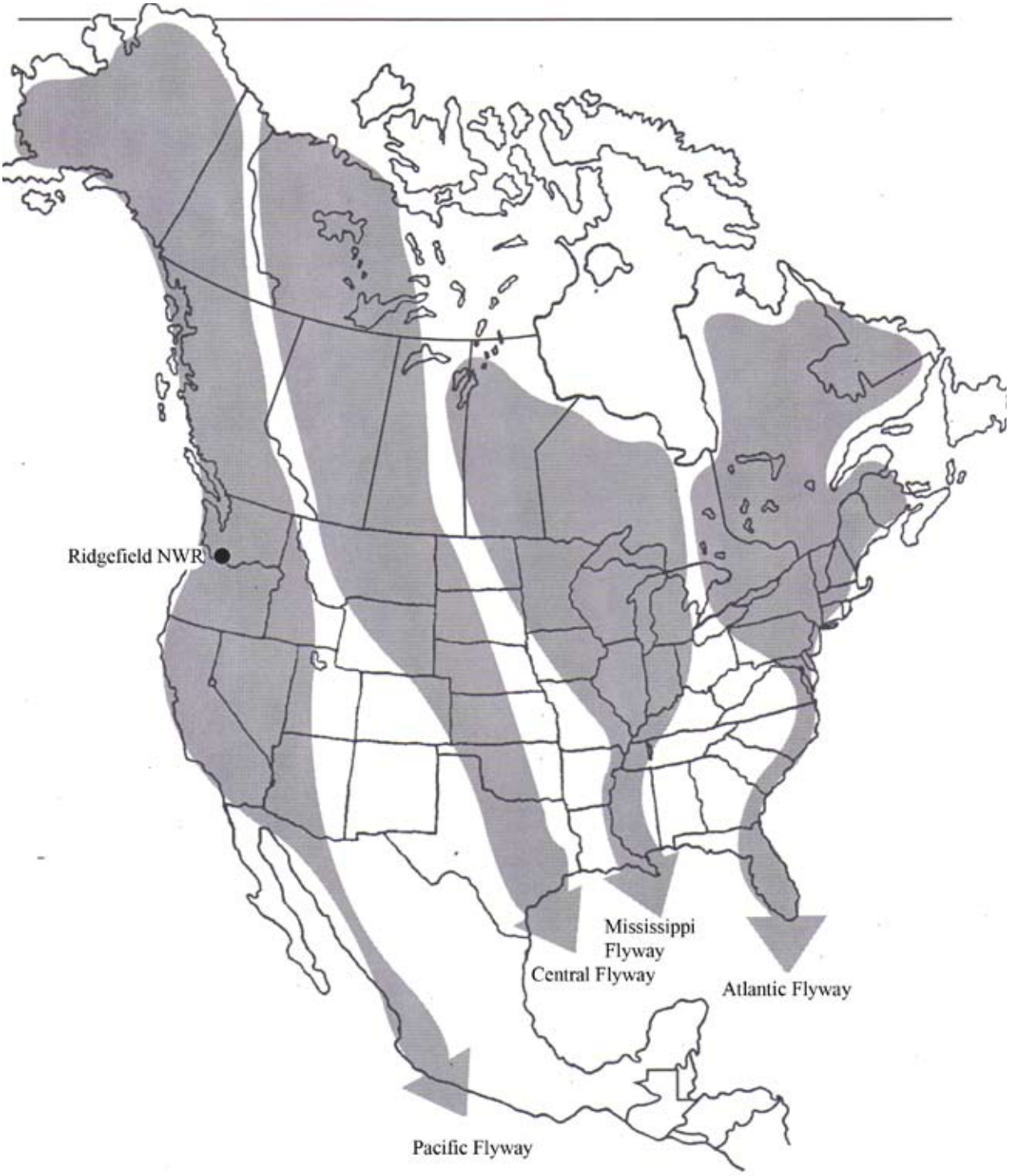
43. Goose banded in southeastern Oregon 7/1/86 recaptured in central Valley of California by another bander, 1/28/90.

44. Goose caught by a dog in northern Minnesota, 5/28/89.

Bird Banding Map

Reference Map

Flyway Map


Ridgefield NWR
Mississippi
Flyway
Central Flyway
Atlantic Flyway
Pacific Flyway

Notes

Notes

Chapter Five

Migration Studies - Outdoor and Classroom Activities

Habitat Studies Overview

Theme

The place where a plant or animal lives is called its "habitat." Every habitat provides its inhabitants with food, water, shelter, and space. Some animals have developed adaptations (ways to survive) for specific habitats. Students will discover more about the refuge's habitats through a variety of investigations.

Mallard

Background

Ridgefield National Wildlife Refuge manages and protects five habitats: open water, freshwater wetland, field, riparian woodland, and upland woodland. The refuge was established with the primary purpose of providing a migration and wintering area for waterfowl. Other objectives include the management and protection of all wildlife species and their habitat, stressing the need to provide biodiversity. Traditionally, biodiversity is defined as the maximum number of species in a given area.

Biologists have recently become aware, however, that an area with a large number of species is not necessarily rich in true diversity. Many wildlife species using a small piece of habitat in a habitat mosaic are generalists, that can live in a variety of habitats or along the edge of a habitat community. Endemic wildlife species, or those which are specialists requiring larger vegetative communities, have become increasingly uncommon as wildlife habitat is fragmented by human development.

Each habitat on the refuge supports a diverse group of plants and animals. The importance of these habitats is evident in the presence of threatened, endangered, or sensitive species they support. Wildlife species of concern include the dusky Canada goose, cackling Canada goose, and bald eagle; plant species include water Howellia, giant trillium, Nuttall's larkspur, and fawn lily. Through habitat studies, students should learn about the importance of protecting habitats.

Web of Life

Classroom

Grades: K-8

Objective

Students will learn how living and nonliving parts of the natural world are connected to each other, either directly or indirectly.

Materials

A ball of yarn

"Web of Life" cards with pictures of plants, animals, and elements (i.e. sun, air, etc.)

Spider and web

Background

Food webs present a pictorial explanation of the relationships between the plants and animals of an ecosystem. A food web may consist of many individual food chains. A food chain illustrates a sequence of living organisms that feed on each other. For example, a food web may include the following food chain:

marsh plants —> marsh mouse —> northern harrier

(The arrow points to the organism that eats the preceding organism).

The chain does not stop here, however. When the northern harrier dies, bacteria decompose the body and turn it into soil nutrients which new plants will use to grow. An incredible number of plants are required to supply enough food energy for one northern harrier!

Some organisms of a food chain are predators (northern harrier) while others are prey (mouse); some may even be both predator and prey (snakes). Predators hunt other animals for their food. The animals eaten by predators are prey. Predator-prey relationships are not constant; they are changing. The number of predators will increase and decrease according to the availability of prey.

In addition to food webs and food chains, food pyramids are used to show the different levels of organisms in an ecosystem and the amount of energy they support. At the bottom, producers (plants) support the entire pyramid and provide the most energy. Plants use the energy from the sun and nutrients from the soil to produce their own food. Primary consumers (herbivores or plant eaters) feed on the producers and provide a food supply for the secondary consumers (carnivores or meat eaters). The amount of energy decreases as one continues up the pyramid because energy is lost between each level. Therefore, the number of producers and primary consumers outweighs the number of secondary consumers.

A food web would not be complete without scavengers and decomposers. These organisms feed on dead plants and animals. They clean up animal litter and help recycle

Web of Life

basic nutrients back to the soil for plants. Food webs display the dependence of organisms on each other. If one link is weakened or lost, the entire system is affected. As John Muir said, "When we try to pick out anything by itself, we find it hitched to everything else in the universe."

Methods

Ask the students to stand in a circle. Hand each student a "Web of Life" card to wear around his/her neck. The webbing begins by asking a player to state one way in which he/she is connected to one of the other players in the circle. For example, I am a Hawk and I breathe air. The hawk would then hold onto the end of the yarn and toss the ball of yarn to the air. Before passing the yarn, each player must state the relationship between the person receiving the yarn and him/her. Each player continues to hold his/her part of the yarn throughout the activity.

Relationships between players may be direct or indirect. For example, a hawk is a carnivore that might eat a rabbit (a direct relationship), but the hawk also depends on reed canary grass because it needs the oxygen released by this plant for breathing (an indirect relationship). When the web is completed, find out what would happen if one of the players in the circle is lost through pollution, habitat loss, over population, etc. That player holds up his/her yarn. As soon as a student feels the yarn move he/she should hold up his/her yarn. This illustrates that everyone in the web is affected, directly or indirectly, by the loss of one member. After all members have been affected, reverse the process. Ask students how the damage can be healed. For example, factories stop pouring pollution into the bay. Show restoration of the area. When you are finished discussing these questions, untangle the web by throwing the yarn backwards, restating all the relationships you named earlier, starting with the last connection first.

Discussion

Conclude the activity with a discussion facilitated by the following questions:

1. Are certain parts of the web more important to the survival of the whole than others?
2. Are you surprised that some animals or elements you had considered unimportant are actually essential to the survival of the whole web?
3. Ask the students if they have any questions.

Notes

• For young children, this activity works best when they are seated and the yarn is rolled. • Web of Life cards can be made by gluing magazine photos to index cards. Punch two holes in the top and put string through the holes. The cards can then be worn around the neck.

The Predator and the Prey

Classroom
Outdoors
Grades: 3-6

Objective
Students will learn about hunting strategies animals use to catch their prey.

Materials
Blindfolds

EALRs
Science: CH03 1.3.7, 1.3.9

Methods

Select two students for the predator and prey roles and blindfold both of them; ask the remaining students to form a circle around them. Ask one of the two students to name a predator that lives at the refuge and the other student to name its prey. (The children can be any predator-prey combination they can think of (hawk-mouse, bird-insect). Have both players, with the help of all students, think of specific sounds that represent the selected animals. The circle of students represents the habitat. To find each other, the predator or prey may make their noise at any time, but the other student must respond immediately by making his/her sound. The predator will try to tag the prey, by listening for its sound. The predator is only allowed to initiate five sounds to locate its prey, but it can answer the prey as many times as the prey makes its sound. Unlike the predator, the prey can make as much noise as he/she dares. The other students make sure that neither of the two players wanders out of the circle by tapping them on the shoulder if they get too close. They also keep track of the number of sounds the predator has initiated.

Extensions

To add a twist to the activity, allow the “habitat” students to move around thereby changing the size and shape of the habitat. Experiment with different numbers of predators and prey in the circle. If the predator is not being bold, or if interest is lagging, tighten up the circle bringing the predator and its prey closer. Switch the predator and prey frequently to give all participants a chance. Try adapting this tag game to include people as predators. For example: use people and whales as the predator-prey combination. Have the students make a list of people’s predatory activities. Examples they already know include: fishing, hunting, abalone diving, and clamming. Have them come up with more examples.

The Predator and the Prey

Discussion

Facilitate a discussion by asking the following questions:

1. What did the students find to be the best hunting strategy; strike fast or hunt slow and easy?
2. Did you (as the prey) move silently or lead your pursuer on a wild chase?
3. List and discuss different hunting strategies of various birds and compare them to the hunting methods of larger mammals.

Apply the concept of predation to the students:

1. How did each predator catch its meal?
2. Who was the prey? Who was the predator? How do you know?
3. Which predator was successful and why?

Great horned owl with mouse

Mini-Expedition

Outdoors
Grades: 2-8

Objective
While exploring a microhabitat, students will 1) make and record observations, and 2) draw conclusions about the observations.

Materials

Mini-expedition role card set

Data sheets plus one extra blank sheet

Optional
3-foot-long piece of yarn or string for each group

Scat display

Plant identification book

1 hand lens per group

EALRs

Reading: 1.1, 1.2, 2.1, 2.2, 3.2

Communication: 1.1, 1.2, 2.1-3, 3.1-3

Math: C1.1.1, N1.1.2, 4.1.1, 4.2.1, 4.3.1

Science: PC03 1.1.5, IQ01 2.1.2, IQ05 2.2.1, NS03 3.1.3

Geography: 2.1

Art: 1.2, 2.2, 3.1, 3.2, 4.2

Background

Ridgefield National Wildlife Refuge has five different habitats within its boundaries: open water, freshwater wetland, field, riparian woodland, and upland woodland. (Review Chapter 1, Habitats of the Refuge.) Each habitat can be studied in detail by investigating only a small section of it. The plants and animals observed represent the living organisms one would expect to see in that habitat.

Methods

Tell the students that they are going on an expedition to explore unknown territory. Divide them into groups of three and hand out the role cards (one of each card per group). Familiarize the students with the roles of the expedition leader, the botanist, and the zoologist by having one of each read the card out loud. After students understand their roles, allow 15 to 20 minutes for the expedition; give them boundaries to stay within. Each group should put their string out in a circle to define their territory. The habitat they are observing is within the area of the string. Tell them to answer the questions on their cards and remember their answers for sharing at the end of the activity. If a data sheet is provided, go over it with them and monitor their progress. During the expedition, hand lenses will enable them to see the plants and animals in detail. Encourage the students to explore several areas if they want to.

Discussion

After the expedition, gather students together in a circle to share their discoveries. As a group, answer the questions on the role cards or review the data sheets. Then go around the circle and ask each student to share something that he/she learned about or saw. What was most interesting? Count how many different plants and animals were found.

Mini-Expedition—Role Cards

Expedition Leader
A scientist who finds and describes the study area

- Mark the boundaries of the habitat with the string.
- Where do plants and animals here find food, water, and shelter?
- Describe the soil. Is it course, medium, or fine?
- Is the soil moist or dry? Warm or cold? What can live in this soil?
- How much sunlight hits your habitat? How is this sunlight and shade used by the plants and animals?

Botanist
A scientist who studies plants

- Describe the plants in this habitat. Are they fuzzy, smooth, succulent (full of water), etc.?
- Describe the size, color, and shape of their leaves and flowers.
- What makes them different from each other?
- How have they adapted to their habitat?

Zoologist
A scientist who studies animals

- Describe animals you find by color, size, shape, and body parts.
- Look for signs of animals who live here (scat, tracks, holes, webs . .)
- Name all animals that appear to live here.
- Describe the food chain for each animal. What do they eat? Who eats them?
- Where do the animals find water and shelter?

Mini-Expedition

Expedition Leader

1. What type of habitat did you choose? *marsh* *field* *woodland* *combination*
2. Soil texture: *coarse* *medium* *fine*

   Soil Moisture: *wet* *moist* *damp* *cool*

   The soil is (cooler or warmer) than the air.

   Soil color: _____ Are layers visible?_____
3. Sunlight: percentage of sunlight hitting ground: _____% (sq. ft. of sunlight/total sq. ft. x 100)
4. How is sunlight used by plants?_____
5. What kind of tracks and textures (mud cracks) can be found in the soil? Who do you think made the tracks? Draw them on the back of your data sheet._____

Botanist

1. How do plants get their food?_____
2. Draw and describe the plants growing in your study area. Record the features of the plants — size, color, shape of leaves and flowers (fuzzy, smooth, woody, waxy, etc.).

3. How are the plants you found adapted to living in this habitat? _____
   _____

Zoologist

1. Draw and describe the animals you found in your study area. Record special features observed about the animals (specialized mouth parts, camouflage, protective parts, color, size, shape).

2. Draw and describe any animal signs found in your study area (scat, tracks, holes, etc.).

3. What is the food chain for each animal?_____
4. Why is this habitat ideal for the animals listed above?_____

Where Have All the Wetlands Gone?

Outdoors
Grades: 3-8

Objective
Students will learn how the loss of wetland habitats may cause plants and animals to become endangered.

