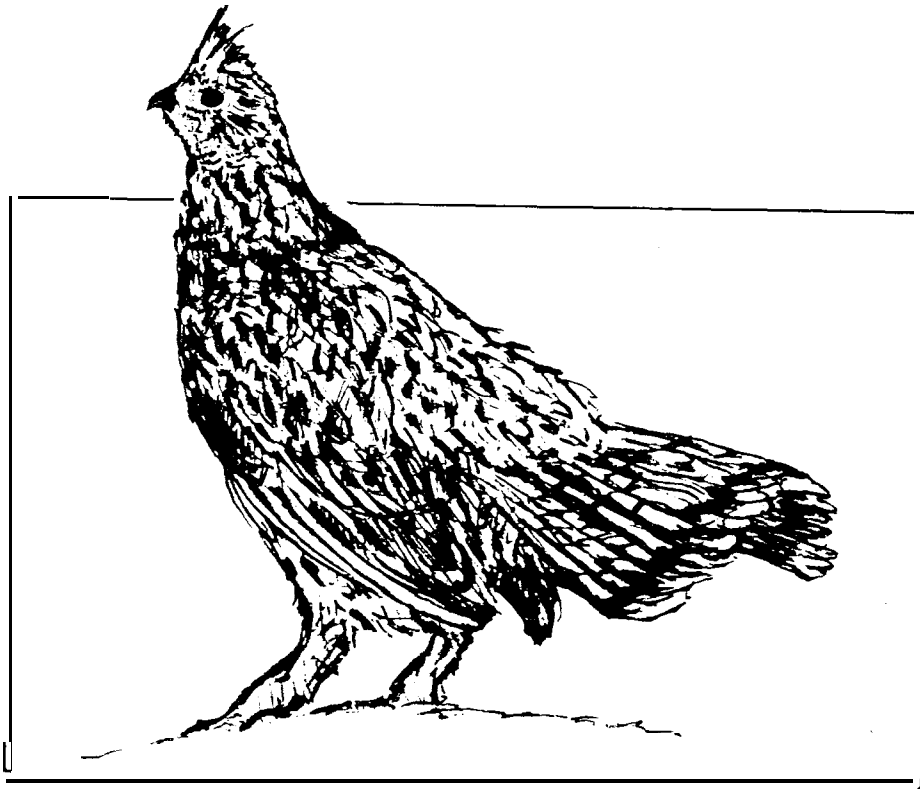


TEACHER'S GUIDE TO STUDENT WORKSHEETS



Unit One

Birds You Know

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Watching birds can involve much more than simply learning their names, but that is the first, indispensable step. In back of this book is a simplified field guide covering 100 species of birds common somewhere in Alaska. If possible, each student should have a copy of his or her own. You might duplicate the pages and post them alongside each other as a class checklist. Other birds seen but not on this guide could be added to the posted list.

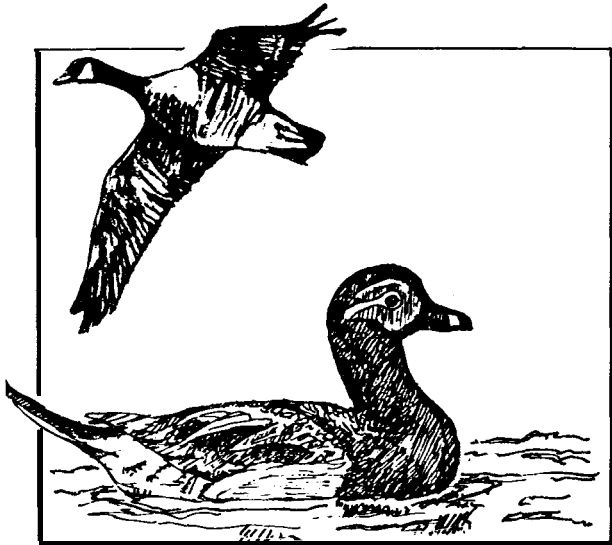
Some of these birds are found throughout Alaska, but others are only found in certain regions. The plumage of many species varies depending on age, sex, and time of year. In bird species whose plumage varies, our field guide illustration and description is of an adult male in spring plum-

age. The spring males are usually the most colorful and easiest birds to identify. (There are exceptions, such as phalaropes, in which the female is more brightly colored than the male.) For help in identifying females and juveniles, as well as the less common species that we don't cover, we urge you to obtain at least one field guide for class use. The standard American field guides are described in the bibliography. A New, Expanded Guide to the Birds of Alaska, by Robert Armstrong, has photographs of each species and contains information about where birds can be found in Alaska in all seasons. Field guides stress identification, and if you wish to explore any topic of bird life in depth, you'll need to go to other kinds of texts.

Worksheet 1A

Your Bird List

This is an exercise to show students that they already know quite a lot about birds--and to develop excitement for learning more. As the students work through the book, they will return to this page and fill out the remaining columns.

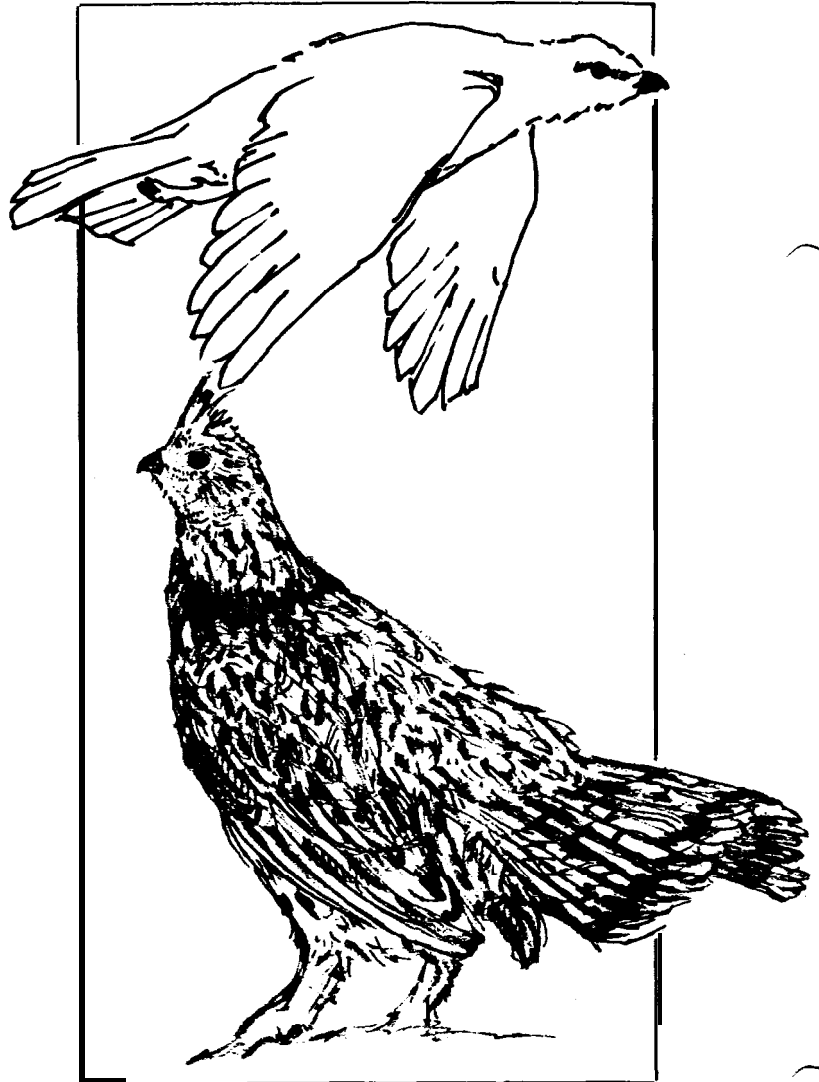


Get students to start thinking about birds by talking about those they are familiar with locally and from trips, books, movies, television, etc. Additional paper can be used if the students know more birds than will fit on the chart. If possible, incorporate names of birds in local languages. The names of birds in different Native languages are available in Gabrielson and Lincoln's Birds of Alaska.

Worksheet 1B

Class Bird List

This activity should help to sharpen student skills in compiling data. This list will undoubtedly include the most common birds in your area, and the ones most likely to be seen on a field trip.



Worksheet 1 C

Use Your Field Guide

Learning to use a field guide is an important aspect of this course. Discuss the organization of the student field guide. The field guide separates birds by groups and by species. There is a box for checking off the species as they are seen, and information on size, bills, feet, spring habitat, where the birds winter, and on their identifying features. A range map for each bird shows where in Alaska it is found.

In general, field guides start with the least evolutionarily advanced families of birds (swimming birds) and go to the more advanced (perching birds). The Sea Week field guide follows a simplified classification system under which birds are divided into six groups:

Swimming birds include waterfowl (ducks, geese, and swans), loons, grebes, and some seabirds (cormorants, puffins, murres, murrelets, auklets, and guillemots). Bird watching on a lake or bay, with binoculars or a spotting scope, can be rewarding even at midday when bird activity is low and birds can be difficult to find in other habitats.

Birds of prey include owls, hawks, and eagles, and falcons. Owls are nocturnal and may be hard to find. Look for the pellets of bones and feathers that they leave under trees.

Grouse and Ptarmigan are the smallest group; four species of grouse and three species of ptarmigan are found in Alaska. They have feathers over their nostrils and lower legs and, in ptarmigans, over the entire foot.

Waders include cranes, herons, and shorebirds (oystercatchers, plovers, and sandpipers). Many shorebirds stay in flocks during migration and in winter. The flocks often show remarkable coordination, flying wing-to-wing and displaying alternately their dark backs and their light bellies.

Gull-like birds include the gulls, terns, jaegers, and gull-like seabirds (fulmars, petrels, albatrosses, and shearwaters). These latter birds, the tubenoses, breed on far offshore islands and are rarely seen near the mainland--we have therefore omitted them from the student field guide.

Perching birds include the true perching (passerine) birds, whose feet, with three toes in front and a long one behind, are adapted for locking onto branches. Flycatchers, larks, swallows, jays, crows, ravens, chickadees, wrens, thrushes, warblers, finches, and sparrows comprise only a partial list of passerine families. For purposes of simplified classification we have also included woodpeckers, kingfishers, hummingbirds, and pigeons with the perching birds.



1C

Use Your Field Guide

Part of the pleasure of "birding" is learning the names of birds in your area. Field guides to birds are books written to help you identify wild birds. They have drawings or photographs, hints to help you tell similar birds apart, and other information. They generally have checklists that you can use to keep track of all the birds you see. Use your student field guide. It lists 100 of Alaska's most common birds. Some are in your area.

1. What is the name of the first bird in your field guide?

Pacific loon

The last bird in your field guide? Snow bunting

2. Identify these birds. If you do not already know their names, look them up in your field guide. Write their names under their pictures. Do the same for all the bird pictures you come across on these worksheets.



American robin

Canada goose

3. Check your field guide to see if you are correct.

4. The birds in your Alaskan field guide are split into six major groups. Write two examples of each group. Your field guide can help.

Answers vary

SWIMMING BIRDS - birds with duck-shaped bodies and webbed feet, usually seen swimming.



Examples: Snow goose King Eider

BIRDS OF PREY - birds with grasping, sharp-taloned feet and sharp hooked beaks for catching and tearing animal foods.



Examples: Beregrine Falcon Rough-legged hawk

1C

GROUSE AND PTARMIGAN - plump, chicken-like birds with short, stout bills and short legs; they don't swim, are usually seen on the ground or low in trees, and fly only a short distance when startled.



Examples: Willow ptarmigan Spruce grouse



WADERS - birds with long legs, often seen foraging in open habitats along shorelines or on the tundra. Some shorebirds can be recognized by their flocking behavior.

Examples: Common snipe Semipalmated plover



GULL-LIKE BIRDS - birds usually seen near water, often in flight--but some nest on the tundra far from water. Most of these birds have pointed wings. Tail shape is important for identification.

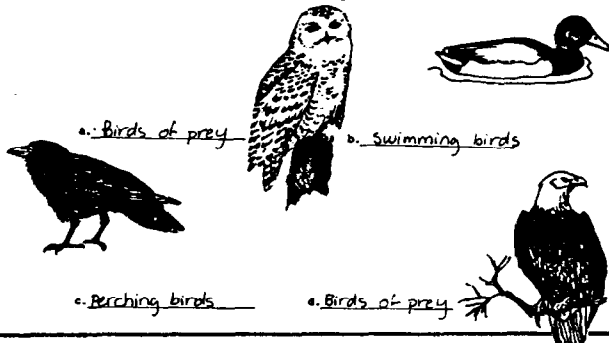
Examples: Mew gull Long-tailed jaeger



PERCHING BIRDS - a large group including sparrows, warblers, jays, woodpeckers, and other birds that commonly perch in trees or on shrubs or rocks.

Examples: Savannah sparrow Snow bunting

5. Find these birds in the field guide. Write the name of the group each bird is in on the line below the bird's picture.



a. Birds of prey

b. Swimming birds

c. Perching birds

e. Birds of prey

Show the students other field guides. Explain how these are similar to their Sea Week guide and encourage students to use them to identify less-common birds, females or juveniles, not in their own field guide. Have students immediately begin to check off birds in their field guide as they see and identify them. A bird that is seen but is not on the list can be added to the student guide in the correct bird group. Unusual sightings should be reported to Dr. Brina Kessel or Dan Gibson at the University of Alaska Museum, Fairbanks, AK 99775.

(On question 5, worksheet 1C, students may be interested in identifying each bird's name as well as its group: a. Snowy Owl; b. Mallard; c. Common Raven; d. Bald Eagle; e. Tufted Puffin; f. Chickadee; g. Yellowlegs; h. Bonaparte's Gull; i. Willow Ptarmigan; j. Sandhill Crane.)

1C

a. Swimming birds

e. perching birds

g. waders

b. Gull-like birds

i. grouse

j. waders

A glossary will help you find answers you don't know, and tell you what some of the words used in this book mean. Turn to the glossary and find the definition for ACCIDENTALS.

a. How many kinds of birds are regularly found in Alaska? 355

b. How many accidentals? 50

c. How many birds in total? 405

GLOSSARY

Introduce the glossary in the back of the student workbook. The glossary can be used for spelling, games, or vocabulary words. Have the students add additional words as they find them during their studies. Make a classroom set of flash cards with these terms. The students can each make two or three cards; then laminate the set.

Additional Activities:

1. **Language Arts** : Have students practice making careful observations by describing a classmate in detail, so that the description is unique to that person. No other classmate will fit it entirely.
2. **Language Arts, Science**: Next, have a student describe a mystery bird to the class one feature at a time, using the field guide or a picture of the bird. After each clue is given, classmates try to guess the bird. The first student to correctly identify it takes the next turn describing a bird to the class.
3. **Language Arts**: Work with students and the librarian to develop a bibliography of books about birds that are available in your school library.
4. **Social Studies, Science**: Have students make a list of people in the community who know a lot about birds. Some of these people may be willing to share their knowledge with your students. (List may include parents, village elders, birdwatchers, hunters, government agency personnel, museum staff, taxidermists.)

5. **Social Studies, Science**: Adopt a bird. Have each student choose one kind of local bird to learn more about, and look for that bird whenever possible, recording information about it.

Suggestions for data to record :

- . Name of bird
- . Habitat where the bird is seen (marsh, tundra, forest, schoolyard)
- . Location of the bird (ground, shrub, air, tree branch, tree trunk)
- . Bird activity (flying, perching, walking, eating, hopping, singing, swimming)
- . Observations about activity (manner of flying, how and what it eats)
- . Relationship with other animals (whether it is alone or in a group, how it communicates with other birds or animals)

At the end of the week, ask students to share and compare their observations. Happy birding !



Unit Two

Definition of a Bird

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Worksheet 2A

What is a Bird?

Bring or have students bring some feathers for this exercise.

2A What is a Bii?

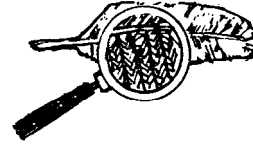
Birds are different from other groups of animals. How?

- Is it because birds can fly? Yes No
 Can other animals fly? Yes No
 What animals?
flying squirrels, bats
- Is it because birds can build nests? Yes No
 Can any other animals build a nest? Yes No
 What animals?
rats, rabbits, squirrels
- Is it because birds lay eggs? Yes No
 Can any other animals lay eggs? Yes No
 What animals?
snakes, alligators, turtles, fish, frogs, duck-billed platypus
- Is it because birds have feathers? Yes No
 Do other animals have feathers? Yes No
 What animals?

BIRDS ARE THE ONLY ANIMALS THAT HAVE FEATHERS!

2A

Flight feathers and tail feathers have a shaft and a web. The web is held together by tiny barbs. Try pulling the web apart; then hook it back together by running it through your fingers (like opening and closing a zipper). Look at the barbs through a magnifying glass. Birds keep their feathers in good order (rippled up) by preening with their bill. Most birds have an oil gland just above the tail. By oiling their bills and then preening, they keep their feathers waterproof. When you are outside, look for a bird preening its feathers.



- Have you ever wondered how many feathers a bird has?

A hummingbird has about 1,000 feathers.

A chicken has about eight times as many feathers as a hummingbird.

A swan has about 25 times as many feathers as a hummingbird.

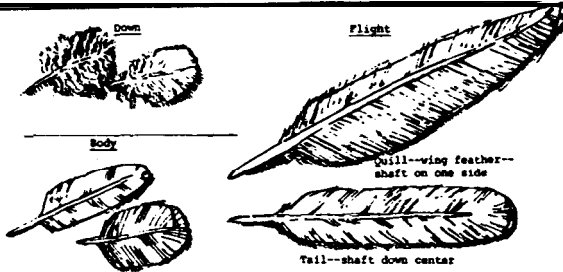
Fill in the chart below.