Materials
1 long rope (to mark "wetland" boundaries)

Food pieces (15 fish, 15 insects, 15 snails, 10 marsh plants, and 10 small mammals and reptiles)

Small plastic ziploc bags (one per student to represent their stomach)

EALRs

Science:SI01 1.2.1, CH03 1.3.7, 1.3.9, 1.3.10

Background

A wetland is defined as an area that is saturated or covered by water at least part of the year. Wetlands are more familiarly known as fresh- and saltwater marshes, estuaries, swamps, mudflats, and bogs; they may contain fresh, brackish, or salt water. Wetlands support a number of valuable ecosystems that provide habitats for plants and animals. People also benefit from wetlands because wetlands filter water, control flood water, and provide educational and recreational opportunities.

Among the many diverse facets of a wetland, one of the most important is the habitat it provides for plants and animals. In the United States, nearly 35 percent of all rare and endangered species either depend upon or inhabit wetlands. Millions of waterfowl use wetlands as a migratory stopover or as breeding and nesting grounds. Wetlands are home to an overwhelming number of species of marine, and freshwater plant and animal species.

In the United States, more than 50 percent of our mature wetlands have been altered or filled in to satisfy the needs of a growing and expanding population. Much of this is attributable to the fact that historically, wetlands have been viewed as vast wastelands. Few people realized that the "wasteland" was home to hundreds of living things. This activity examines the relationship between wetland animals and the wetland habitats. The effects of habitat loss and food shortage on animals will be observed.

American coot

Methods

Before starting this activity, have the students brainstorm a list of different kinds of wetlands and the plants and animals that may live there. Tell them they are going to pretend to be muskrats, great egrets, dowitchers, tree frogs, and northern harriers. All of these animals live in

Where Have All the Wetlands Gone?

and depend upon the marsh. When the wetlands are destroyed, these animals must find another marsh or lose their lives.

Place the rope on the ground in any shape, as long as the ends of the rope meet. This identifies the wetland habitat. Have the class sit around the outside of the "marsh." Divide the group into animals by counting off — there should be five groups. Give each animal a bag to use as his/her stomach. Using the food chart at the end of this activity, explain the specific diet of each animal; make sure the students understand they can only eat the food their animal eats. Their job is to forage (feed) in the marsh. They should put the food pieces in their stomachs as they collect them.

For the first round, sprinkle all the "food" pieces throughout the "marsh" area. Allow the animals to forage for 30 to 60 seconds or until the food is gone. When time is called, all animals must stop foraging and return to the outside of the marsh habitat. Check each stomach. If any are empty or only have one piece of food, those animals have starved to death and they should remain sitting around the marsh. (You may use this opportunity to explain that when the animals die they decompose and return to the bottom of the food chain and there help other organisms grow.) The "dead" animals could chant "decompose, decompose, decompose . . .." Collect all the food.

Now tell the class that part of the marsh is being filled in so a road can go across it. Take in some of the rope to make the marsh smaller. You should also remove three snails, insects, and fish and one marsh plant, small mammal, and reptile from the food supply; set them aside. Explain how loss of habitat also means loss of food for many animals. Scatter the remaining pieces of food around the marsh and send the animals off to forage. (Remember, the animals who starved to death do not forage again..)

Repeat the feeding sequence — shrink the marsh, remove food, forage — until only a few animals are left. You will want to use different reasons for the shrinking of the marsh. Ask the students what reasons they think might cause people to want to fill in the marsh. Here are some suggestions:

- The marsh was filled to build houses, airports, office buildings, and/or garbage dumps.
- A sewage spill from upstream enters the marsh.
- The marsh is filling up with silt from developments upstream.
- A company dumps toxic waste in the marsh, thereby contaminating the food sources.

Where Have All the Wetlands Gone?

Discussion

It is important to conclude an activity like this one with a follow-up discussion. Here are some questions you may discuss:

Q: What is the effect of a shrinking habitat on an animal that depends upon it?
A: Loss of shelter, food, water, and space.

Q: Is it necessary to build marinas, housing developments, or garbage dumps in wetland areas? What are some of the alternatives?
A: This is a sticky situation because if we don't clear away some area, — where will people live? Housing developments might take priority over marinas, but even still, a lot of discussion should occur before these decisions are made. We, as humans, should not take the fate of a species lightly, simply because we have the ability to control that fate.

Q: Why don't these animals go somewhere else to live, such as a forest? Discuss the needs of each animal.
A: Each species has specific requirements in order to live. Wetland animals can find these in the marsh, but they may not be able to find them in other habitats, such as a forest.

Q: Why can't the animals exist in smaller, but more crowded marshes?
A: Competition for food, shelter, water, and space would be too great, causing many species to become diseased or to die from the crowding.

Q: What needs to be done to help animals such as these?
A: Education, heightened awareness, increased interest, etc.

Q: How can you help endangered animals?
A: Make efforts to learn more about them, write letters to your Senators and Representatives, and Adopt-an-Endangered Species.

Food Chart for Wetland Inhabitants

Food / Animal	Marsh Plants	Fish	Insects	Snails	Small Mammals and Reptiles
Muskart	x				
Great Egret		x	x	x	x
Dowitcher			x	x	
Tree Frog			x		
Northern Harrier		x			x

Adopted from Nature Scope's Picky Eaters Activity and Project Earth

Field, Forest, and Stream

Outdoors
Grades: 4-8

Objective
Students will 1) investigate/measure components in three different ecosystems, 2) describe similarities and differences they observe among three ecosystems, and 3) identify ways that the non-living components of an ecosystem affect the living components.

Materials
Butcher paper
Marking pens
Paper for recording observations
Trowel or stick
Photographic light meter or photosensitive paper
Thermometer
Small strip of paper
Compass

EALRs
Science:
PC031.1.5,
SI01.1.2.1,
CH03 1.3.9,
IQ01 2.1.2,
2.1.3

White-tailed deer

Background

An ecosystem is a community of different species interacting with each other and with the chemical and physical factors making up its nonliving environment. It is a system of interrelationships among organisms and between organisms and the physical environment.

In a specific environment, plants and animals interact with each other in various ways. For example, plants may depend on insects or birds to pollinate flowers and on earthworms to aerate the soil; animals may depend on plants for food or shelter. However, plants and animals also interact with the nonliving elements of their environment. In a local environment, physical factors such as sunlight, moisture, temperature, and wind influence the suitability of an area for particular organisms. Those factors determine the kinds of plants and animals that live there. Physical factors may be determined by the environment's water, its elevation, or its geological features. In addition, the resident organisms (particularly plants) may affect the sunlight, moisture, temperature, and wind of the area. For example, the tall trees of a redwood forest tend to block sunlight and thus create a dark, moist environment, or micro climate, on the forest floor that is suitable for shade-loving plants but is too shady for other kinds of plants. Micro climate refers to special conditions of light, moisture, and temperature that occur in a narrowly restricted area within an ecosystem; for example, under a bush or in a small woodland opening.

Preparation

Find three study sites that are somewhat different from each other in terms of sunlight, air temperature, soil moisture, wind, and number and types of plants and animals living there. If possible, select one site that is open, like a field or lawn; one that has trees; and one that contains water. Possible study sites include a school lawn; a park, playground, or other area with many trees; a flower bed or vegetable garden; a vacant lot; a pond, stream, or marsh; an open field; and/or a forest.

Field, Forest, and Stream

The Carty Unit on the Ridgefield Refuge offers excellent sites for this activity.

Plan to visit the sites on the same day or on different days at about the same time each day. Obtain any necessary permission to take the students to visit the sites you have chosen. Check the sites beforehand to identify and possibly remove any safety hazards.

Arrange to have at least one parent volunteer, aide, or older student help supervise a team of no more than five students during outdoor investigations. This person will help the activity go smoothly, ensure students' safety, and don't damage to the sites.

Photocopy team chart (page 103) for each team to record their observations.

Using butcher paper and marking pens, prepare a large chart for compiling each team's data.

Methods

1. Ask students to think of a place they enjoy visiting. (It might be a park, a grandparent's house, or the library.) Ask them to think about these questions:
    - What did you enjoy about the place? The people? The physical space?
    - What did you do?
    - What living things (people, plants, animals) made your place enjoyable?
    - Name any nonliving things (water, mountains, climate) that made your place enjoyable.

    Help students see that any place has both living and nonliving parts working together to make an ecosystem. Explain that students will investigate ecosystems at three different study sites to find out how living and nonliving elements affect each other.
2. Divide your group into six teams. Explain that each team will investigate and record observations of a different component of three different study sites. (If you have a large group, divide students into twelve teams, with two teams studying each component, then average their data.) Give students instructions, a copy of the team chart, and materials as described below. Later, teams will transfer their observations to the class data chart.

    Team 1 — Soil

    Ask this team to determine the soil moisture at the study sites. Students can use a trowel or stick to scrape the surface of the ground and to obtain a small sample of soil from underneath the surface. By feeling the soil, they should be able to tell whether it is wet, moist, or dry. (Moist soil will stick together.) They should examine the soil for other characteristics such as texture, color, and smell. They should also note plant material organisms in the soil.

Field, Forest, and Stream

Team 2 — Sunlight

Ask this team to determine how much sunlight reaches the ground at each study site. Students may determine light intensity at each site by using a photographic light meter or photosensitive paper. If these items are not available, they can use relative terms such as shady, dark, medium light, or bright; or "site 1 is brighter than site 2, and site 2 is brighter than 3."

Team 3 — Wind

Ask this team to use the small strip of paper to determine the wind movement at each site. One student can hold the paper away from the body, while the others observe whether it hangs straight down or blows at an angle. Ask students to use the compass to determine the direction the wind seems to be blowing.

Team 4 — Temperature

Ask this team to measure each site's temperature at ground level, 1 inch (2.5 cm) deep in the soil, and 1 yard (.9 m) above ground. If one site is a pond, stream, or lake, have the team measure the temperature just above the water, 1 inch (2.5 cm) deep, and 1 yard (.9 m) above the water.

Team 5 — Plant Life

Ask this team to observe the various kinds of plants at each site (large trees, small trees, shrubs, small plants, grasses — no need to identify species). Suggest that students record the most common types of plants found in each location and to note especially where each grows relative to the others.

Team 6 — Animal Life

Ask this team to note the various kinds of animals at each site (insects, birds, reptiles, fish, frogs, tadpoles, etc.) Students should note evidence of animals such as scat, tracks, burrows, or leaves that have been chewed.

3. After teams have had sufficient time to investigate each location, have them all come together to present their findings and to share what they have learned.
4. Each team should listen to the reports of the other teams and use this information to complete its team chart.
5. Ask teams to enter their data on the large class chart you prepared. Use this chart as a basis for discussing differences between the locations and any interactions students observed among the elements. Ask the following questions:
    - Which ecosystem had the greatest number of plants? Animals? Which had the least of each? How do you explain this difference?
    - How are plants and animals the same at different sites? How are they different?

Field, Forest, and Stream

- Which site had the highest air temperature? The lowest? The most wind? The least?
- Which had the wettest soil? The driest?
- Do plants seem to affect the light intensity, air temperature, and soil temperature in an area?
- How does water seem to influence the soil temperature, air temperature, and soil moisture?
- What relationship does light seem to have with air temperature? With soil moisture? With plants?
- Which of the six elements we studied seems most important for determining the character of the environment at each site? What makes you say so?

Extensions

1. Visit each site again at a different time of year and repeat your investigations. Compare your results: How has the soil changed? The temperature? The wind? The plants and animals? What factors influenced each change?
2. Revisit each location to look for ways humans have affected it. Students might look for things such as litter, damaged plants, new animal arrivals, polluted or cleaner water, or an improved path. Discuss these questions:
   - Which human actions have harmful effects on these ecosystems? Which are beneficial?
   - Are these short-term or long-term effects?
   - What might we do to keep further damage from occurring?
   - What might we do to encourage more beneficial or protective kinds of actions?
3. It's easier than you think to bring the outdoors inside! Create a class terrarium of a local ecosystem or have teams of students create terrariums of various ecosystems.

Male and female ruddy ducks

Adapted from Project Learning Tree,
The American Forest Council

Field, Forest, and Stream—Team Chart

Teams	Habitat 1	Habitat 2	Habitat 3
Soil Moisture			
Sunlight			
Wind			
Temperature			
Plants			
Animals			

Run for the Border

Classroom
Grades: 5-12

Objective
Students will make observations about the differences in plant communities to determine where wetland boundaries exist, and to discuss conditions for wetland existence.

Materials
"Wettable" footwear

Per Team:

Wetland Observation Worksheet

Wetland Investigation Guide

Clipboard

Pencil

Towel

EALRs
Science: PC03 1.1.5, CH03 1.3.9,

IQ01 2.1.2, NS03 3.1

Canada Goose

Background

Where does a wetland begin and end? Sometimes it is hard to tell where the boundaries lie, since wetlands gradually fade into upland at one limit and a waterway at the other. Scientists delineate (draw the boundaries of) wetlands by looking closely at the makeup of the plants, soils, and "wetness" in the area. Generally, where wetland plants (certain species used as wetland indicators), wetland soils, and a certain degree of wetness occur, the area is called a wetland. Where these things do not occur, the area is called an upland. There is a very fine line between the two - one that is not always definitive.

In this activity, students will be looking at the most obvious indicators of the wetland/upland border — changes in plant communities and different degrees of wetness. Students do not have to be skilled in identifying species of plants; they will only need to recognize physical differences among plants. With a little practice you can easily distinguish between plant types. The conditions of an area predetermine which plants will grow there — the type of soil, slope of the land, climate, amount of sunlight that falls on the area, and hydrology (wetness). Many plants may share an area with the same conditions — this is called a plant community. Plant communities are usually obvious: a forest is one type of community, a field is another, and a cluster of cattails and rushes is a community distinct from one containing mainly shrubs.

Procedure

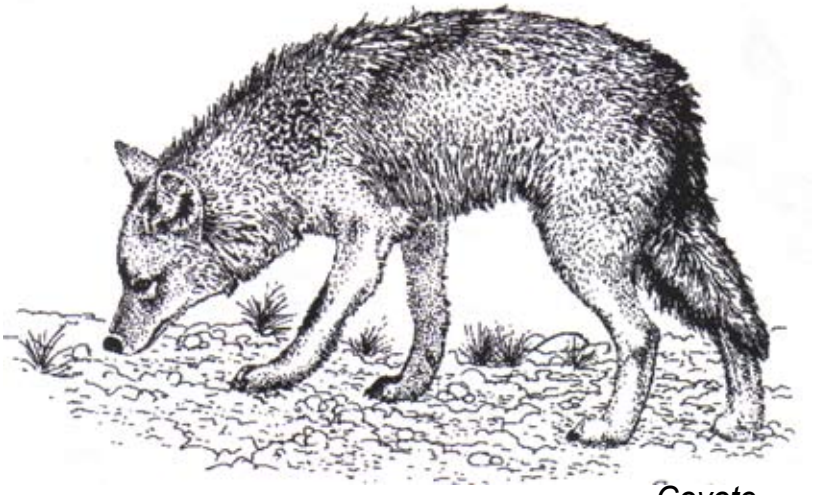
Explain to the class that they will be going to a wetland to investigate how it is organized. Review the wetland observation worksheet on page 106 and discuss how students will go about making those observations working in teams. Then, practice distinguishing between pairs of photos or samples of plants (even houseplants). Ask: "Is this plant the same as this one? Why not?" Describe both plants in as much detail as you can. Discuss the things that plants need

Run for the Border

and “prefer” for growth — use houseplants as an example, since some require direct sunlight, while others grow best in shade and some need more water than others. Ask: "Would a cactus grow in a wetland? Would a water lily grow in the desert? Why not? " Explain that these are the sorts of things that students should keep in mind when making their observations and looking at changes in plant communities. By making these observations, they will essentially be determining where edges or borders of the wetlands lie. Review the wetland investigation guide on page 107.

Note

This activity is merely a lesson in observation and understanding that wetland conditions are not always obvious. Accurate wetland delineation is something best left to wetland science professionals. Students’ inferences on boundaries need not be proven right or wrong.



Coyote

Run for the Border—Observation Sheet

Wetland Observation Worksheet	
Scientific observations are descriptions of what we actually see, hear, feel, taste or smell. We make inferences when we use logic, or even guesses, to interpret or explain our observations. One set of observations may lead you to many inferences or none. This observation guide suggests where to direct your observations in order to make some logical inferences about a wetland.	
1. Are all the plants in the wetland the same kind? If not, how many kinds are there?	5. Is the same amount of water visible everywhere? Is the soil everywhere equally damp?
2. Are the plants distributed evenly, randomly, in clumps, or in some pattern?	6. Are some specific types of plants usually found close to the water or in the dampest soil?
3. Are some kinds of plants always found close together?	7. Are some types of plants never found close to the water or found only in the driest soil?
4. Are some kinds of plants never found close together?	8. Write any other observations on the back of this sheet which your team will need to answer the investigation questions.

Run for the Border—Investigation Guide

Wetland Investigation Guide		
Investigation Questions	**Relevant Observations** Write the observation that led you to your explanation	**Explanation** Possible Answer
1. Where do you think the upland ends and the wetland begins? How can you tell?		
2. Does the wetland have another boundary? If so, what is it?		
3. What seem to be the conditions necessary for a wetland to thrive?		
4. Where might the wetland be changing or being destroyed by nature or man?		
5. What indicates that the wetland might be part of an aquatic food web?		
6. What indicates that the wetland is important to land and water animals?		

Run for the Border—Investigation Information

For the Instructor — Suggested Answers to Investigation Worksheet

Q: Where do you think the upland habitat ends and the wetland begins?

A: The upper limits of wetlands are usually marked by changes in vegetation and soil. In many marshes, there is a clear transition from trees and shrubs to tall grass-like plants, such as cattails, sedges, or rushes. The vegetation changes are less clearly defined on the upper edges of forested wetlands, such as swamps. There, soil color and moisture changes might be the best clue. Unless it has rained very recently or there has been a prolonged dry spell, wetland soil will be noticeably wetter, often squishy or even inundated.

Q: Does the wetland have another boundary? If so, what is it?

A: The lower limit will usually be the adjacent waterway. Some wetlands may be bound on all sides by uplands or seem to stretch on indefinitely.

Q: What seem to be the conditions necessary for a wetland to thrive?

A: By finding the upper and lower limits to wetlands, students can infer conditions wetlands require (i.e. an abundance of water but not deep or swiftly moving water).

Q: Where might the wetland be changing or being destroyed?

A: Over geologic time, wetlands are very dynamic places, undergoing rapid change. Trapped sediments (whether natural or increased by human activities such as development) can fill wetlands. Rising sea level can flood coastal wetlands and erosion can wash them away. Only erosion may be readily apparent. This is best observed along the lower limits of wetlands bordering swift tidal creeks, streams that flood during heavy rains, open bays or rivers.

There may be any of a variety of human caused changes or destruction. Some observable changes include:

- *Damming the waterway downstream might flood wetlands.*
- *Damming the waterway upstream may dry them up.*
- *Drawing water from the waterway for irrigation, or lowering the water table with (too many) nearby wells, could dry up a wetland.*
- *Cutting a ditch across a wetland may drain it.*
- *Pushing dirt onto a wetland, as for preparing a construction site, would fill it in and obviously destroy it.*
- *Dramatically disturbing the soil on the nearby upland might cause enough sediment to wash onto the wetland to fill it in.*
- *Repeated wakes from excess boat traffic could destroy a marsh by erosion.*

Q: What indicates that the wetland might be part of an aquatic food web?

A: Encourage students to observe the abundance of dead plant material (detritus) in the wetland (most obvious in marshes). Detritus is one of the "basics" of a food

Run for the Border—Investigation Information

web. If necessary, point out that most of the detritus along the waterway edge is likely to be washed into the waterway and into other connected bodies of water. From this, students might deduce the importance of wetland plants as a major component of aquatic food web. They may also have made other observations such as animals feeding in the water or evidence of such activity in the wetland vegetation itself (e.g., plants cut or chewed off near their bases by a muskrat).

Q: What indicates that the wetland is important to land and water animals?

A: Wildlife benefits can be inferred by observing animals present, such as turtles, snakes, insects and birds, and by finding their signs, such as droppings, tracks and nests. Other wildlife values can be identified by noting whole plants, seeds, fruits, and small animals that might be used as food by other animals.

Northern Harrier

Adapted from “Marsh March” Your Backyard Classrooms, pg. 87-92 and WOW!: The Wonders of Wetlands. Environmental Concern Inc.

Notes

Chapter 6

The Cathlapotle Plankhouse

Cathlapotle Plankhouse Overview

Theme

Try to imagine your neighborhood without all the roads and sidewalks, without the cars and telephone poles, without the stores and apartment buildings. In their place imagine forests full of animals and berry bushes, marshes full of birds and plants, and streams full of fish. That is how the land looked to the people who lived here long ago. There are still a few places that look like that not far from where you live. Ridgefield National Wildlife Refuge in Ridgefield, Washington, is one of them.

Ridgefield is special, but not just for its natural beauty. Ridgefield is special because under the trees on the river bank it holds an important key to the past — Cathlapotle [Kath-lah-poh-tul]. A long time ago, Cathlapotle was one of the largest Chinookan Indian towns on the Columbia River!

Background

Today it is an archaeological site buried under the ground. People lived at Cathlapotle for many centuries. They built large cedar plankhouses on the river bank. They made carved wood objects and finely-woven baskets which were both beautiful and functional. Men hunted elk in the forest and fished for salmon in the river. Women gathered fruits, berries, roots, and stems to eat. They did all the things people do to live in comfort.

Excavations at the Cathlapotle site

When Europeans and Americans came to the Columbia River in the late eighteenth century to trade, they also brought diseases that the Chinookans and other Northwest Coast people had never known before. Many Indians died. Those that survived joined up with other tribes. As more and more white people came to settle along the river, the Indians lost the land where they lived as well as their traditional hunting and fishing grounds. By the 1840's there were no more people living at Cathlapotle. Eventually, the houses fell down and nature took over.

In the 1990's, archaeologists explored Cathlapotle so that we all might learn more about the past and how people once lived along the Great River!

Adapted from Discover Cathlapotle Environmental and Heritage Educational Project

Cordage Making

Classroom or Outdoors

Grades: 4-7

Objective

Students will be able to identify ways in which cordage was used by the chinookans and recreate the process of making cordage

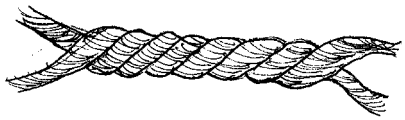
Materials

Natural raffia or hemp

EALRs

Economics 1.1.1, 1.3.1

Science 1.3.10, 3.2.1



Background

This activity gives students an opportunity to make cordage using the same process the Chinookans and other Northwest People used. As an extension, students can use the cordage to make necklaces or bracelets which incorporate traditional dentalia shell beads or trade beads they make themselves.

Methods

1. Purchase enough raffia or hemp from a local craft store so that each student can have at least two pieces

2.. Share the following information with your students:

Cordage of all types — rope, string, fine twine — played an important role in almost every aspect of life along the Columbia River. Cedar was a favorite material but nettle, rushes, willow bark, and other fibers were also used. Almost any activity you can think of utilized some sort of cordage.

3. For example, ask your students how they think cordage might have been used for:

Fishing? Twine for nets, rope for fishing lines, anchor lines

House Construction? Raising a house beam, rope ruler for measuring lengths

Clothing? Rope for protective armour, cord or string for blanket

Cordage Making

Explain: These are just a few examples of the many ways cordage was used. Can you think of other uses?

Consider the fact that one simple blanket would require 300 feet or more of fine twine. Now, imagine having to make all that twine yourself!

4. Tell your students they are going to have the opportunity to try making cordage themselves. Distribute the activity sheet and two pieces of raffia to students, and let them try their hand at cordage making. If the class has already done the fiber-dying experiment and there is raffia left over from that activity, let them each combine a strand of dyed with the natural raffia. This will help them examine the process.

Note: Practice making cordage prior to the activity so you can help students who get stuck. It's not difficult, it just takes practice.

Discussion

Have students list the ways they use cordage today. Do they think the Chinookans would have used it that way? Ask them to think of additional ways the Chinookans might have used it.

Assessment

Students understand the process of cordage making and can identify several ways in which it was used.

Extensions

After making cordage, students can do one or more of the extension activities.

Discuss trade and the popularity of trade beads in Chinookan culture after contact with Euro-Americans. Show students samples of beads in the kit, and let them make their own beads out of clay, rolled paper, etc. They can then use their twine to string the beads for bracelets, necklaces, etc.

Have students keep logs of how long it takes to make a specific length of cordage (for example, 10 minutes for 3 inches of twine). Ask them to complete problems such as:

Cordage Making

If it takes you ___minutes to make____inches of twine, how long would it take you to make 150" of twine?

How many inches of twine could you make in an hour and a half?

(You can make up problems to suit your students' abilities)

Experiment with scientific principles of tensil strength before and after making cordage.

Experiment with a variety of fibrous materials such as nettle.

Harvesting nettle

If you are ambitious, plan ahead, and have access to a patch of stinging nettle, you can harvest a supply in the late summer/early fall when it is turning brown. Wear gloves! Let it dry. At that stage it will no longer sting. Then pound gently with a flat stone along the length of the stem to loosen up the fibers. Gently pull away the bark, leaving the fibers as long as possible. This is another activity students can experience to get a sense of how much work went into the process of cordage making!

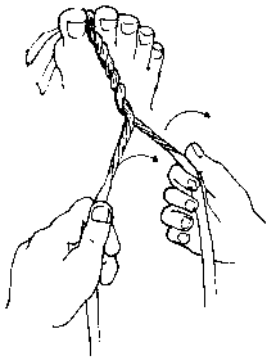
Activity inspired by Mary Schlick, author of Columbia River Basketry

Adapted from Discover Cathlapotle Environmental and Heritage Educational Project

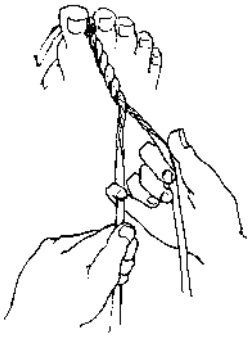
Cordage Making

Discover what making cordage is all about:

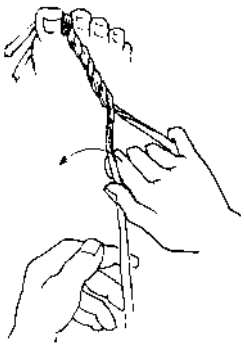
1 Select two strands of raffia*, knot them together at the end, and tape to a table. (Or go barefoot as in the diagrams below!)



2 Holding one strand in either hand, begin to twist each one clockwise.



3 With the little finger of your right hand, pick up the left strand.



4 Cross your right hand over to the left, turning both strands in a counterclockwise direction.

* While not a material the Chinookans would have used traditionally, raffia is very popular today and is readily available in most craft stores.

Drawings by H. Stewart, Cedar, 1984

Cedar Circle: Looking Closely at the Tree of Life

Classroom
Grades: 1-7

Objective
Students will be able to identify the different characteristics of cedar which make it a versatility raw material for making artifacts

Materials
Samples of cedar
Pencils
Paper
Cedar circle copycat page
Profile of a cedar copycat page

EALRs
Economics 1.1.1, 1.
Science 1.3.10, 3.2.1

Summary

In this whole-class discovery activity, students are introduced to the versatility of the cedar and the reason for its great importance to Northwest Coast People. Without knowing what it is, volunteers examine samples of cedar (in different forms) using their tactile sense (eyes closed) to describe what they feel to classmates (also with eyes closed). The class then tries to determine what the material is, and what kinds of objects could be made with it.

Background

Cedar was literally the tree of life for Northwest Coast People. They used it for everything from houses to clothes to diapers. One reason for its importance was its great versatility. The inner bark - which was peeled from the tree without killing it - could be used in its original state, shredded into soft fibers, or made into strips. It could be cut down and hollowed out to make canoes or cut into planks for houses. Supple twigs, called withes, could be removed to use for lashing. Even the roots could be dug up to use for basketry.

To grasp how extensive the applications for using cedar really were, students need to understand the diversity of its physical properties. This activity allows students to discover for themselves the different textures and qualities of cedar.

For more background information about the way Northwest Coast groups used cedar, see Hillary Stewart's book Cedar, included in the kit.

Methods

1. Before the activity, put the cedar samples in a convenient out-of-the-way location so students can't see them.

Cedar Circle: Looking Closely at the Tree of Life

2. Have students form their desks into a circle facing outward, so their backs are to the center. Ask them to get out pencil and paper. Place a chair in the center.

3. Ask for three volunteers. Blindfold the first volunteer and have him/her sit in the chair. Explain to the class that the volunteer will be describing a material used by the Chinookans to make things they used. Instruct the volunteer that he/she can use descriptive words, but cannot identify what she thinks the material is. Tell students not to look at the volunteer or the material, but to write down the adjectives or draw a picture of what the volunteer is describing.

4. When you think the first volunteer has described the sample fully, hide it again and remove the blindfold. Have a quick discussion about what the material might be used for, given its properties as described by the volunteer.

5. Repeat this procedure for all the samples.

6. When the activity has ended, ask students to turn their desks around and discuss the different samples, comparing drawings and descriptions. Ask students what they think the materials were, and explain that all three were cedar. Hand out or project an overhead of the “Profile of a Cedar Tree” as you discuss what part of the tree each sample came from, and they ways they were used by the Chinookans and other Northwest Coast peoples.

7. Bring out the samples so the whole class can handle them.

Discussion

Have students complete “Cedar Circle” activity page. Refer to the “Profile of a Cedar Tree” activity page for discussion of which part of the cedar would have been used for each object.

Assessment

Students should be able to identify the properties of different parts of the cedar tree and their uses.

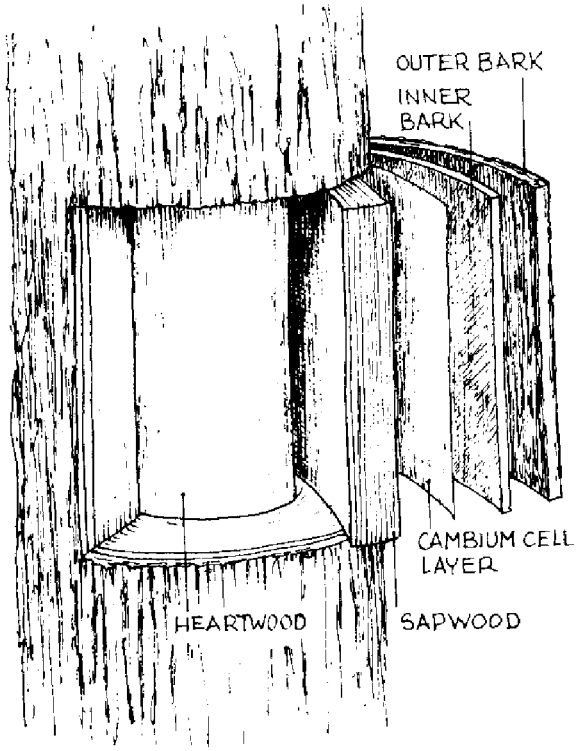
Extensions

“Basket in the Forest: A Problem-Solving Activity” is a good follow up for this introduction to cedar.

Adapted from Discover Cathlapotle Environmental and Heritage Educational Project

Cedar Circle: Looking Closely at the Tree of Life

Profile of a Cedar Tree



Drawing by H. Stewart

Withes are the flexible young branches of the tree. They were used for making baskets and rope.