BIRD	ESTIMATE
Hummingbird	1,000
Chicken	8,000
Swan	25,000

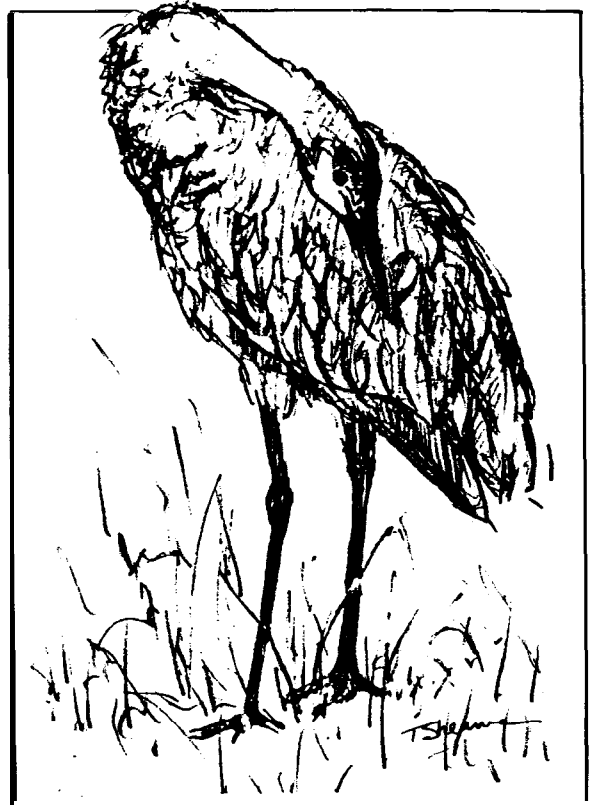
- INTERESTING FACT: Most birds have a body temperature of 108° to 112°F.

- What is your body temperature? 98.6°F
- Is this warmer or cooler than a bird's? cooler
- How is a bird able to stay so warm? By maintaining a high metabolism, eating much food and remaining active most of the time: i.e. flying.

2A



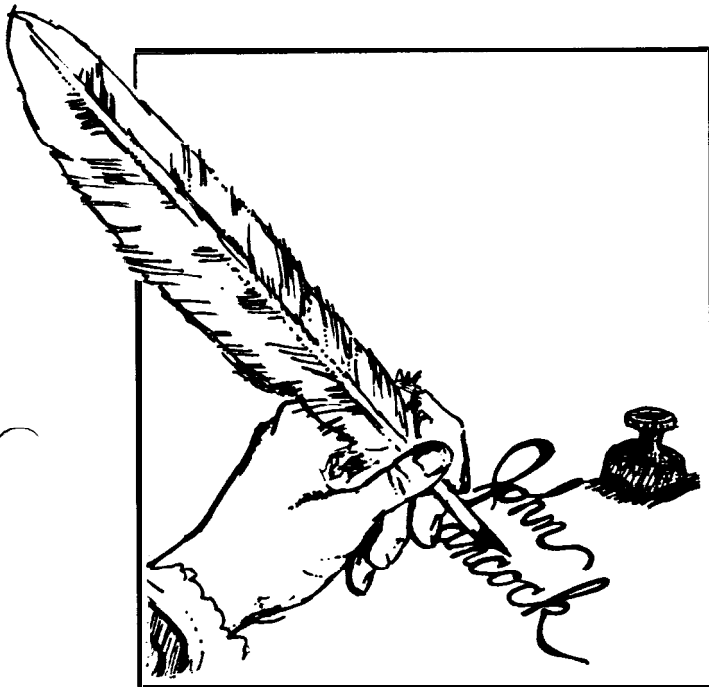
- How many kinds of feathers are there? 4
- What kind of feather does a bird use for
 - underwear: down
 - flying: flight
 - topcoat: body
 - steering: tail
- Which of these feathers would you put in a sleeping bag?
down
- Which kind of feather would make a pen?
flight
- How can you tell a wing feather?
has the shaft on one side
- How can you tell a tail feather?
has the shaft down the center



Worksheet 2B

Make a Feather Pen

You will need feathers, knives or scissors, bottles of ink or ballpoint pen filler points, and glue. You may also need boards on which to cut.



Be sure to have a safety session if students will be using the knives. Ask students to suggest ways to be safe. They should cut away from themselves and never walk around with open knives. If for some reason a student needs to carry a straight-bladed knife without a sheath, the knife should be held at the side, pointing downwards. The ballpoint filler pen is easier to make than an ink pen, but does not demonstrate the way a quill pen works.

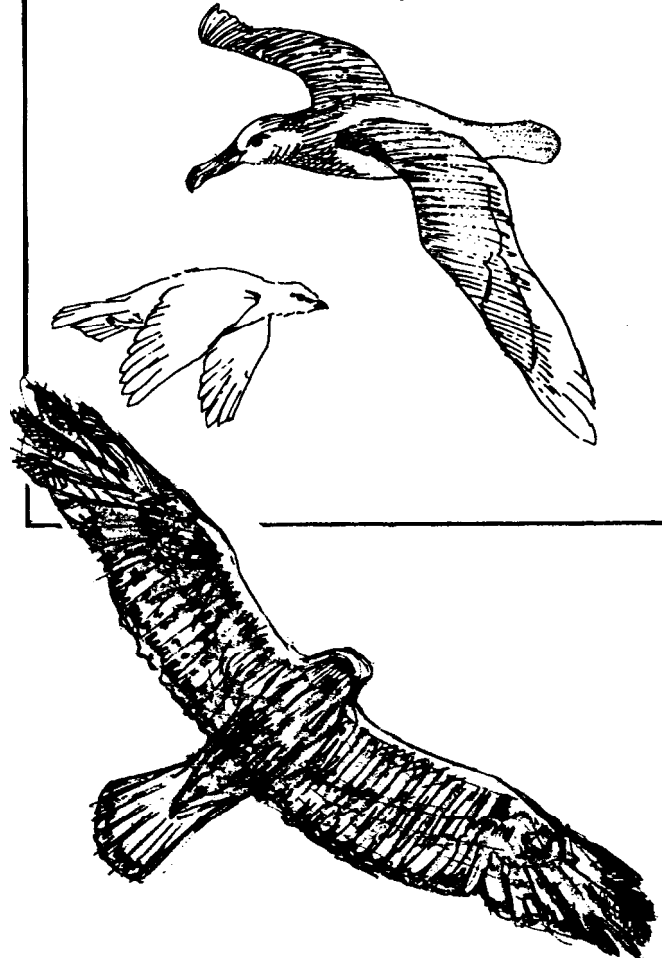
Worksheet 2C

How Birds Fly

You may want to bring in bird and animal bones for comparison. Open the bones to show what is inside.

2c

1. Name a bird that soars.
Golden eagle, Albatross
2. Name a bird that has to keep flapping hard most of the time.
Tufted puffin, Ptarmigan
3. Why do you think there is a difference in the way they fly?
Puffin has shorter wings and a relatively heavier body



Worksheet 2D

Flight Strategies

Students may want to invite a local pilot to talk to them about the problems of flying. For centuries, people dreamed of flying like the birds--but it is only recently that we learned how. You might read aloud the Greek story of Icarus, the boy who wanted to fly. He made wings of wax and jumped off a mountain, but the sun melted the wax and he fell to his death.

2D

Flight Strategies

Before a bird lands, it sets its tail and wings against the wind, using them like brakes to slow itself down. Water birds often use their feet like skis to slide along the water as they land. Watch a duck land on the water as it applies "brakes" and slides on its "landing gear."

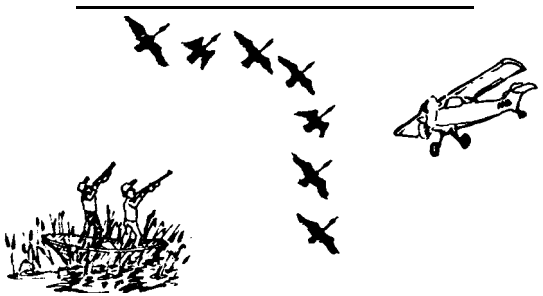
Have you ever thought that birds and aircraft pilots might have some of the same kinds of problems?

1. List some things that are problems for pilots of small planes.

*windy, rain, snow, ice storms, dust
fog, hail, thunderstorms, telephone
and electrical wires, bridges,...*

2. List some things that are problems for birds in flight.

*wind, frozen rain, hail, predatory
birds, hunters, dust, aircraft,
windows,...*



Additional Activities:

- Language Arts:** Have students close their eyes. Then touch them with a variety of feathers on the backs and palms of their hands, and on their cheeks. See if they can tell a down feather from a flight feather or one species of bird feather from another. Have them talk about the differences. For example, an owl feather has a soft velvet cover on it that helps silence the bird's flight.
- Music, Language Arts:** Have students sing bird songs, then write your own. Begin with a common tune everyone knows, and make up verses about local birds. For example, here's an adaptation of "Old McDonald Had a Farm":

Old, old Chevak had some
tundra
e i e i o
And on that tundra lived a
goose
e i e i o
With a honk honk here and a
honk honk there
Here a honk, there a honk,
everywhere a honk honk
Old, old Chevak had some
tundra
e i e i o
And on that tundra lived a
tundra swan.. . . .