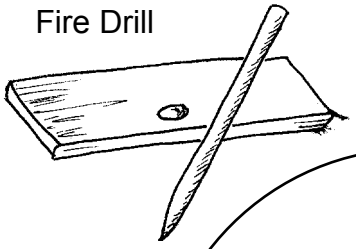
Small straight roots were dug up and split into flat strips for use in basketry and making rope.

Cedar Circle: Looking Closely at the Tree of Life

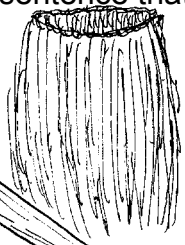
The Chinookans found materials in their environment to make objects they used every day. One of the most important materials was the cedar tree. Different parts of the tree provided shelter, clothing, and tools.

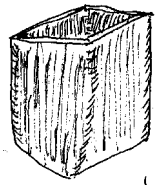
Look at the objects here. Then match each picture to the sentence that tells how it was used.

Fire Drill

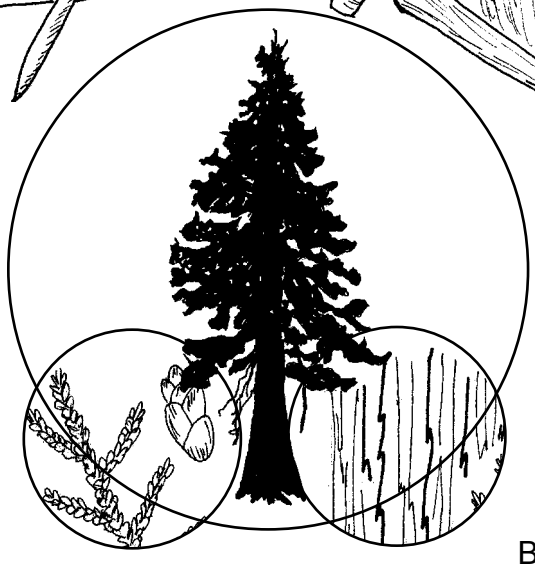


Skirt



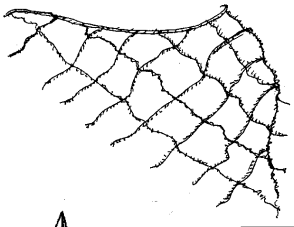


Bentwood box

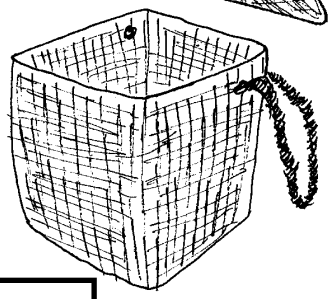


Paddle

Net



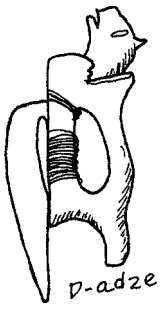
Basket



Arrows

1. Food was stored in a _____.
2. A _____ was used for paddling a canoe.
3. Men used _____ for hunting animals.
4. A _____ was used to start a fire.
5. A woman carried berries in a _____.
6. A fisherman used a _____ to catch fish.
7. A _____ was worn by a woman.
8. A _____ was used to carve wood.

D-Adze



Cedar Circle: Looking Closely at the Tree of Life

Discussion:

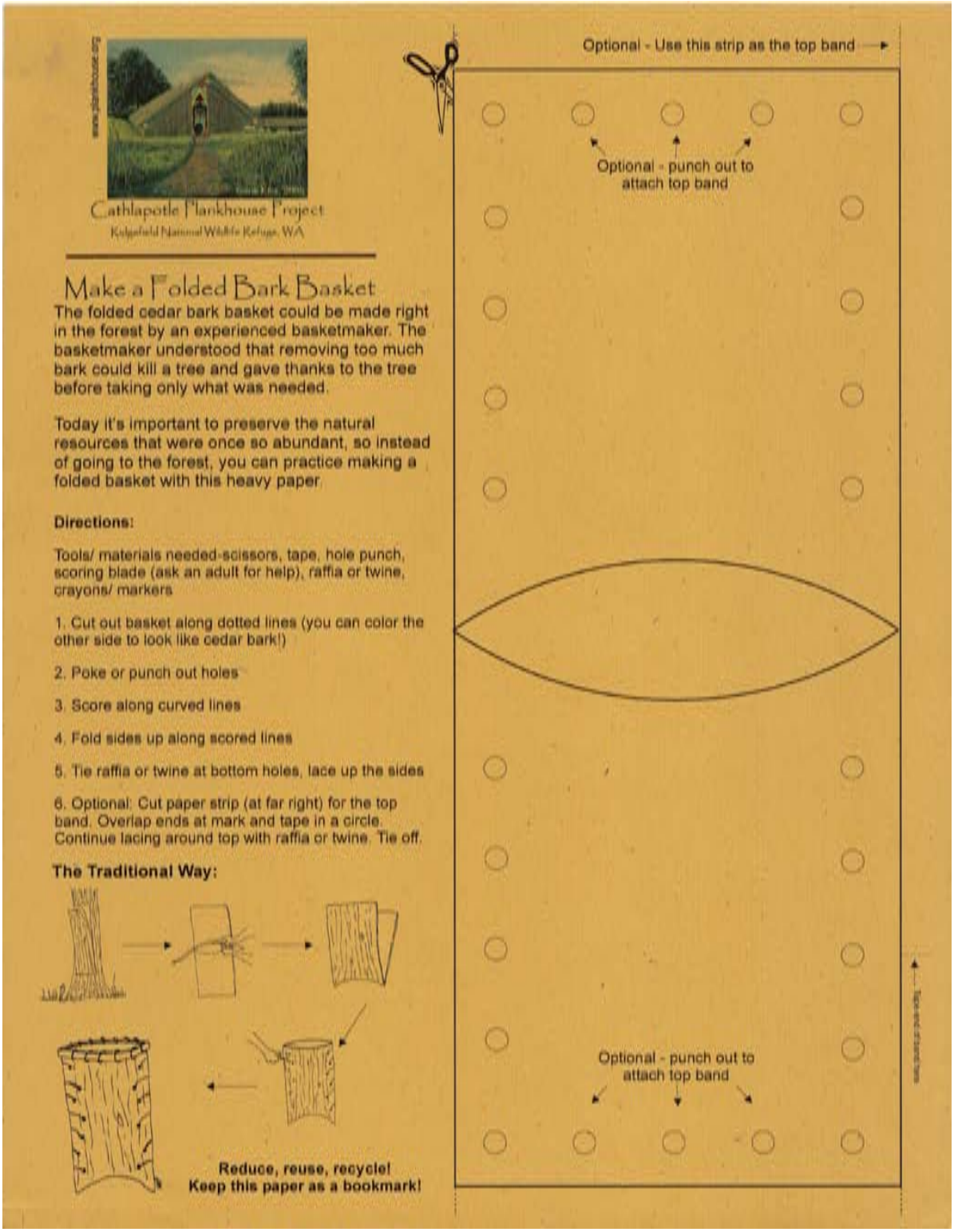
Can you think of some ways we use wood today?

In the box draw a picture of an object we use today for one of the following:

storing food
starting a fire
carrying food
fishing

How are the objects Chinookan people used different from the objects we use? How are they the same?

Cedar Circle: Looking Closely at the Tree of Life



Plankhouse Math: The art of Chinookan House Construction

Classroom and Outdoors
Grades: 3-6

Objective

Students will be able to:

Calculate the perimeter of a full-scale plankhouse.

Measure a length of twine to fit the dimensions of the plankhouse.

Materials

Ball of twine at least 300 feet long

4 stakes/trash cans

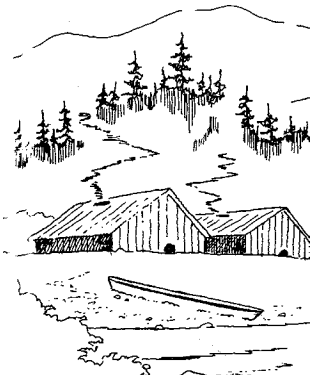
Paper and pencils

EALRs

Geography 2.2, 2.3

Math 1.2.1, 1.2.3

Science 1.3.10, 3.2.1



Summary

In this physical activity emphasizing math and critical thinking skills, students calculate the perimeter of an average size Chinookan plankhouse using twine and imagine how life might have been similar and different for the people who lived in such a house. This is an activity that can be done in preparation for visiting the Cathlapotle Plankhouse at Ridgefield National Wildlife Refuge.

Background

Gabriel Franchére, an Astorian trader who lived on the Columbia from 1810-1814 noted:

"The native houses, built of cedar, are remarkable for their form and, above all, for their size. They are nearly a hundred feet and thirty to forty feet wide" (journal of G. Franchére, 1819-1814, p. 114).

The cedar plankhouse was the typical permanent dwelling of the Chinookans and other coastal Northwest people. The size of the sturdy buildings Franchére recorded ranged from approximately 14 by 20 feet to the 40 by 100 feet. At Cathlapotle, archaeological research has revealed that the smallest were about 40 feet long while the largest were over 200 feet long! The size of the structure depended on the wealth of the owner and the number of families inhabiting it. Each family unit occupied a distinct portion of the house. Rush mats hanging from the rafters formed the walls for separating the living spaces. They were also used

Plankhouse Math: The art of Chinookan House Construction

for sitting and sleeping on. At the center of the house was the communal fire hearth where all the members of the house could gather to socialize, eat, and work during long winter evenings. A large house would have multiple hearths down its length. Sleeping platforms were set up along the walls, and food hung from the rafters to dry. For more information, see the section “Houses” in the teacher’s background information.

Methods

1. Have students sketch floor plans of their homes from memory, or assign it for homework the day before the lesson.

2. Share the background information with your students. Show them a floor plan of a typical plankhouse as found at Cathlapotle. (You can use the Kane paintings included in the cathlapotle traveling trunk for reference.) Have them compare it to their own. Ask where they think activities like cooking, eating, or sleeping—which generally have special spaces today—would have taken place.

4. Hand out the activity sheet. Define perimeter if necessary, and have students calculate how much twine it would take to wrap once around the perimeter of a house that was 40 x 100 feet (P=2L+2W).

5. When they have figured out the math problem, have the class measure out and cut the correct length of twine.

6. In an outdoor space, have students lay out the twine in a rectangle with 40 x 100 foot dimensions. You can give them a hand by laying out stakes for the corners. Or, for older students you can use this opportunity to teach triangulation, having students measure 90 degree and 45 degree angles with compasses.

7. Once the students have layed out the foundation of their twine plankhouse, have them step inside and imagine what it might have been like to live within the space. Have students compare the average number of people living in a house with the number of students in the class.

8. Give students some time to role play activities in and around the “plankhouse.” These might include cooking, sleeping, making tools, cleaning, playing games, etc.

Plankhouse Math: The art of Chinookan House Construction

Discussion

Students make correct calculations and can identify the areas of the house where different activities took place.

Extension

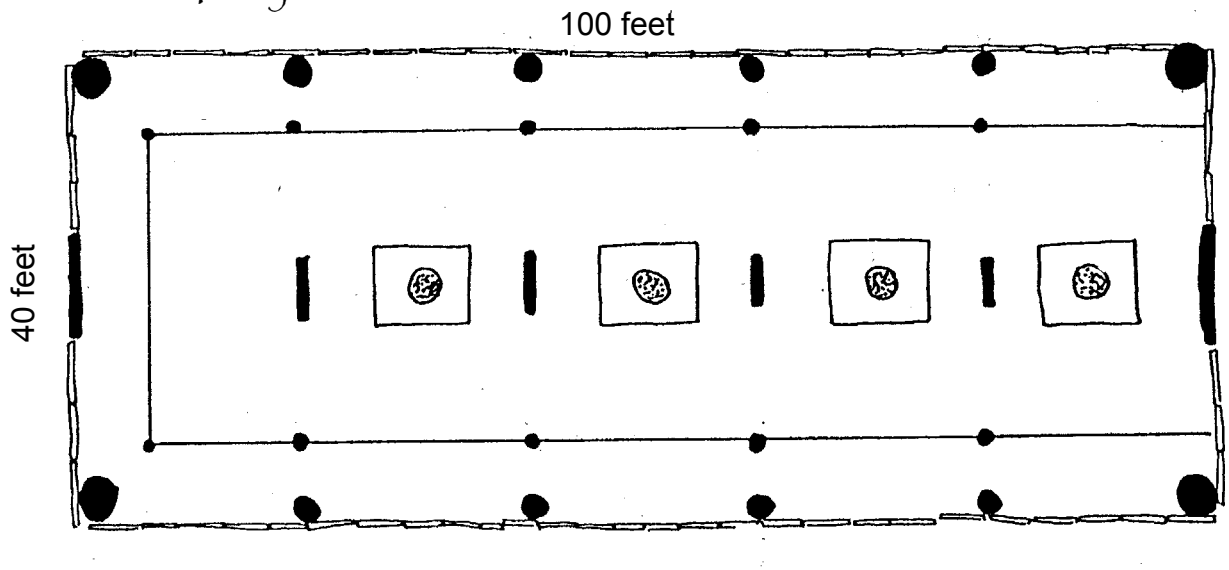
Just as Chinookan people used to do in the evening, have your students gather around the “hearth” in the “plankhouse” and tell them a Chinook legend.

A full-scale replica of a Chinookan-style cedar plankhouse has been built, primarily by volunteers, at Ridgefield National Wildlife Refuge. Educational programs are currently being developed for field trip opportunities. Go to www.plankhouse.org for more information about the plankhouse, or call the Refuge at 360-887-4106 to find out what opportunities for visiting currently are available.

Adapted from Discover Cathlapotle Environmental and Heritage Educational Project

Plankhouse Math: The art of Chinookan House Construction

Plankhouse Party



The Chinookans once lived in large houses built of cedar planks. If you took the roof off and looked down at a plankhouse from above, this is what you would see!

● Are wooden posts of different sizes. These helped to hold up the roof and the walls.

▭ Are planks cut from cedar logs. These were put side by side to make the walls.

 Are hearth boxes. They were built in the center of the house and used for cooking, light, and heat. The smoke from the fires dried food hanging in the rafters.

Plankhouse Math: The art of Chinookan House Construction

The question is. . .

Imagine you are helping to build a plank house which is 40 feet wide and 100 feet long. How many two-foot wide planks will you need for the long wall?

For the short side?

How many total two-foot planks will you need for all four sides of the plank house?

How many feet of twine would it take to wrap once around the perimeter of the plankhouse?

When Lewis and Clark met the Chinookans in 1805, they estimated (that is, they made a guess based on what they saw) 14 houses and 900 people living at Cathlapotle. What was the average number of people living in each house?

Extra:
Make your own model of a plankhouse using popsicles sticks or wood you find on the ground! Choose a scale: 1 inch = 1 foot, 1 inch = 2 feet, or 1 inch = 5 feet.

Plankhouse Math: The art of Chinookan House Construction

The question is. . .

Imagine you are helping to build a plank house which is 40 feet wide and 100 feet long. How many two-foot wide planks will you need for the long wall?

100 /2=50 planks

For the short side?

40 /2=20 planks

How many total two-foot planks will you need for all four sides of the plank house?

(20 x 2) + (50 x 2) = 140 planks

How many feet of twine would it take to wrap once around the perimeter of the plank-house? (2L + 2W=P) 2(100) + 2(40) =280 feet of twine

When Lewis and Clark met the Chinookans in 1805, they estimated (that is, they made a guess based on what they saw) 14 houses and 900 people living at Cathlapotle. What was the average number of people living in each house?

900/14= 65

Extra:
Make your own model of a plankhouse using popsicles sticks or wood you find on the ground! Choose a scale: 1 inch = 1 foot, 1 inch = 2 feet, or 1 inch = 5 feet.

It's About Time: A Timeline Activity

Classroom
Grades 3-6

Objective

By looking at time in two different ways students will be able to:

1. *Locate events in history and their own lives on a linear timeline*
2. *Explain how time is represented in stratigraphy*

Materials

Events in Northwest history cards

Introduction to Cathlapotle handout

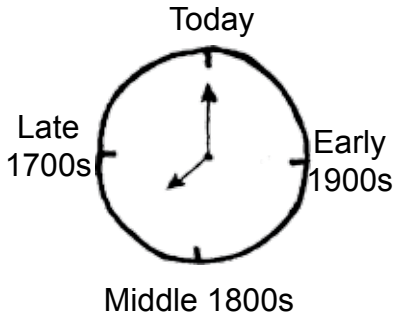
It's About Time activity sheet

Looking at Stratigraphy activity sheet

Encyclopedias/history books for reference

Stratigraphy worksheet

Paper & pencils



Summary

Chronology is often a difficult concept for children to grasp. By relating historical events in Northwest and Cathlapotle history to significant dates in a student's own family history, students will gain a better understanding of time depth, and consequently, of archaeological stratigraphy. Archaeologists use stratigraphy—the chronological layering of deposits—to aid in dating sites.

Vocabulary

Stratigraphy: the layering of deposits in archaeological sites. Over time natural sediments cover cultural remains, burying older layers beneath newer layers.

timeline: a visual representation of events in chronological order.

Background

In this lesson students will use a timeline to place Cathlapotle in its proper historical perspective. Using what they learn during this study of chronology, students will recreate the process of sediment deposition which results in stratigraphy at an archaeological site.

A timeline is one way to look at events in chronological order. Even if your students have had experience with timelines already, this exercise will help them to visualize where Cathlapotle fits into history from their personal perspective. Students will collect dates both from world history and from their own family histories to plot on the timeline. By adding important dates from Cathlapotle, students will gain perspective on when events at Cathlapotle occurred in relation to their own lives.

It's About Time: A Timeline Activity

Archaeologists try to establish the chronology (or sequence of events) at a site by dating artifacts and features such as hearths or building foundations and recording where they are found in relation to each other. When a site is abandoned, natural sediments eventually bury cultural remains. If the site is used again at a later date, more cultural materials will be introduced. The older layers will be covered over by the newer layers. These layers are referred to by archaeologists as stratigraphy. When an archaeologist excavates, he or she is digging down through those layers.

Stratigraphy can be disturbed by a number of events. Wind and water not only serve to deposit sediments, they can sometimes erode them away as well. Many sites have been swept away by the Columbia River during floods or in the natural changing of the river's course. At Cathlapotle, however, instead of being washed away the stratigraphy has actually preserved a record of the river's floods and course changes.

Natural phenomenon such as earthquakes or landslides can also alter or destroy the chronological sequence of a site. Even rodents, tree roots, and plants can affect stratigraphy. Digging new house foundations, food storage pits, or fire hearths at previously occupied archaeological sites are among the human activities which can confuse the chronological record. Today, vandals and artifact collectors disturb the chronological record by digging and removing artifacts which could be used for dating if found in the stratigraphical layer—or context—in which they were deposited.

Methods

Part One: Linear Time

The Day Before

1. On the day before the lesson is planned, ask students to read (or read to them) the Introduction to Cathlapotle handout.

2. Send introductory letter home with students and have them enlist their parents' help in recording some important dates in their family history. The letter introduces the activity to parents and explains how the information will be used. The letter stresses that participation is voluntary because some families may not want to share family information. As an alternative, ask them to research a few dates from world history together.

3. Make a large, simple time line to hang on the wall, similar to the one on the "It's About Time" activity sheet. If your classroom is at least 12 feet long you can make

It's About Time: A Timeline Activity

each 20 year increment 1 foot long. Attach a long piece of rope to the left end (with markings every foot) to use for dates that fall before 1780.

4. Photocopy “Events in Northwest History” and “Events in World History” cards, each on a different color. Cut them out.

The Day of the Activity

1. Distribute timeline activity sheets so students can record events.

2. Distribute the “Events in Northwest History” cards in the kit to volunteers along with a piece of tape. Have each volunteer read the event on his/her card and affix it to the timeline in proper chronological order.

3. Next, hand out blank “Events in World History cards and ask students to each provide a date in world history that they know about. Make encyclopaedias and other history books available to look up dates if necessary. Add these to the timeline on the wall. (Use the string to mark off the relative locations of events which occur prior to the beginning date of the timeline)

4. When you have a good assortment of dates listed, explain to students that they are now going to place themselves in history. Ask someone to tell you when their great-grandparents were born, and record under the line. Go around the room to get a sample of relatives’ birth years, and finally ask them for their own birth years.

5. Point out to students the event cards which feature information about Cathlapotle and talk about the amount of time Cathlapotle was occupied.

6. To make sure students understand what they are looking at, you can ask questions such as:

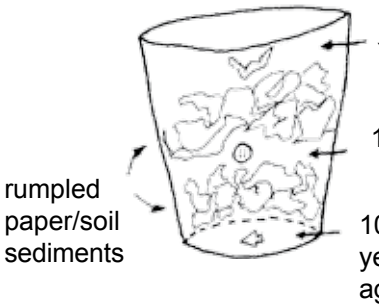
•Were your great grandparents alive when Cathlapotle was first occupied?

•Where do the most recent events fall on this timeline?

•What historic events have happened during your lifetime?

•Do you notice anything else about this timeline? (Gives students the opportunity to make other observations)

It's About Time: A Timeline Activity



Part Two: Vertical Time

7. Explain that an archaeological site presents time a slightly different way. Instead of recording events with oldest on left and most recent on right as on the timeline, an archaeological profile records events with oldest on the bottom and most recent on top. This is called stratigraphy. Do the "Site in a Trash Can" activity to illustrate how stratigraphy occurs.

Site in a Trash Can

•Empty out a trash can or recycling box and collect three objects to represent artifacts. One should represent a spear point dropped 1500 years ago, another a button dropped in 1830, and the third a gum wrapper dropped yesterday.

•Give three volunteers the objects. Explain that the first volunteer is a Chinookan hunter who has just broken this point after shooting it from his bow. He leaves it where he has removed it from the arrow shaft. Ask the volunteer to walk by the box and drop the "point" in. Then explain that time passes, the site is flooded and then sediments begin to cover the point. As you do this, pile some paper into the box, representing the sediments.

•It's 1830. Ask next student to drop "button" in and then add more paper. Follow the same procedure for the "gum wrapper" from "yesterday." By this time students should have a clearer picture of what is happening. To make sure, ask where the oldest object is.

8. Explain that when an archaeologist digs a trench, it's like cutting a slice out of a layer cake and then looking at the profile of the cake that remains.

Discussion

9. Ask them to draw a quick sketch of what they think the profile of the site in a trash can would look like and have them label where the three artifacts would be. Show them the "Looking at Stratigraphy" activity sheet.

10. Summarize with students how stratigraphy helps archaeologists to establish chronology at archaeological sites, and discuss what would happen to the profile if someone came and dug a hole in the middle of a site. Would the chronology still be useful to archaeologists?

Assessment

Students should be able to plot historical events on both linear (timeline) and vertical (stratigraphy) representations of time.

Adapted from Discover Cathlapotle Environmental and Heritage Educational Project

It's About Time: A Timeline Activity

Date_____

Student Name_____

Teacher Name_____

Dear Parents:

Your child is about to travel back to the time when Chinookan Indians lived on the banks of the Columbia River near where you live today.

The passage of time can be a difficult concept to grasp. To help your child understand how long ago the Chinookan town of Cathlapotle was occupied, we are going to look at timelines and record events with which students are familiar. Family history is one point of reference to which children can relate. While the fact that an event took place in 1890 may mean very little to a child, the fact that it happened before his or her grandparents were born is much more relevant.

It is for this reason that I have asked your child to discuss your family history with you, and to come to school with some dates to record on our class timeline. This is a voluntary assignment, though your child will benefit greatly from any information you can share. If you decide not to provide family history, please help your child research the dates of at least two important events in American or world history.

Thank you for your participation! (Note: Names are not necessary)

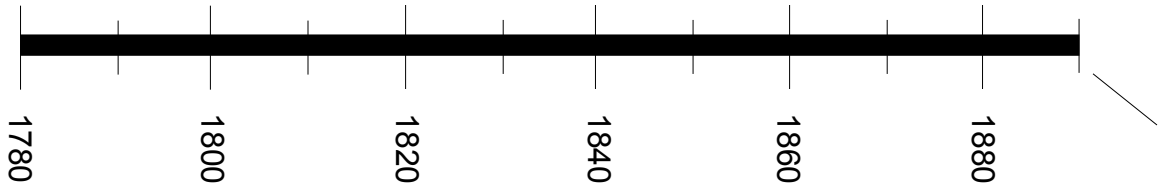
Great grandparents' birth years:

Grandparents' birth years:

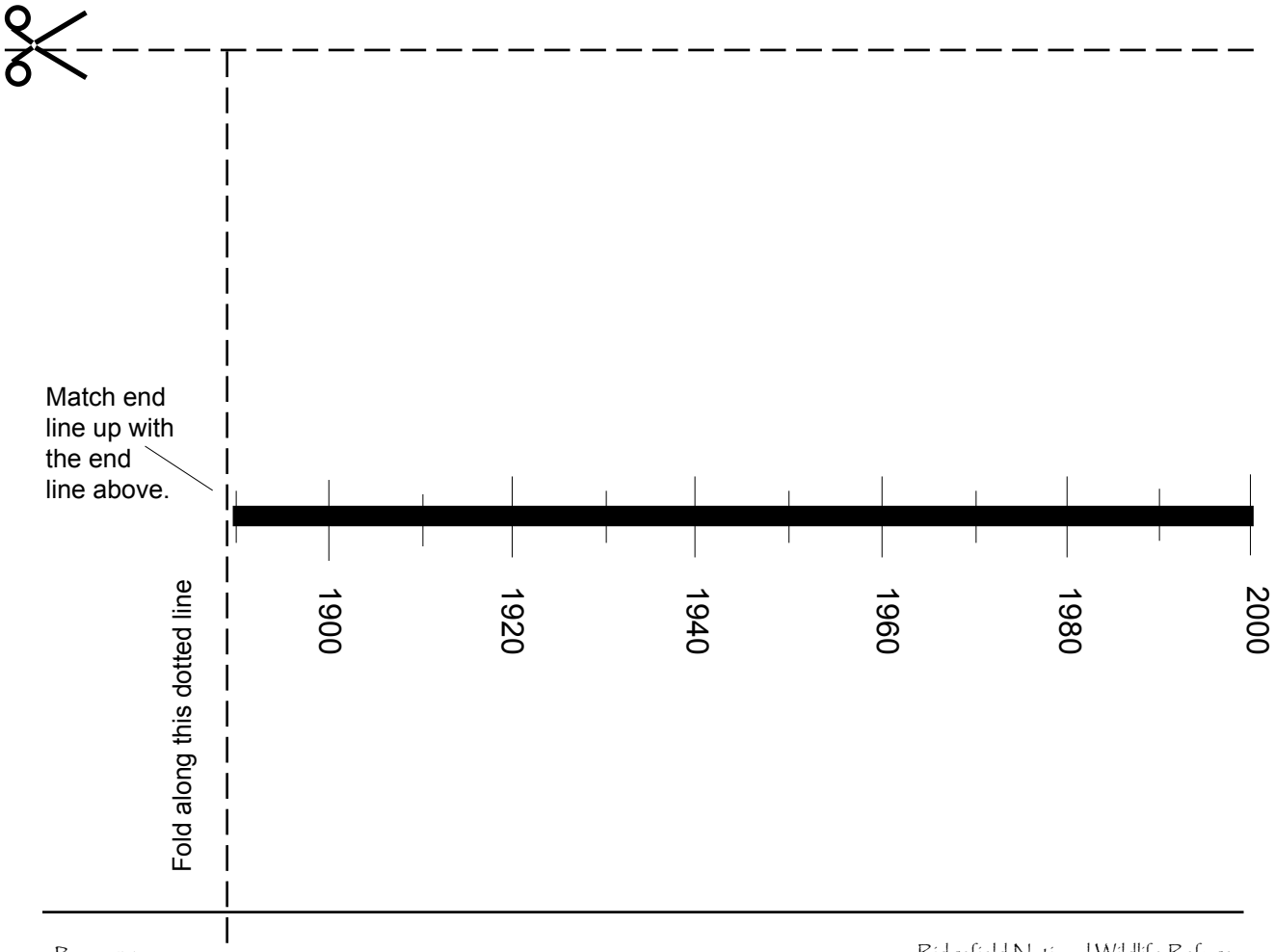
Parents' birth years:

Student's birth year:

It's About Time: A Timeline Activity

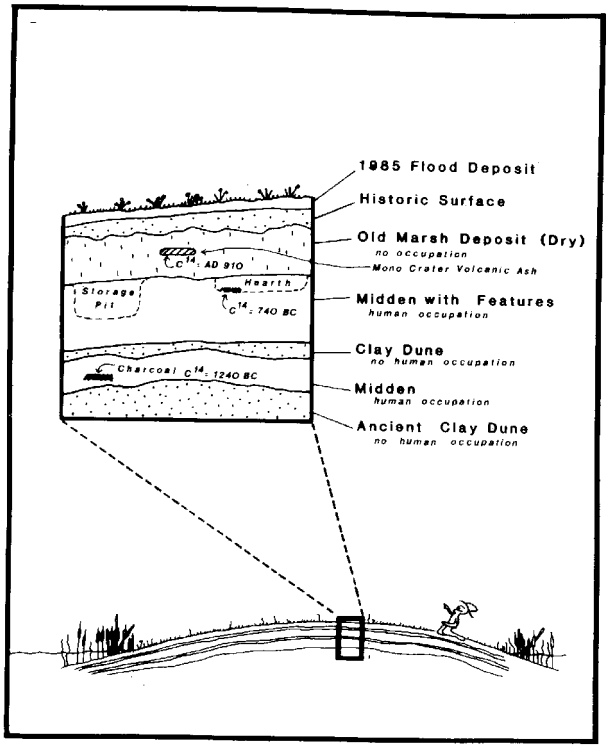


Match this line with the left end of line below and tape together



It's About Time: A Timeline Activity

Looking at Stratigraphy



Both these illustrations are examples of stratigraphy. An archaeologist digs carefully, noting changes in the layers of soil and recording the locations of the artifacts he or she finds.

When digging is completed, the archaeologist makes a drawing of the trench wall. This is called a soil profile. Back in the laboratory the profile is used to match up the artifacts with the soil layers where they were found.

It's About Time: A Timeline Activity

Copycat page

•Cathlapotle Plankhouse•

Events in NORTHWEST History

6th century B.P.

First evidence of occupation at Cathlapotle.

Events in NORTHWEST History

1782-1783

Many Indians of the Columbia River die during an epidemic of smallpox.

Events in NORTHWEST History

1788

John Meares is the first known European trader to land in Chinookan territory (he dropped anchor in Shoalwater Bay).

Events in NORTHWEST History

1792

Captain Robert Gray is first Euro-American to sail up the Columbia River.

Events in NORTHWEST History

1805-1806

Lewis and Clark meet the Cathlapotle Chinookans during their trip down the Columbia River.

Events in NORTHWEST History

1812

Fort Astoria is opened for trade.

Events in NORTHWEST History

1824

Hudson Bay Company opens Fort Vancouver.

Events in NORTHWEST History

1829-1840

Many Indians of the Columbia River die of flu and epidemics of smallpox (in 1829 and 1836).

Events in NORTHWEST History

1837

Last written reference to people living in the town of Cathlapotle.

It's About Time: A Timeline Activity

Events in NORTHWEST History

1845

The "village" of Portland is settled.