- Social Studies, Language Arts:** Have students find out about local aviation history. When did a plane first come to your community? How did people react to planes? How did planes change the way people lived?

Unit Three

Parts of a Bird

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Worksheet 3A

Making a Living

Once students have completed this activity, have them play a modified form of "Simon Says" to reinforce the comparison of humans with birds made in the student workbook. They can take turns leading the activity in front of the class.

Peter says :

- "Open your beak! "
- "Wave your wing! "
- "Pat your belly! "
- "Touch your eye stripe! "

Making a Living 3A

People use their upper limbs--arms and hands--for many purposes, including the basic work of gathering food and building shelter. (What else do we use our arms for?)

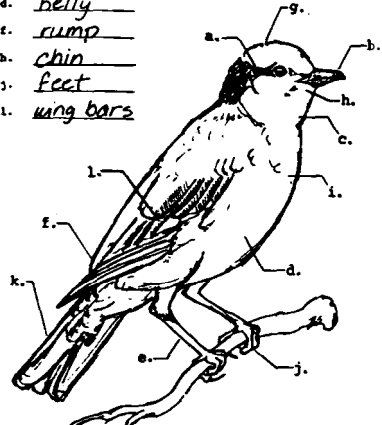
People use their lower limbs--legs and feet--mostly to travel, to walk.

Birds' upper limbs are not arms and hands, but wings. Birds use their upper limbs not to hold and build things, but to travel--to fly or, in the case of wading birds and some other birds, to swim.

Since birds can't use their upper limbs for grasping and building, they use their feet and bills instead. Birds use their feet to walk, to hold food, to cling onto bark, and to carry nest material. They use their bills for tearing food, for nest building, and for cleaning their feathers. Different types of birds have different needs and have developed specialized feet and bills to serve these needs.

Label the parts of this bird. Choose from these terms: back, belly, bill, breast, chin, crown of head, eye stripe, foot, leg, rump, side, tail, throat, wing bar.

1. eye stripe	b. bill
2. throat	d. belly
3. legs	e. rump
4. crown of head	h. chin
5. breast	j. feet
6. tail	k. wing bars



Worksheet 36

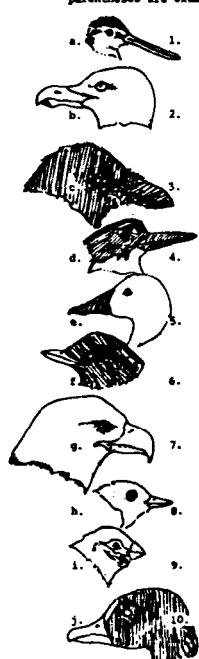
Types of Beaks

Have students make up questions to quiz each other on types of beaks.

- "What kind of bill does a robin have?"
- "What bird has a sharp hooked bill?"

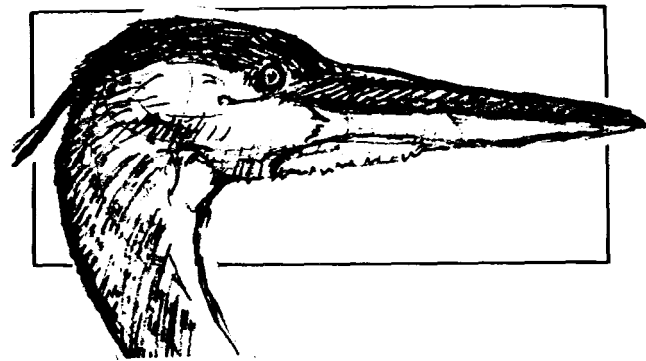
3B Types of Beaks

Different birds have different kinds of bills or beaks to help them obtain food. Match the bills with their correct descriptions. The birds listed in parentheses are examples, not a complete list.



1. SHORT STRONG BILL for eating and cracking seeds (sparrows, grosbeaks, waxwings) **(1)**
2. LONG SPEAR-LIKE BILL for catching fish and other small creatures (herons, cranes, loons, kingfishers) **(d)**
3. SHARP HOOKED BILL for tearing animal food (eagles, hawks, owls) **(g)**
4. SLENDER BILL and wide mouth for catching insects (swallows, warblers) **(h)**
5. LONG POINTED BILL for digging little animals out of the mud (sandpipers, snipe) **(a)**
6. STRONG SLENDER BILL for probing for worms or picking up seeds (robins, larks, blackbirds) **(f)**
7. HEAVY POINTED BILL for all-purpose eating: mussels, eggs, and other scavenged food (jays, crows, magpies, some seabirds) **(c)**
8. WIDE FLAT BILL for eating pond weeds and sifting mud (ducks, swans) **(j)**
9. WEDGE-SHAPED BILL for eating grass and roots (geese) **(e)**
10. STOUT HOOKED BILL for catching and tearing fish and scavenged food (gulls and many other seabirds) **(b)**

Now find Column 4 on worksheet 1A, and write in the bill type for each bird. Check with your field guide.



Worksheet 3C

Types of Feet

After students have completed the activity sheet, play foot charades. Have them move their feet or hands to imitate swimming, wading, grasping, perching, scratching-- and see if the other students can guess what bird they're mimicking.

Note that the student book directs students to fill in both beak and foot types on the chart of birds they began in Unit 1.

Additional Activities:



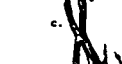


1. **Language Arts, Art, Science:** Have students work in groups to design imaginary birds. Use large sheets of paper and magic markers. Have students explain the parts of the bird and how it makes a living using its specialized parts. Their bird might eat garbage, run computer programs, nest in oil drums, or fly messages along the Iditarod trail!
2. **Art:** Copy this tangram and have students cut it out and arrange the pieces into a variety of bird shapes. Use paints or crayons to color the birds.

3C

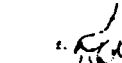

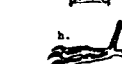
Types of Feet

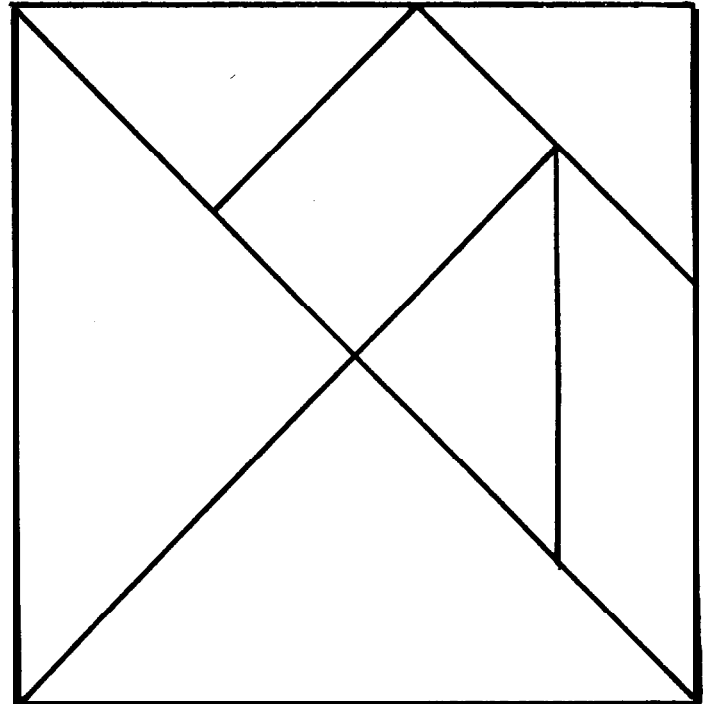
Even though birds travel mainly by flying, they can also walk. But birds use their feet for many other purposes besides walking.

Match the feet with the correct descriptions of what they are used for and how they look.

 <p>a.</p>	<p>1. SWIMMING--webbed (ducks, geese)</p> <p>(g)</p>
 <p>b.</p>	<p>2. WADING in water and soft mud--long straight toes and, usually, long legs (herons, sandpipers)</p> <p>(a)</p>
 <p>c.</p>	<p>3. GRASPING prey--long talons and curved feet (eagles, owls)</p> <p>(e)</p>
 <p>d.</p>	<p>4. PERCHING on branches--long curved toes for grasping (thrushes, crows, warblers, sparrows)</p> <p>(d)</p>
 <p>e.</p>	<p>5. SCRATCHING for food--three strong toes in front and a spur-like toe behind (chickens, grouse, ptarmigan)</p> <p>(b)</p>

Some birds have feet highly specialized for their needs.

 <p>f.</p>	<p>6. GRIPPING TREE BARK--two toes go forward and two back (woodpeckers)</p> <p>(c)</p>
 <p>g.</p>	<p>7. CLUTCHING ROCKS while walking under water--long thin toes (dippers)</p> <p>(h)</p>
 <p>h.</p>	<p>8. WALKING ON SNOW--toes covered with feathers (ptarmigan)</p> <p>(f)</p>



Unit Four

Birds - Bird Watching

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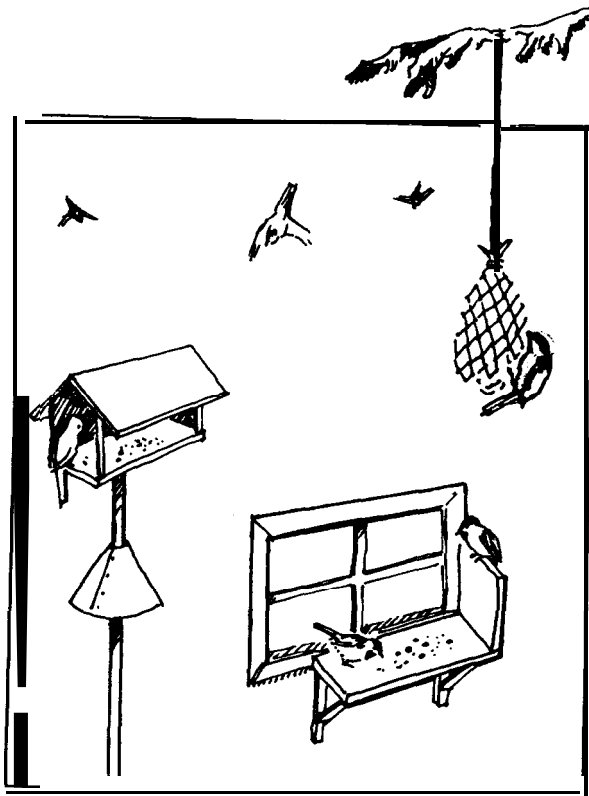
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Anyone can enjoy watching birds, but to become good at identifying them in the field requires careful observation and patience. Many of the nation's best birders began at the age of your students. Setting up a feeder is an especially good activity for beginning birders, because birds at a feeder can be observed at close range. Gradually, students will learn to identify birds at a distance and in flight.

Worksheet 4A

Make a Bird Feeder

If possible, build a bird feeder directly outside your classroom window. The Alaska Department of Fish and Game report Winter Bird Feeding in Alaska mentioned in the student book is an excellent source of ideas. Students can take turns recording data. They may want to design experiments as well. Put an owl picture in the window and see what happens. Play recordings of bird songs. Try different kinds of food, such as sunflower seeds versus a bird-seed mix. This can be done in one feeder at different times, or the students can set up a second (control) feeder.



Worksheet 4B

Field Marks

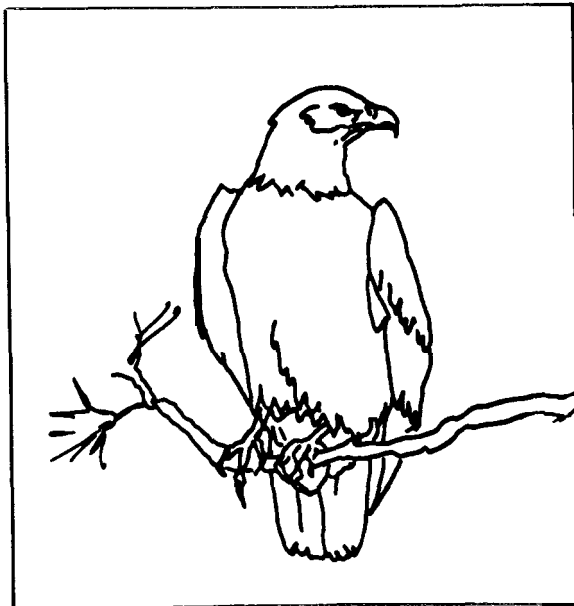
One of the most difficult aspects of birding is to remember what you see when you observe a bird, so that you can identify it later. This activity will help sharpen students' observational skills as well as their use of descriptive language.



Worksheet 4C

Name and Color these Birds!


You can make flash cards from bird pictures cut out of the student guide or magazines. Students can practice identifying them with binoculars. Have one student hold up the cards, while another at the back of the room uses binoculars to identify them. Most binoculars have both a center focus and an individual eyepiece focus. The individual eyepiece focus helps when one eye is stronger than the other. It remains on the same setting for an individual; if both eyes are the same, set it on zero. When a bird is spotted, look at it and raise the binoculars to meet it, then focus with the center focus. If you don't see the bird, circle around the spot with the binoculars. If you still don't see it, start over and look for it again without the binoculars.




4c

Name and Color These Birds!


Hint: Use your field guide. By deciding what group they're in first, you'll know better where to look in your guide.




Belted kingfisher




Tufted puffin



mallard

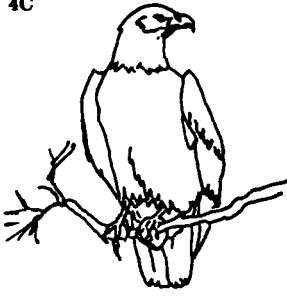


Ruby-crowned Kinglet




Pine grosbeak


4c




Bald eagle




Rufous hummingbird



Chimney swift



Common redpoll



Oldsquaw

Worksheet 4D

Alaska Bird Regions

Alaska has a great variety of bird habitats. Dr. Brina Kessel and Dan Gibson described six regions in their 1978 publication Status and Distribution of Alaska Birds (see bibliography); these regions are also used in Armstrong's Guide to the Birds of Alaska, and we make use of them in the student field guide at the back of this book. For this activity, students will need red pencils or crayons to color their region red. You may want to have an Alaska map available so that students can locate the names of communities in the different regions. Have your students write letters to classes in other regions, including questions about local bird life and other topics of interest. The following table may be helpful in your geographical studies.

4D

Alaska Bird Regions

Alaska can be divided into six regions. Each has a different climate, different vegetation and different birds.

- Label these regions using these terms: Central, Southcoastal, Northern, Southwestern, Southeastern, Western.
- Draw a dot on the map where you live. Write the name of your community by the dot. Color your region red.
- Your field guide at the back of the book has a map for each bird species, showing where it can be found in spring. The regions where birds are likely to be found are blackened on the map. However, just because a region is black on the map does not mean that a bird can be found anywhere in that region. It can only be found in the kind of habitat it prefers. For example, puffins are common in Southcoastal, Southwestern and Western Alaska, but that doesn't mean you're likely to see one wedding through downtown Anchorage! Puffins are found only in their preferred habitat of salt water and certain sea islands.

Some birds are much more common than others. The field guide maps are black for any bird that you are likely to see in a region, whether it is common or not very common.

Birdcatchers spend much of their time looking for rare birds. The maps are striped in regions where a bird is rare. The maps are white in regions where a bird is never seen. List six birds that you are likely to see in your region; three that are rare; and three birds that have never been seen in your region.

answers will vary

Likely to see:

raven	Robin	chickadee
rock dove	gray jay	redpoll

Rarely seen:

boreal owl	snow goose	crane
------------	------------	-------

Never seen:

rufous hummingbird	puffin	murre
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4. Now list six birds that are common to all regions of Alaska:

Tundra swan	raven	common snipe
old squaw	short-eared owl	pintail

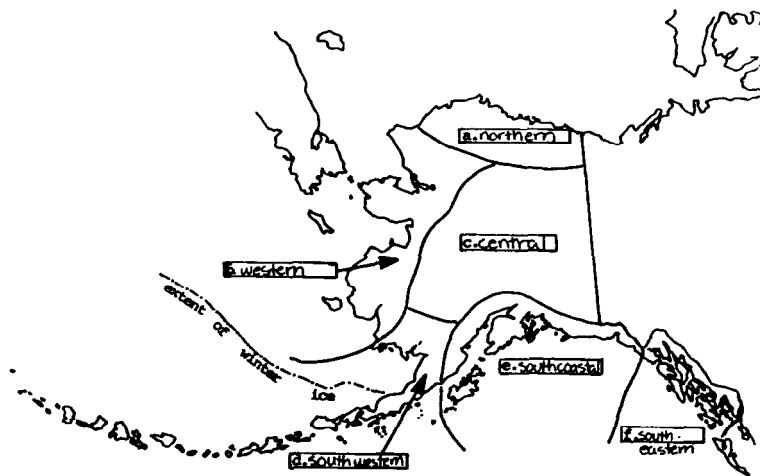


TABLE OF CHARACTERISTICS OF ALASKA BIRD REGIONS

	South-eastern	South-coastal	South-western	Central	Western	Northern
Weather						
Winter	cool-wet	cool-wet	cool-damp	cold-dry	cold-dry	cold-dry
Summer	cool-wet	cool-wet	cool-damp	hot-dry	cool-damp	cool-damp
Vegetation Types						
Wetland	Yes	Yes	Yes	Yes	Yes	Yes
Forest	Yes	Yes	no	Yes	no	no
Mountain Tundra	Yes	Yes	yes	Yes	Yes	Yes
Wet Tundra (wetland)	no	no	Yes	no	Yes	Yes
Length of Season						
(Open Water)						
Fresh Water	8-12 months	8-12 months	8-12 months	6 months	5-6 months	2-5 months
Salt Water	all year	all year	all year	none	8 months	6 months
Bird Abundance						
Summer	abundant	abundant	abundant	abundant	abundant	abundant
Winter	abundant	abundant	abundant	scarce	scarce	scarce
Numbers of regularly seen bird species (kinds)						
Summer Water Birds	85	106	105	64	104	72
Summer Land Birds	91	80	62	87	65	35
All Birds Summer	176	186	167	151	169	107
All Birds Winter	124	119	105	39	28	5

For all of Alaska, the total number of species, not including accidentals, is 355.