Events in NORTHWEST History

1851

The Chinook and other Lower Columbia River tribes sign the Tansey Point Treaty, but it is never ratified in Washington, D.C.

Events in NORTHWEST History

1853

Washington becomes U.S. territory, many Indians are put on reservations.

Events in NORTHWEST History

1855

The Chinook Tribe at the mouth of the Columbia refuse to sign a treaty which would remove them from their homes and traditional fishing grounds.

Events in NORTHWEST History

1887

Fort Stevens is founded at the mouth of the Columbia River.

Events in NORTHWEST History

1957

Traditional Indian fishing grounds at Celilo Falls are permanently flooded during construction of the dam at The Dalles.

Events in NORTHWEST History

1970

Boldt Decision guarantees 50% of the salmon run to Indian fishermen.

Events in NORTHWEST History

1980

Mount St. Helens erupts.

Events in NORTHWEST History

Date:

Event

It's About Time: A Timeline Activity

Events in WORLD History

Date:

Event

Events in WORLD History

Date:

Event

Events in WORLD History

Date:

Event

Events in WORLD History

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Events in WORLD History

Date:

Event

Chinook Jargon: Looking at the Trade Language of the NW

Classroom

Grades 1-3/4-7

Objectives

Students will be able to:

1. Define the role of the Chinook in regional trade.

2. Identify problems of communication among people of different languages and discuss possible solutions (both in an historic and contemporary context)

3. Identify, translate, and converse with words from Chinook Jargon.

Materials

Klahowya, Chinook Jargon dictionary and tape (included in the traveling trunk)

Younger Students:

Chinook Jargon Vocabulary Sheet —Basic

Handout, river scene word/ picture match up

Older Students:

Chinook Jargon Vocabulary Sheet—Advanced
Handout, river scene with word/picture match up with questions

Summary of Activity

Students will learn about the role Chinookans played in Northwest trade and about the Chinook Jargon which became the lingua franca for traders. Using vocabulary lists, a Chinook Jargon dictionary, and pronunciation tape, they will have the opportunity to learn vocabulary and create their own conversation. Note: There are two variations of the activity geared toward older students and younger students respectively.

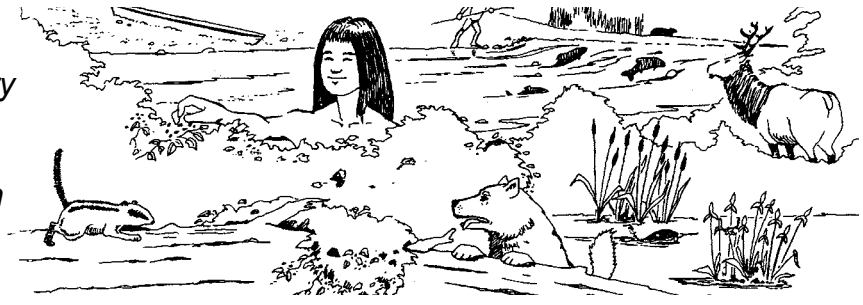
Vocabulary

Jargon: the specialized or technical language of a profession or group.

Background

To familiarize yourself with the topic of trade and Chinook Jargon, refer to the section on trade in the teacher's guide.

Long before Euro-Americans arrived in the Northwest, the Chinook chinookans and their neighbors had been engaged in an extensive network of trade which extended north to Alaska, south to California, and east onto the Plains. The Columbia River was one of the major trade routes, and the Chinookans were strategically located to play a central role in the transfer of goods between coastal peoples and inland peoples.



Chinook Jargon: Looking at the Trade Language of the NW

True Chinook Vocabulary

(Compiled by Gary Johnson, member of the Chinook tribe)

klahowya	Welcome, hello (a greeting)
clamons	doubled elk hide clothing worn for protection in battle
suyapee	“upside down face”-referring to bearded white man who was bald
Concomly	famous Chinook chief
Tyee	chief
sag’-ha-lie	sky
mamook	work/doing
kummatux	to understand
yakala	eagle
equanimox	salmon
wakeenas	friends
mahsie	many thanks

Chinook Jargon: Looking at the Trade Language of the NW

When the non-Indian traders and explorers began to interact with the Indians a new language was developed which incorporated French and English words with the Chinook language and other native words already in use. The result was Chinook Jargon, and it became the trade language used all around the Northwest.

Methods

Older Students

1. Share the background information with students. Explain that the Chinookans had their own language, called Chinook, which was different from the Jargon. Chinookans on the lower part of the river spoke a dialect of the language called Lower Chinook, while further upriver, among the Cathlapotle, and other groups in the Vancouver-Portland area, for example, the dialect was called Upper Chinook.

2. Share with students some examples of true Chinook vocabulary from this list. Write them on the board or on a large sheet of paper so students can look at them. Explain that these words are examples of the language the Chinookans spoke to each other.

4. Tell students they are going to get to experience how the Indians along the Columbia and the Euro-American traders were able to communicate with each other.

5. Divide class into two groups facing each other. One represents the people who live at Cathlapotle, the other represents a group of traders from Boston, Massachusetts.

6. Give each group a few minutes to decide what items they have for trade, and ask them to discuss how they think they will be able to communicate their intentions to the other group. (They may want to draw pictures of their trade items to help their communication process, since they don't have the real objects as traders would have had.)

7. Have them face each other again, choose a trading partner from the other side, and begin to barter. Since neither knows the other's language, they should avoid using words. Let students engage in this activity for a few minutes.

8. Call the class together again and discuss the difficulties encountered in communicating when there was no common language. What methods were used?

Chinook Jargon: Looking at the Trade Language of the NW

9. Explain: The Chinookans had been trading with other Indian groups who spoke different languages for many years before the Euro-Americans arrived. A language based on Chinook and incorporating words from the other Indian languages had been developed. When the non-Indian traders arrived, words from their languages were also incorporated (these included English, Russian and French). After the Euro-Americans learned the new shared language they were able to communicate with Indians all around the Northwest in order to conduct trade. Chinook Jargon became a universal trade language. It was not considered a true language, however, because it did not have enough words. That is why it was called a "jargon."

10. Hand out the Chinook Jargon vocabulary sheets. Use Klahowya, the Chinook Jargon dictionary and tape as a resource for familiarizing students to the pronunciations of words.

11. Ask students to get back into their trader/Indian pairs and look over the list, pronouncing words.

12. Have the students conduct a short conversation in Chinook Jargon (perhaps 3-5 sentences each), writing down their sentences for their partners. This will take some time, since each one will have to look up the words for their sentences, then give their partner time to translate and respond. Another option is to have them work together to write a short conversation and present to the class (6-10 sentences).

13. After these activities, call the class together (ask a few of the pairs to present their conversations). Discuss their experiences. Was it more successful than the initial attempts before they shared a language? What difficulties did they experience in trying to communicate this way (limited vocabulary; lack of information about verb tenses; many words sound similar, especially if spoken quickly; difficulties of pronunciation)?

In particular, discuss the fact that in Chinook Jargon one word often means many things. Use tupsoe as an example. In addition to grass, the word also means hair, feathers, finely-pounded bark of the cedar, grass, blossoms, and leaves. In Chinook each of these has its own name.

Assessment

Chinook Jargon: Looking at the Trade Language of the NW

Older Students
Students complete “river scene word/picture match up” activity (including additional questions)

Extensions

Older Students
Discuss how people today overcome language barriers. How do the communication problems Indians and Euro-American traders faced differ from ours? (Then there was no one who knew both languages, now many people are multilingual) [other discussion questions?]

Explain that Chinook Jargon was also used to write treaties with Indians in the middle of the 1800s. Discuss what kinds of problems might have occurred in trying to use this language to write treaties.

Have students draw a picture depicting some of the vocabulary words (nouns and verbs), then have them compose questions for classmates to answer.

Have students illustrate words and compile a class dictionary of Chinook Jargon.

Methods

Younger Students
1. Go over the background information with students. Explain that the Chinookans had their own language which was different from the Jargon.

2. Share with students some examples of True Chinook vocabulary from the list provided. Write them on the board or on a large sheet of paper so students can look at them.

Discuss how different the Chinook language is from English.

3. Ask students to imagine different ways they might have communicated with the Euro-Americans who came to trade with them. (sign language, new language)

4. Explain that a language was developed, based on Chinook language but incorporating words from English, French, and Russian, so that they could communicate. This was called Chinook Jargon. Explain that it was a jargon because it

Chinook Jargon: Looking at the Trade Language of the NW

did not include enough words to be a true language.

5. Hand out Chinook Jargon basic vocabulary list and review, pronouncing words and providing translation. Use Klahowya, the Chinook Jargon dictionary and tape as a resource for familiarizing students to the pronunciations of words.

8. Ask students to look for words that are similar to English words that they know.

Discussion

Younger Students
Students complete “river scene picture/word match up” activity sheet.

Extension

Younger Students
Have students illustrate words and compile a class dictionary of Chinook Jargon.

Adapted from Discover Cathlapotle Environmental and Heritage Educational Project

Chinook Jargon: Looking at the Trade Language of the NW

Chinook Jargon Activity Page

Look up the definitions for the Chinook Jargon words and then write the number next to that object in the picture below.

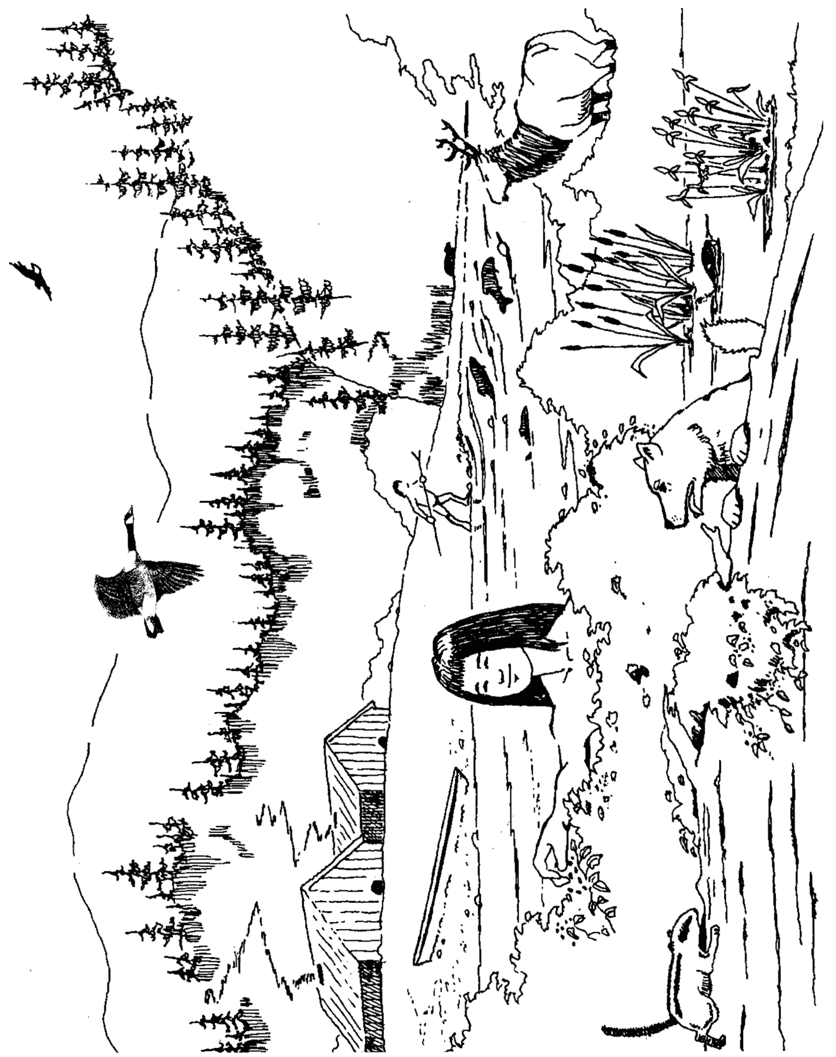
Name__________

Class__________

Date__________

Match-Up Words

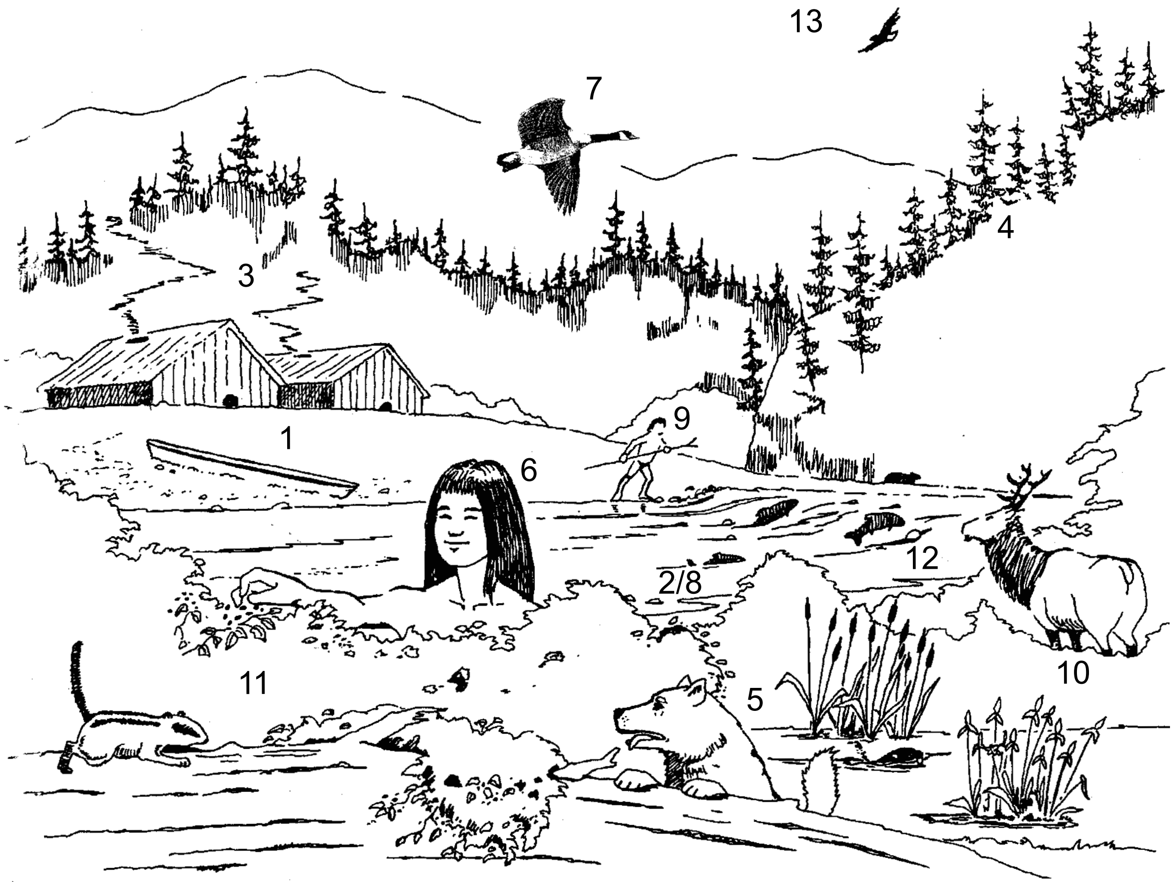
1. canim__________
2. chuck__________
3. house__________
4. kalekwote__________
5. kamooks__________
6. klootchman__________
7. kwikwi__________
8. liver__________
9. man__________
10. moolack__________
11. olallie__________
12. pish/samon__________
13. saghalie__________



Chinook Jargon: Looking at the Trade Language of the NW

Chinook Jargon Activity Page

Look up the definitions for the Chinook Jargon words and then write the number next to that object in the picture below.