You may want to put the preceding chart on an overhead projector for your students, and ask them questions about it such as:

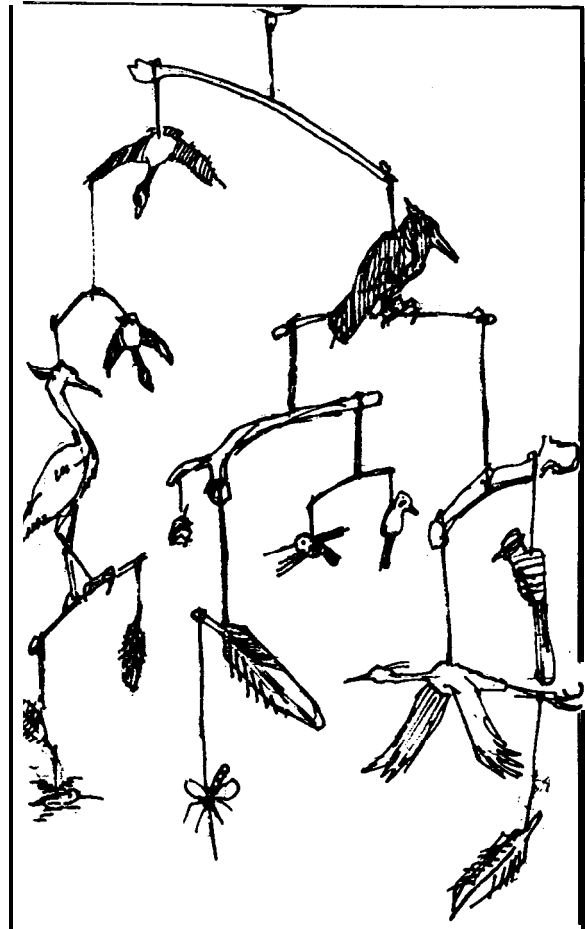
- How would you describe the weather in our region?
- What else can you find out about our region from the chart?
- What region has a hot summer? (Central)
- What region has the most species of birds in summer? (Southcoastal)
- What region has the fewest species of water birds? (Central)
- What region has the fewest birds in winter? (Northern)
- What region has the most species of water birds in summer? (Southcoastal)
- Is fresh water or salt water free of ice for the longer period? (salt water)

Additional Activities:

1. **Art:** Make a bird mobile. Cut out pictures of birds or bring in feathers and attach them with heavy thread to driftwood or pieces of coat hanger.
2. **Science:** Encourage students to be bird detectives. Many important discoveries about bird behavior have been made by people watching birds out their windows! (See "The New Art of Bird Reading" by Jean George, published in

both International Wildlife Mar./Apr. 1973 and Reader's Digest Mar. 1973. Here are a few ideas to get your students started:

- Which birds dominate at the feeder?
- What happens when an eagle or raven flies overhead?
- Where does each bird eat at the feeder?
- How does each bird come in for a landing?
- What happens on a sunny day compared to a rainy or snowy day?
- What happens when it's windy?



One book that may be particularly helpful during these migration studies is Bellrose's Ducks, Geese and Swans of North America (see bibliography). It has full-page maps of waterfowl migration routes.

For more information on what overwintering birds eat, see the Alaska Department of Fish and Game Wildlife Weather Reports No. 1 (Winter Bird Feeding in Alaska) and No. 2 (Landscaping for Wildlife in Alaska) by Sue Quinlan. A more comprehensive treatment is given in The Audubon Society Encyclopedia of North American Birds.

Additional Activities:

- 1. Geography, Science, Art :** Make a large classroom bird migration map. Have students trace the migration routes of several birds on the map with different-colored markers. See how many Alaskan birds you can track. But remind students that we don't know birds' exact migration routes. We can gain information by banding birds, but sometimes all we find out are the end points and general direction.
- 2. Language Arts :** Migration is a special time. Birds flying south in the fall are a sign that winter is coming; birds returning after the long winter seem to bring the spring with them. Have students look for poems about migration--and write their own. The English poet Ted Hughes has written an especially fine poem on the subject: (see next page)
- 3. Art, Geography :** Have students draw pictures of what birds see as they migrate over your community. Add pictures of what birds see en route, and attach with yarn to a bulletin board map of the bird's migration route.
- 4. Mathematics :** Use the migration map and scale to create math problems. Have students determine 1) the length of the oldsquaw's flight path; 2) how long it would take the oldsquaw, flying 40 miles per hour, to reach its wintering grounds; 3) how many days the flight would take if the bird flew nonstop; 4) how many days it would take if the bird flew eight hours a day and rested and ate the remainder of the time.
- 5. Physical Education, Mathematics, Geography :** Figure the migration distances flown by several different birds. Then have the class pick one bird. Adding up daily distances for the whole class, have the students try to run as far as the bird migrates. Mark your progress on the map. For example, if each of your 25 students runs a mile, then your bird has flown 25 miles for that day. You may need help from other classes, joggers, or cross-country team members to reach your bird's destination. Another alternative would be for your class to run every day for a week. Then have the students figure what fraction of the bird's migration route they have completed.

Unit Five

Bird Migration

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5A

Alaska Bird Migrations

Some reasons birds migrate (move from one part of the country to another) are:

- To find food
- To find places to nest
- To avoid cold weather
- To find open water (not frozen or dried up)

In Alaska there is lots of food for birds in summer. In winter there is less food for birds.

List some kinds of food birds can find in Alaska in the summer that are not available in winter when the water is frozen and snow covers the ground.

1. insects
2. worms
3. fish
4. berries

Where do birds go in winter? The following map shows half the world. The circled numbers on the map mark the migration beginning and end points of some Alaskan birds. The 1's mark the flight of the robin. Robins have been seen in all regions of Alaska in the summer. Connect the 1's with a red line to show the robins route. Where do robins winter?

5. California or Florida

The 2's mark the beginning and end points for the barn swallow, which is found in southcentral and southeastern Alaska in the summer. Connect the 2's with a blue line. Where does the barn swallow winter?

6. Argentina, Chile

The oldsquaw duck can be seen in all regions of Alaska in the spring. Connect the 3's with a black line. Where does the oldsquaw winter?

7. Siberia or California or NY

(Some oldsquaws also winter in Prince William Sound and Southeast Alaska.)

The migration of birds has been an endless topic of fascination. How do birds manage to travel so far time after time? Birds travel without road signs, restaurants, or travel guides.

Worksheet 5A Alaska Bird Migrations Worksheet 5B Bird Wintering Areas Worksheet 5C Alaska Bird Migration Map

The Alaska Bird Migration Map, worksheet 5C, is needed for both exercises in this unit. Students will also need colored pencils and narrow felt-tip markers or crayons.



Bird Wintering Areas

5B

Each bird description in your field guide includes a category called "Wintering Area." Look in your field guide to find out where some of the birds you know migrate to for the winter. Write each bird's name and where it goes for the winter on the table below. Then draw lines on the map to show the migration routes. Number the lines on the map to match the numbers on the table.

answers will vary

Name of Bird	Wintering Area (Where Bird Goes in Winter)
1. <u>Tree swallow</u>	<u>California to Panama</u>
2. <u>Mew gull</u>	<u>Coastal Alaska to California</u>
3. <u>Black-capped chickadee</u>	<u>Central + southern Alaska</u>
4. <u>Downy woodpecker</u>	<u>coastal Alaska to Washington</u>
5. <u>Boreal owl</u>	<u>central America</u>
6. <u>pine grosbeak</u>	<u>Japan</u>

Answer the following questions using your field guide.

- Name two birds that can be found in all regions of Alaska in the winter:
raven willow ptarmigan
- Name four birds that winter in Japan:
common redpoll glaucous-winged gull
old squaw snow bunting
- Name one bird that winters in New Zealand:
golden plover
- Name one bird that winters in Africa:
wheat ear
- Which bird migrates furthest south?
barn swallow



5B

- Find or draw a picture of a bird or birds that stay in your area winter. Put the picture here. Label your bird.

answers will vary

- List some other birds that stay in your area all winter. What have you seen them eating? answers will vary

Name of Bird	Eat in Winter
<u>Rock dove</u>	<u>seeds on snow</u>

Unit Six

Wetland Habitats

Index:

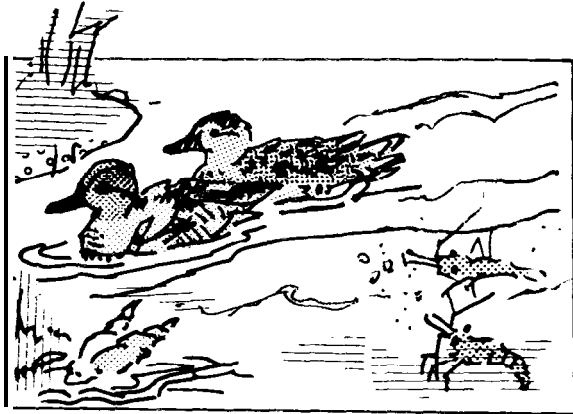
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Alaska is more than 85 percent wetlands. Look at the number of ponds, rivers, sloughs, streams, lakes, and freshwater marshes on a detailed map of the state--not to mention the 34,640 miles of coastline with its estuaries, salt marshes, tidelands, river deltas, and barrier island lagoon systems.

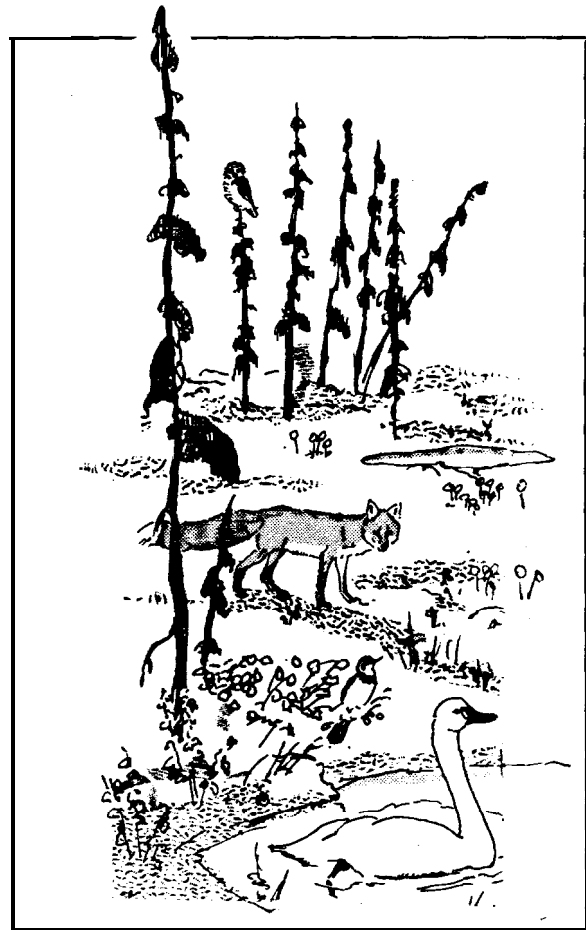
Wetlands are highly productive biologically, producing more biomass per acre than our best farm fields. Alaska's wetlands provide food, water, and cover for fish and wildlife, and food and recreation for people. Alaskans visit wetlands to pick berries or to fish, to hunt moose, bears, ducks, and

geese, to trap muskrat and beavers, and simply to watch and enjoy the wildlife. Wetlands function in other ways useful to humans: they help control floods, buffer storms, improve water quality, and provide drinking water.

In Unit 11, we'll discuss the ways in which wetlands benefit us. For now, let's take a closer look at what a wetland is.



Alaska's wetlands are wet most of the summer and support plants and animals that prefer wet soil. In this book we talk about four categories of wetlands: coastal wetlands; wet tundra; rivers, lakes, and marshes; and muskeg. (These divisions basically follow the classification system used in the Alaska Department of Fish and Game's Wildlife Week materials by Sue Quinlan--see bibliography. We have used the Water, Wetlands, and Wildlife volume of the Wildlife Week program extensively in preparing this unit.)



These four types of wetlands are tied together by the water cycle. Water falls on land as rain and snow, then heads slowly toward the sea. Some water collects in low-lying areas, where it creates lakes, ponds, puddles, and soggy land. The rest flows in rivers to the sea; surface sea water evaporates and collects in clouds; clouds blow inland; and the water falls again as rain or snow.

Worksheet 6A

What Makes a Habitat?

The concept of habitat is very important. Plants and animals need their habitat (or home) to provide the right amount of food, water, and safe cover. The single greatest threat to wildlife is loss of habitat. As towns, roads, and industrial developments spread, the ranges of animals like caribou, bears, and waterfowl are reduced dramatically. Some species are able to co-exist with people; others cannot adapt to human encroachment. Mallards will return to a lake that is being built up. Trumpeter swans, by contrast, although they may tolerate some human activity, will not nest on a lake that is being crisscrossed by motorboats.

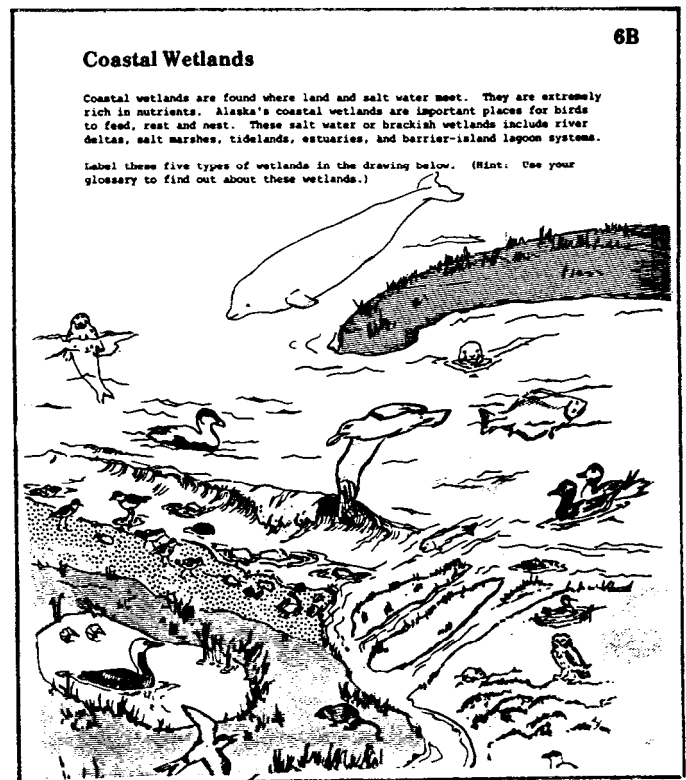
Birds nest in many different kinds of habitat, but the summer nesting birds in Alaska concentrate in the wetlands; the river flats and tundra. Millions of migratory birds nest and raise their young in Alaska, primarily in these biologically rich wetland areas. If too much of this key habitat is destroyed, they will have no place to go.

For designing a wetland logo, students will need colored pencils, crayons, or narrow felt-tip pens, scissors, cardboard, glue and safety pins. Students may want to sketch their logos in their books, then draw them again on a separate piece of paper. After coloring, they can cut the logos out, paste onto cardboard, attach safety pins, perhaps glue on ribbons, and wear as badges.

Worksheet 6B

Coastal Wetlands

Alaska's coastal wetlands, where nutrient-laden river water meets the salt water, are biologically among the most productive areas in the world. They are important feeding, resting, and nesting habitat for astonishing numbers of migratory birds. Coastal wetlands take different forms: river deltas, salt marshes, tidelands, estuaries, and barrier island lagoon systems. Every small delta and salt marsh is an important link in the chain of wetlands that enables birds to migrate from as far away as South America and Polynesia to arctic Alaska. Most migratory waterbirds--from swans to sandpipers--stop in wetlands to rest and eat in preparation for the next leg of their journey. They also need wetlands all along their route for shelter during storms.



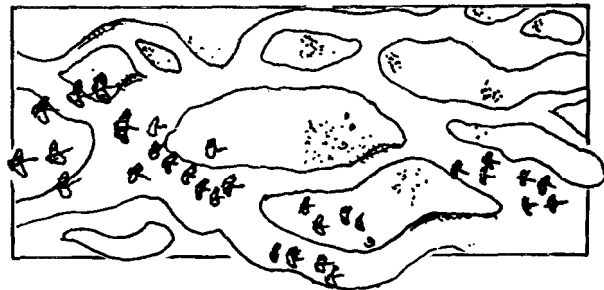
DELTA

Migratory birds are found in all of Alaska's coastal wetlands, but certain areas are particularly important to large numbers of birds. For example, the delta at the mouth of the Stikine River in southeast Alaska is a migration stopover for thousands of snow geese, trumpeter swans, ducks, and shorebirds (or waders). Other major coastal wetlands in the state include the Copper River Delta, the Yukon-Kuskokwim Delta, Izembek Lagoon, and the North Slope's barrier island lagoon system.