Match-Up Words

1. canim ___Canoe___
2. chuck ___water___
3. house ___house___
4. kalekwote ___cedar___
5. kamooks ___dog___
6. klootchman ___woman___
7. kwikwi ___goose___
8. liver ___river___
9. man ___man___
10. moolack ___elk___
11. olallie ___berries___
12. pish/samon ___fish___
13. saghalie ___sky___

Notes

Notes

Chapter 7

Refuge Stories

Red Wings Lesson: By Ron Ward

Appropriate for grades k-1

Red Wing's Lesson

See Glossary for Vocabulary:
Wapato, Plankhouse, Canoe, Cattails

See end of story section for illustrations:
Wapato, plankhouse, canoe, cattails, authentic dress

Chapter 1 Wapato Harvest

Red Wing jumped down from the low oak tree limb near the side of her plankhouse. She raced to where her mother was getting into her brightly painted cedar canoe.

"Where are you going Mama?" shouted Red Wing.

"I'm going with Jumping Fox to harvest wapato for dinner," replied her mother, Singing Dove.

"Can I go along?" asked Red Wing.

"No, the wapato grows in the bottom of Wapato Lake and you are not tall enough to help."

Red Wing gave her mother a pouting look with her dark brown eyes.

"You are only 5 summers old and when you are 10 summers and taller, you can help harvest wapato." Red Wing said, "Running Deer got to go with father and he isn't 10 summers."

"Well, Running Deer wouldn't be tall enough to help with wapato either, the water is too deep. Jumping Fox and I will be back soon and you can help grind up some of the wapato,"

Her mother waved as Jumping Fox pushed the canoe out into the river. Singing Dove, began paddling the canoe up the river toward Wapato Lake. As they both continued to paddle, Jumping Fox notice that Red Wing was following along the river bank.

"Singing Dove, your daughter is following us.

"Singing Dove replied, "She will have to stop and go back when she gets to the swamp. Let's just ignore her."

Red Wings Lesson: By Ron Ward

Red Wing trotted along the bank watching her mother and Jumping Fox paddle upstream. When she came to the soggy edge of the swamp she stopped. She stood silently watching her mother's canoe disappear around the bend in the river. She frowned and thought to herself, "I could have helped them, if they let me go with them."

"I know, I'll get some cattail roots. They are better tasting than wapato. Boy, will they be surprised when they get home."

With that, she walked around the edge of the swamp to where she knew that there was a big patch of cattail plants growing in the water at the edge of the swamp.

Red Wing wadded into the swamp, where the largest plants grew and used her digging stick to loosen the roots of the cattail plants. She knew that she needed to take the entire plant because her family could make baskets and mats by weaving the leaves. She would help her brother braid the leaves to make cords that could be used to tie meat up to be smoked over their cook fire.

As Red Wing collected cattails, she wadded out to the farthest clumps and found that her feet were stuck in the mud. She tied the cattails that she had collected together and set them inside the last cattail clump.

She strained and pulled to get her feet free of the mud. She ducked down under the water and tried to dig her feet free with her stick. She was frightened about stay underwater very long. But no matter how hard she pulled or dug, the mud just would not let go. Tears came to her eyes. Red Wing was angry because she could not get free and becoming a little frightened. She had never been trapped like this before.

"Oh, no!" she thought, "no one knows where I have gone and it is already afternoon."

Chapter 2 Swamp Trap

A half hour later, they pulled their canoe over the mud bank from the river and into Wapato Lake. Both women pulled off their clothes and lowered themselves into the lake. They held onto the side of their canoe. The water came up to their necks. They dug the wapato tubers out of the muddy bottom with their toes and the tubers floated to the surface. The women caught them and put them into the canoe. When they had enough wapato, they moved the canoe out of the lake and across the mud bank into the river.

"We really got some big wapatos today," said Jumping Fox.

"Yes, we should have enough to cook some for dinner and dry the rest and grind it into a power," replied Singing Dove.

Red Wings Lesson: By Ron Ward

“Are you going to get Red Wing to help with the grinding? "asked her partner.

“Yes, she likes do to that and maybe it will help make up for her not being allowed to come with us,” replied Singing Dove.

Singing Dove and Jumping Fox pulled their canoe on the bank by their village. They each lifted a basket filled with wapato and headed for their plankhouse. Singing Dove looked around for Red Wing.

Singing Dove said, “I don’t see Red Wing. I wonder if she is still pouting because she could not go with us?”

“She is probably inside,” said her friend.

They carried the baskets of wapato through the round door in the plankhouse and let their eyes adjust to the dim light inside. There were more than twenty women and children doing various jobs in the plankhouse but no one had seen Red Wing since before midday.

Singing Dove went outside and checked all of the places that Red Wing usual played but she could not find her daughter.

Singing Dove called to Jumping Fox, “I can’t find Red Wing.”

Jumping Fox said, “let’s look by the swamp. That was the last place I saw her.”

When they arrived at the swamp’s edge, they saw Red Wing’s foot prints going around the edge of the swamp. They continued around the swamp but could not see her. They had lost the trail of her foot prints and so turned around.

As they were retracing their own trail, Jumping Fox noticed that the water was muddy at one spot. She called, “Red Wing!”

A faint cry came back over the water, “I’m here.”

Singing Dove hollered, “Where are you?”

Red Wing called back, “I’m out here by the end of the cattails, mother. I’m stuck in the mud.”

Singing Dove called, “Okay, we will get you out in a little bit.”

Jumping Fox and Singing Dove walked into the forest to get a large branch to use as a float for Red Wing. They drug it back and pushed it out into the water.

When they got out to Red Wing, they had Red Wing try to pull herself up on to the branch while the two women dug around Red Wing's feet with a long stick to loosen the mud.

All of a sudden, Red Wing popped loose from the mud.

Singing Dove frowned at Red Wing, “What were you doing here?”

Red Wings Lesson: By Ron Ward

“I wanted to help by getting cattails for us,” replied her daughter, her lower lip quivering.

“Did you ask if you could go?”

“No.”

“Did you tell your grandma where you were going?”

“No,” replied Red Wing, hanging her head.

“Did you ask anyone to go with you?”

“No. I’m sorry mother, I know that I shouldn’t have come out here without telling anyone. I just wanted to help. I thought I could be a help by bringing back cattail roots and leaves for the family.”

“What will you do next time you want to help,” asked her mother.

“I’ll tell someone where I am going and ask someone to go with me to pull me out if I get stuck,” answered Red Wing.

“You had us worried,” said Singing Dove, her face stern. But then her face broke into a smile of relief. “Just promise me that you won’t do it again.”

“I promise!” said Red Wing.

“Well, we had better head back to the plankhouse,” said Jumping Fox. “We have a lot of wapato and cattails to take care of now.”

With that they all shouldered a bundle of cattails and headed home.

Red Wings Lesson: By Ron Ward

Extensions:

1. Make up names for students (Running deer, tweet birdie etc.)
2 . Draw pictures with this sentence
   I am _____summers old.
   My name is (write new name)
3. Design a plankhouse, mapping out where each student in the class would sleep. etc,
4. Have students make origami canoes paint them appropriate colors

Red Wings Lesson: By Ron Ward

Vocabulary:

Canoe: The Chinookan people would use a adze (chopping tool) and fire to hollow out and shape a cedar log into a boat.

Cattails: A plant that grows along the edge of water such as ponds and slow streams. It looks like big tall grass with a stem that comes up out of the center with a brown (hot dog shaped) seed hear

Cedar: A large tree that has rusty wood and is easy to carve

Plankhouse: A house that the Chinookan people built out of planks split from a cedar log.

Wapato: A kind of plant that grows in ponds. It has heart shaped leaves. Its roots (tubers) grow in the mud at the bottom of the ponds. Chinookan Indians used this tuber much the same as we would use a potato.

Red Wings Lesson: By Ron Ward

Cattail

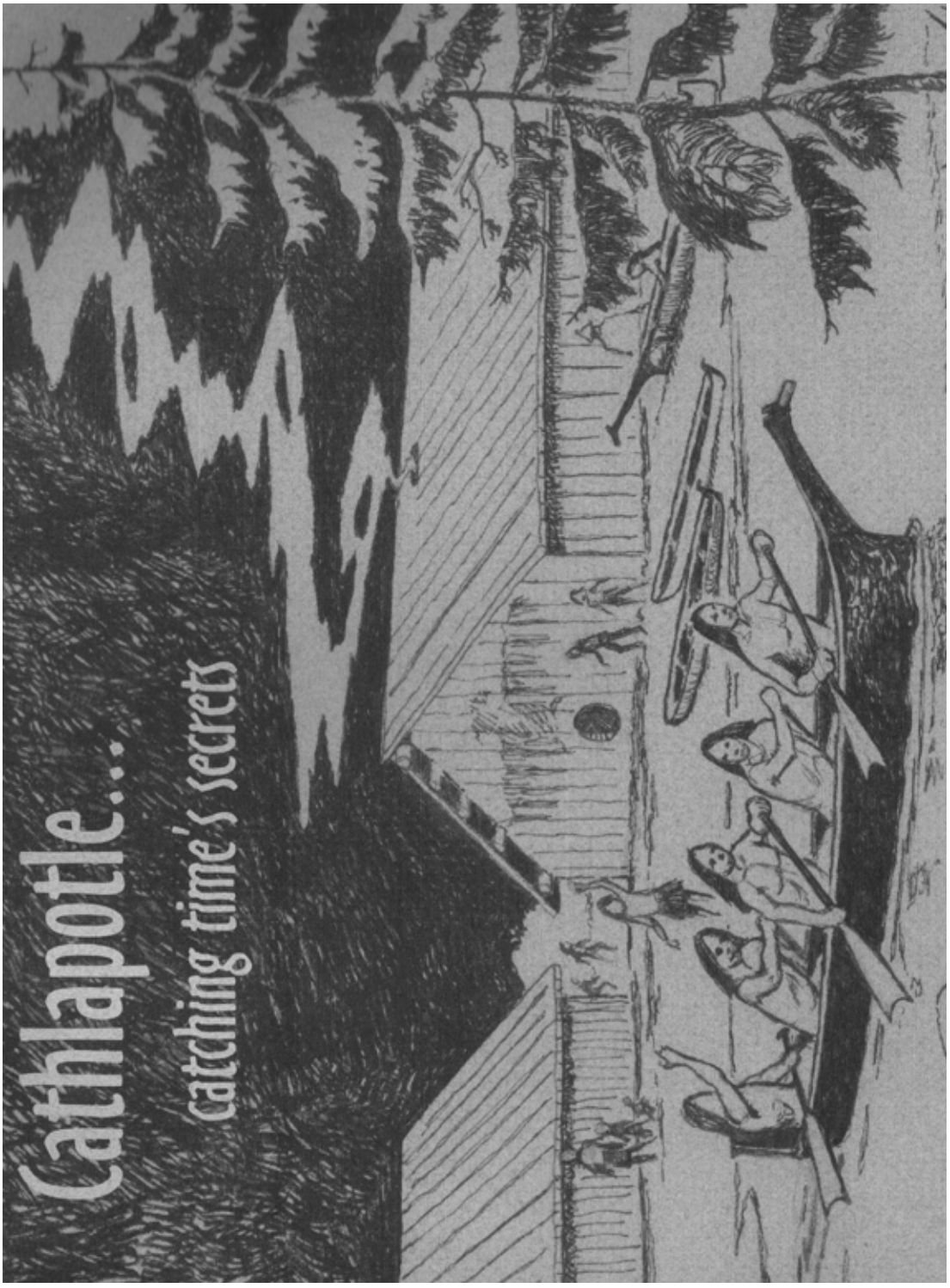
A plant that grows along the edge of water such as ponds and low streams. It looks like tall grass that comes up out of the center with a brown (hot-dog shaped) seed head.

Red Wings Lesson: By Ron Ward

Wapato

Wapato grows vigorously in the wetlands of the Portland Basin. The tasty tubers can be roasted, boiled, or pounded into a powder. It was a staple food and trade item for the people of cathlapotle (*Cathlapotle…Cathcing Time's Secrets p .12*)

Red Wings Lesson: By Ron Ward



Chinookan Indians in a canoe on a river by their plankhouse

Red Wings Lesson: By Ron Ward

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Notes

Chapter 8

Post-Trip Classroom Activities

Fill in the Blank

Classroom
Grades: 3-6

Objective
Students will learn more about Ridgefield National Wildlife Refuge.

EALRs

Writing: 1.1.1

Communication: 1.1.1, 1.1.2, 1.3.1, 1.3.2, 3.2.1

Method

Have small groups of students write sentences that include special words (or vocabulary words) relating to the field trip. Each group, one at a time, writes a few of its sentences on the board with a _____ instead of the special word. The other groups try to figure out the missing word to complete the sentence. Repeat this until all groups have had a chance to put their sentences on the board.

Note

The word game works best with words from the glossary.

Sharing Circle

Classroom
Grades: K-6

Objective
To encourage further learning about Ridgefield National Wildlife Refuge.

EALRs

Communication: 1.1.1, 1.1.2, 1.2.1, 1.2.2, 2.1.1, 2.3.1, 2.3.2

Method

This is appropriate for the end of your field trip. Have the students gather in a circle and share something that they learned or observed during the field trip. This could also be done on the bus going back to school. Some sentence starters could include: "The National Wildlife Refuge was interesting to me because_____," or "My favorite activity today was_____," or "One thing I learned today was_____."

Thinking it Over

Classroom
Grades K-6

Objective
To encourage further learning about Ridgefield National Wildlife Refuge.

EALRs
Communication: 1.1.1, 1.1.2, 2.1.1, 2.1.2, 2.3.1, 2.3.2

Writing: 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.3.2, 2.1.1, 2.3.1, 2.3.2

Method

Describe your favorite place from today's trip. Use all your senses.

Use one word for how it looks.

_____

Use two words for how it smells.

_____ _____

Use three words for how it sounds.

_____ _____ _____

Use four words for color.

_____ _____

_____ _____

Use five words for how it feels.

_____ _____ _____

_____ _____

Imagine that you owned the marsh area. Tell a story about how you would use it.

Password

Classroom
Grades 3-8

Objective
To encourage further learning about Ridgefield National Wildlife Refuge.

EALRs
Communication: 1.1.1, 1.1.2, 1.2.1, 1.2.2

Method

Have two students stand with their backs to the chalkboard. The special word is written on the board and the class gives the two players one word clues, one person at a time, that will help the students discover what the special word is. When the password is guessed, start again with two new players.

Holding a Town Meeting

Classroom Grades: 4-12

Objective
Students will gain knowledge of how conflicting interests shape public policy by participating in a town meeting. The meeting is being held to decide how a piece of land will be used.

Materials
Identification cards for each presenter

A permit for the city council to hold (provided by teacher)

EALRs

Communication: 1.1.1-3, 1.2.1-3, 1.3.1-3, 2.1.1-3, 2.2.1-3, 2.3.1-3, 2.4.1-3, 3.1.1-3, 3.2.1-3, 3.3.1-3
Science: CH03 1.3.9, 1.3.10, IQ05 2.2.1

Civics: 1.2.1, 1.3.1, 1.3.3, 2.2.1

Art: 1.2, 2.2, 3.1, 3.2, 4.2

Method

Allow 15 to 30 minutes for the meeting and 15 minutes for discussion. Number the identification cards for each presenter as you like; they will deliver their cases in that order. Each presenter may speak for 2 minutes; emphasize the power of a few, well-delivered sentences. Before the town meeting begins read "Background Information for the Town Meeting." During the meeting, questions will be taken from the citizens. After the presentations, city council members will take a short break to make their decision. When the decision is announced, involve students in a discussion about this role-playing activity.

The Presenters

Barbara the Biologist
From the U. S. Fish and Wildlife Service.

Dan the Developer
Comes in after meeting has begun (late plane).

Mr. Bird
Represents the Bird Watchers' Society.

Ms. History
From the Historical Society.

Pam the Planner
From the town planning office.

Pauline the Politician
Running for mayor.

Sam the Sportsperson
Represents all those who hunt and fish in the marsh.

Bob the Businessperson
Represents the local business community.

City Council Members
Will decide the best use for the land, and will give the permit to Dan if the members (3) agree with the plan.

Citizens
Interested, happy, and upset; they are full of questions.

Timekeeper
To keep everyone short-winded — 2 minutes each.

Holding a Town Meeting

Background Information for the Town Meeting

Read to Your Class

Mom and Dad are worried. Whenever there is a town meeting, it causes such a fuss that no one gets *anything* done for at least 3 days before and after it happens.

The last open land area near town, the old marsh, might be sold. Fifteen acres of it would be sold to Dan the Developer for a shopping center, like the one on the other side of town.

Everyone around _____ (your town) remembers growing up with the marsh nearby. It is a good place for a great adventure or two, even if Mom and Dad don't appreciate the bugs and worms you bring home. In springtime you watch the mallards raise their young; in fall and winter you watch thousands of migrating ducks as they stop over to feed in the marsh and sloughs on their way south. You know how you can lose all track of time while watching the birds feeding in the marshes. The marsh is a great place.

It sure will be hard to see the old marsh go, but Mom said it would be good for business to have some new stores. Plus, you wouldn't have to ride your bike all the way into town; it would be a lot easier.

You wonder what will happen tonight at the town meeting. People want to know if Dan will get a permit to build on the marsh.

Discussion

At the end of this simulation activity, students should have an opportunity to step back from the role-playing situation to think about the following questions:

1. What additional information would have helped you plan your group's proposal?
2. Where would you go to get this information?
3. Were you assigned to a group you didn't want to represent? If so, how did you feel? (Point out that other people have different needs and ideas, and this might be a way to identify them.)

Encourage the students to call developers and ask about their feelings on this issue. Call wetlands organizations for more information about developments.

Adapted from Habitat Fun Pack, grades 4-6, U.S. Fish and Wildlife Service, 1989.

Holding a Town Meeting– Id Cards

Barbara the Biologist

Remember, Barbara, you stand for the fish and wildlife of the area. You represent the creatures who cannot speak for themselves.

Could the marsh area be left alone as a habitat for the birds?

The ducks use the sloughs in the winter when it is too cold to stay up north in Alaska and Canada.

The curlew, killdeer, and sandpipers love to hunt for food in the mud. The egrets hunt in both the marsh and the slough.

Remind people that the marsh is home for many other kinds of fish and wildlife too.

Long live the wildlife!

Mr. Bird

Remember, Mr. Bird, your wonderful birds are in danger. As this year's president of the Bird Watchers' Society, it is up to you to save them!

If Dan the Developer puts in that shopping center, not one bird will return to the area. All that habitat will be lost forever.

Not only are there very few areas left for the birds, there are very few places left for people to watch birds and enjoy nature and the outdoors.

Hang in there for your birdwatcher friends and your feathered friends!

Dan the Developer

Remember, Dan, you stand for all the investors from Portland.

They will put a lot of money into this project. They expect you to convince the people of the town, especially the city council members, that the shopping center will bring jobs for the town and better and easier shopping for the people.

The town has really grown. It needs a shopping center on the north side of town.

You and your investors will all make a good profit if the shopping center is built.

Go for it!

Ms. History

Remember, Ms. History, you stand for all the old places that are left in this town; there aren't many left.

The first family to settle in the area built their barn on the edge of that marsh, and it is still standing today.

That barn is more than 100 years old and should be preserved in some way, not torn down.

Unfortunately, it is on the piece of land that may be sold to Dan the Developer. There is no way he is going to let the barn stand.

MS. History, fight for the past!

Holding a Town Meeting– Id Cards

City Council Members

Remember, City Council Members, that you were elected by the people of the town to represent them — all of them.

You must listen carefully to all the speakers and people from the audience before you decide whether to grant the permit to Dan.

You might grant the permit only if some changes are made in the plans. What would those changes be? If you give him the permit so the sale can go through, you had better be ready with good reasons why.

The town is waiting for your answer!

Sam the Sportsperson

Remember, Sam, you represent all of the people of the town who like to fish and hunt in the marsh.

Women and men interested in outdoor sports such as hunting and fishing want to protect natural areas where fish and wildlife live.

There are fewer and fewer places to go and enjoy these activities with your children or friends.

You want to save those places that are left!

Pauline the Politician

Remember, Pauline, that you want to represent the town as mayor next year, so you had better start lining up the votes now!

How can you support both the shopping center and the saving of the marsh? The shopping center would provide jobs for people, but destroying the marsh would make people like Mr. Bird and all of his birdwatcher friends vote for your opponent.

So, just think of a plan that will make Dan and the nature lovers happy.

Now is the time to show this town what a leader you can be!

Bob the Businessperson

Remember, Bob, you represent local business people who want the town to grow and prosper.

The shopping center would bring jobs and money into the town. You think it would be good for everyone.

You support Dan the Developer and want the shopping center to be built.

Holding a Town Meeting– Id Cards

Pam the Planner

Remember, Pam, you are to look at all of the town's needs, because your job is to help find the best solution for all the town's citizens.

The town really needs the new jobs the shopping center will bring.

However, you also have to think about all of the new roads a shopping center will require. How will the town pay for them?

The town needs to clean up the river which flows by the marsh and into town. The marsh could be a natural water filter to remove silt and absorb pollutants. Does the marsh provide other benefits people are forgetting?

Is there a way to build the shopping center so that all of the marsh won't be lost?

Pam, the city council members want to know what you think, so think hard.

Timekeeper

Remember, Timekeeper, the folks at the town meeting are going to be excited.

It is your job to see that each of the eight speakers does not go over the time limit of 2 minutes.

Questions from the audience should be short — about 20 to 30 seconds each.

City council members are counting on you to keep order tonight.

Good Luck!

More Field Trip Follow-Up Activities

Classroom
Grades: K-12

Objective
To enrich and expand upon the lessons learned about the Ridgefield National Wildlife Refuge.

EALRs
Communication: 2.1.1-3, 2.2.1-3, 2.3.1-3, 2.4.1-3, 2.5.1-3
Writing: 1.1.1-3, 1.2.1-3, 1.3.1-3, 2.1.1-3, 2.2.1-3, 2.3.1-3, 3.1.1-3, 3.2.1-3, 3.3.1-3, 3.4.1-3, 3.5.1-3
Art: 3.1.1-3, 3.2.1-3

1. Organize a Parents' Night where the students report on their field trip. Have them narrate a slide show or tell stories of what they did and learned.
2. Write letters or send drawings to elected officials or newspapers describing the trip, impressions, and importance of the refuge.
3. Write and read a story to the class. An example might be a first-person account of the life of a Canada goose.
4. Do research reports on marsh-related topics.
5. Do nature walks or scavenger hunts around your own school.
6. Recycle classroom trash, glass, paper, aluminum, etc.
7. Design art projects and murals; draw a map or build a model of an animal you saw.
8. Do any of the games in the previous sections.

Common Yellowthroat

Notes

Chapter 9

Glossary and Resources

Glossary

Adaptation. An adjustment to environmental conditions; a modification of an organism or its parts that helps that plant or animal survive.

Aerate. To supply with or add air.

Algae. Tiny, non seed-bearing aquatic plants; chlorophyll is often masked by a brown or red pigment.

Anadromous. In reference to fish, species that spend part of their life in freshwater and part in saltwater.

Avian. Of, relating to, or derived from birds.

Aquatic. Growing in, living in, or frequenting water.

Biodegradable. Capable of being broken down to simple compounds, especially into harmless products, by the action of microorganisms.

Biodiversity. The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Bird Banding. Attachment of identification tags to individual birds to help scientists understand bird population dynamics and migration routes.

Brackish. Somewhat salty but less salty than sea water.

Carnivore. A flesh-eating animal or plant.

Community. A group of plant and animal populations living in a prescribed area or physical habitat.

Conservation. Controlling the use of and protecting natural resources.

Consumer. An organism that eats other organisms or organic matter.

Decomposer. An organism (such as bacteria or fungi) that returns components of organic matter to the environment by feeding on and breaking down dead plants and animals.

Delineate. To draw boundaries (e.g., to delineate wetlands).

Dependence. The state of requiring something outside of oneself for individual survival.

Detritus. Decaying bits of plant and/or animal remains (resembles gooey mud sometimes).

Diurnal. Active or occurring in the daytime.

Ecology. The study of the interrelationship of organisms and their environments.

Ecosystem. A system made up of a community of living things and the physical and chemical environment with which they interact.

Emergent Vegetation. Aquatic vegetation rooted underwater but growing above the surface of the water.

Endangered Species. A species that is in danger of extinction throughout all or a significant portion of its range.

Endangered Species Act. A 1966 federal law designed to prevent species from passing into extinction.

Endemic. Describing a population or species that is native to or limited to a certain region.

Estuary. A body of water or water passage where tidal salt water is diluted

Glossary

by fresh water.

Extinct Species. An animal or plant species that has died out everywhere in the world.

Fauna. Animals, especially of a region or period.

Fledge. To rear until ready for flight or independent activity.

Flora. Plants, especially of a region or period.

Flyway. A route taken by migratory birds during their flights between breeding grounds in the north and wintering grounds in the south.

Freshwater Habitat. An area where standing freshwater exists year-round in most conditions.

Food Chain. A sequence of living organisms in an ecological community in which members of one level feed on those in the level below them and in turn are eaten by those in the level above them.

Food Pyramid. Demonstrates the loss of energy between different levels of consumers of a food chain.

Food Web. The totality of interrelated food chains in an ecological community.

Habitat. The place or type of site where a plant or animal naturally or normally lives, often characterized by a dominant plant form or physical characteristic (the stream habitat, the forest habitat).

Herbivore. An organism that eats living plants or their parts.

Hydrology. The study of water and its properties.

Impoundment. A basin created by the construction of dikes. Water control structures are usually installed in the dikes to allow for the impoundments to be drained of or filled with water.

Inference. The use of logic or even guesses to interpret or explain observations.

Interdependence. Within biological communities, the state of species depending upon each other, often to the extent that if one is lost other cannot exist.

Invertebrate. An animal without a backbone or spinal column.

Magnetic Field. The portion of space near a magnetic body.

Mate. Either member of a breeding pair of animals.

Micro climate. The essentially uniform local climate of a small site or habitat.

Migration. The act of moving (usually seasonally) from one locality to another for feeding or breeding purposes.

Molt. To shed hair, feathers, shell, horns, or an outer layer periodically.

MPD. Miles per day.

Nocturnal. Active or occurring at night.

Nutrients. The raw materials necessary for continuing life processes.

Omnivore. An organism that eats both plant and animal material.

Organism. A living thing.

Pacific Flyway. A route in the western United States, extending from Alaska to Mexico, taken by migratory birds during their flights between breeding grounds in the north and wintering grounds in the south.

Glossary

Pollution. Contamination of the environment, especially with human-made wastes.

Predator. An animal (rarely a plant) that captures and eats animals for food.

Prey. An animal killed for food.

Producer. An organism capable of producing food by combining inorganic materials, as in photosynthesis.

Rare Species. A species that has a small number of individuals and/or has a limited distribution. A rare species may or may not be endangered or threatened.

Riparian. On or near the banks of a river or other flowing body of water; usually refers to vegetation.

Riverine. Relating to or resembling a river; located on or inhabiting the banks of a river.

Scat. An animal fecal dropping.

Scavenger. An organism that feeds habitually on refuse or carrion.

Scientific Observation. Descriptions of what we actually see, hear, feel, taste, or smell.

Slough. A slow moving backwater which is (or has historically been) connected to a river; a stagnant swamp, marsh, bog, or pond, especially as part of an inlet or backwater.

Species. One population of organisms, all the members of which are able to breed amongst themselves and produce fertile offspring.

Submergent Vegetation. Aquatic vegetation growing underwater.

Threatened Species. A species whose numbers are low or declining. A threatened species is not in immediate danger of extinction, but is likely to become endangered if it is not protected.

Understory. An underlying layer of low vegetation in a forested area.

Upland. Ground elevated above the lowlands, marshlands, or rivers.

Vegetative Community. A group of plant populations living in a prescribed area or physical habitat; it may refer to one or to all of the plant species within a given area.

Wetlands. Areas that, at least periodically, have waterlogged soils, support plants adapted to wet soil, and are submerged in water. Bogs, freshwater and saltwater marshes, and freshwater and saltwater swamps are examples of wetlands.

Woodland Habitat. Typically, a habitat with trees, shrubs, and a ground layer of vegetation.

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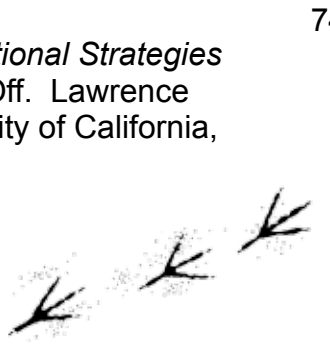

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Additional Resources

At Home with Wetlands: A Landowner's Guide. 1990. Publication 90-31. Washington Department of Ecology. Olympia, Washington 98504.

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Refuge Educational Visit Form

Advance reservations are required for all school groups visiting Ridgefield National Wildlife Refuge. Reservations allow the Refuge to schedule activities, arrange logistics, secure staffing, and avoid conflicts between other groups and resource management. The completed questionnaire can be mailed, faxed, or emailed to the contact information listed below. Requests will be processed on a first come, first served basis. The Refuge will attempt to accommodate educational visits within the limitations of funding, staff, and facilities availability. Your approved Educational Visit Request Form will be mailed or faxed back to you stating the availability of personnel and facilities and confirming your trip. The approved Form will also serve as your waiver for the Refuge's entrance fee. Educational visits to the Refuge are exempt from the entrance fee if visits are *prearranged and support stated educational objectives/goals that relate to natural or cultural resources.* It is requested that after your visit, you complete the post visit survey found on the third page of this document. This survey will help us better serve future educational visits.

School's/Groups Name:			Teachers/Group Leaders Name:		
Grade Level/Levels that will be attending:			Have you brought a class to the refuge before: Have you taken the refuge field trip class before:		
Visit Day/Date:	Arrival Time:		Departure Time:		
We would like to visit (Check those that apply below):					
____ Auto Tour Route	____ Kiwa Trail (May 1 - Sept. 30)	____ Cathlapotle Plankhouse	____ Oaks to Wetland Trail	____ Other (Specify):	
We request the following Services (Check those that apply below):					
____ Staffed Plankhouse Interpretation	____ Refuge Orientation Talk (10-15 minute)	____ Guided Naturalist Hike	____ Guided Naturalist Auto Tour Route Trip	____ Dusky Duffel Backpack equipped for Self-Guided Tours	____ No Services Required
I. Academic Objective of Trip:					
II. Activities Prior to Trip:					
III. Activities During Trip:					
IV. Follow Up Activities:					

Refuge Educational Visit Form

V. Special Needs Considerations, including any disability covered by the Americans with Disabilities Act, ailments that may Impair Breathing, (ex. Asthma, Emphysema, Bronchitis) or allergies to Bees/Wasps, etc…		
Number of Students:	Number of Teachers:	Number of Chaperones:
Additional Information/comments:		
Teacher Signature:		Date:
Phone: Fax: Email:		

Refuge Educational Visit Form

- What was of unique educational value in this field trip?
- How well did the activities you completed fit with the objectives/expectations? What went well, not so well?
- My objectives were successful, or unsuccessful?
- Was there adequate time?
- Was there adequate staff and adult supervision?
- What might be done differently to make this a better experience in the future?
- What special points should be emphasized next time?
- What special problems should be addressed in the future?
- What would improve a visit to this site in the future?
- Other Comments?

Notes