The Copper River Delta in southcentral Alaska is a stopover and feeding ground for thousands of sandhill cranes and nearly 20 million shorebirds, including the entire world population of western sandpipers and most of the red knots and dunlin in North America. These birds rest and feed in the delta before flying farther north and west to nest in other Alaskan wetlands. They use their long bills to probe deep in the estuary mud for tiny clams, worms, and other invertebrates. The Copper River Delta includes not only extensive mud tidelands used by shorebirds, but also salt marshes and a series of sloughs among the freshwater ponds and marshes heavily used by ducks, geese, and trumpeter swans. Offshore sandbar islands provide nesting habitat for glaucous-winged gulls, and a protected lagoon system used by salmon, seals, and sea otters.

In western Alaska, the Yukon-Kuskokwim Delta area, where wet tundra on the inland delta intergrades with rich coastal estuaries, is one of world's most important bird nesting areas. This delta alone is the nesting ground for

nearly two million waterfowl and an estimated 100 million shorebirds, including most of the western sandpipers, dunlin, and black turnstones in North America. It is important habitat for sandhill cranes, tundra swans, and three of Alaska's most beautiful ducks: the common, spectacled, and Steller's eiders. Nearly the entire world population of emperor geese and cackling Canada geese, and most of the Pacific flyway white-fronted geese and brant, nest in this area. Unfortunately, these goose populations have declined dramatically in the past few years. Biologists and interested people living all along the flyway have been joining forces to help protect them.



BARRIER ISLAND LAGOON SYSTEMS

Along the North Slope and in a few places in western and southwestern Alaska, long, narrow gravel barrier islands separate the sea from the mainland. The islands protect the lagoons from icy winds, rough seas, and the harsh scouring of pack ice. The lagoons are rich, like other coastal wetlands, because of the continuous deposit of silt and detritus (dead organic matter) by rivers and streams. The lagoon water warms up more quickly than open sea water, and the barrier islands provide nesting sites free from predators such as arctic foxes, which can't cross the lagoon waters. Molting waterfowl utilize the protected waters; Simpson Lagoon in northern Alaska is

crowded each summer with over 100,000 molting oldsquaw ducks.

The protected lagoons are important stopover places for migratory birds such as common eiders, arctic terns, and brant. Most of the western North American population of brant stop to rest in Izembek Lagoon on the Alaska Peninsula, and to feed on the eelgrass in the shallow water, before making their two-and-one-half-day nonstop flight to Baja California. Most of the world population of Steller's eiders and emperor geese also gather in Izembek Lagoon during fall, and remain in Alaska throughout the winter.

Invertebrates that live in lagoon mud are also food for fish and gray whales. Many fish overwinter in lagoon channels where a bit of open water remains during winter. Belukha whales, and ringed and spotted seals, spend much of every summer preying on fish that live in the lagoons.

The barrier islands off the Copper River Delta are sandbar islands. This barrier island lagoon system is very rich and productive, supporting large populations of fish, shellfish, marine mammals and birds. The islands are important nesting areas for thousands of glaucous-winged gulls. Most dusky Canada geese (a subspecies of Canada) nest on the Copper River Delta. But some of these duskies are starting to nest on the islands as the predator population, consisting primarily of brown bears, increases on the mainland.

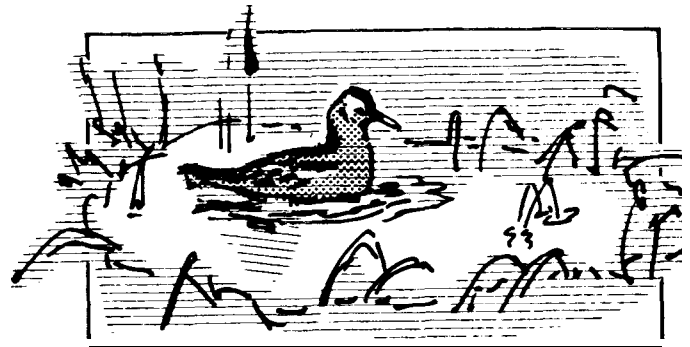
(The above material is drawn largely from Sue Quinlan's description in Water, Wetlands, and Wildlife, p. 9; Unit 2 of Wildlife Week.)

Worksheet 6C

Estuary: A Very Special Place

Estuaries, a type of coastal wetland, form where rivers meet the sea. The term includes the mouth of the river or stream, along with the bay and adjacent marshes, tideland, and river delta. Salt water and fresh water mix in warm shallow water and support an extremely high level of productivity. Scientists call this a "nutrient trap." The lighter, fresh river water flows over the heavier ocean water. The salt water moving in from below creates a circular motion that traps the nutrients. Twice a day, the rising tide from the ocean sends these nutrients surging over the marsh. And the ebb tide returns nutrients to the bay.

Nutrient-rich water draining into coastal wetlands enriches sea water and provides a rich nursery ground for marine fish and invertebrates. Clams, crabs, and abalone are among the great variety of marine animals that use estuaries during part of their lives. Most of the animal species that we harvest from the sea in Alaska depend on estuaries.



Estuary: A Very Special Place

Directions: Fill in the blanks with these words: fish, nurseries, productive, coastal wetland, plankton, fertilize, sea, fresh water, salt marshes, tidelands. (Hint: check to see whether the sentence needs a noun, verb, or modifier.)

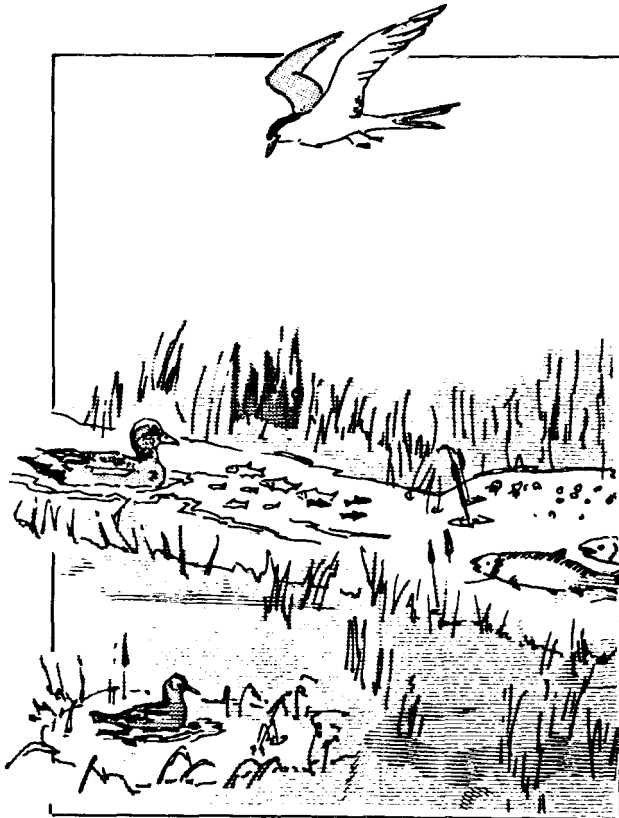
Estuaries are very special places. Estuaries are one kind of coastal wetland. An estuary is where a river or stream meets the sea. Estuaries include bays, river, and inlets and the surrounding salt marshes and tidelands. Estuaries are extremely rich and productive places. Salt water and freshwater mix in warm, shallow areas. Nutrients from the river and the sea are blended together. This is just right for growing a thick plankton soup. Plants and animals grow in enormous quantities. Many waterfowl, mammals, and fish use estuaries as nurseries for their young. And the tide carries nutrients and detritus (dead plant and animal matter) out to sea to fertilize offshore waters. So deepwater fish benefit from estuaries, too.

answers below will vary.

1. What is the name of the estuary nearest to your community?

2. How many miles is it from your village or town to the estuary?

3. Why is the estuary important to you?



**Worksheet 6D
Wet Tundra**

Wet tundra is found over most of northern and western Alaska. Some of the areas covered by wet tundra receive only 8 to 10 inches of rain and snow per year--desert conditions. But in spite of the low precipitation, these areas are classified as wetlands because of the permafrost--permanently frozen ground--beneath the surface. Water can't soak into permafrost, so when the few inches of winter snow melts, the water remains at the surface and covers the tundra with a sheet of water.

Wet Tundra

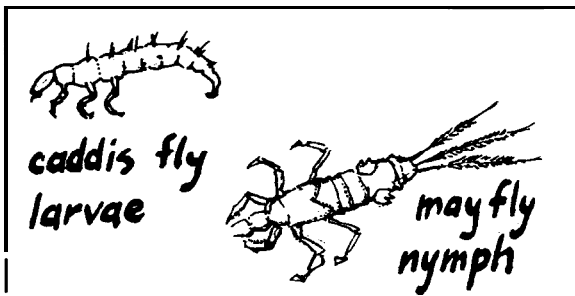
Wet tundra is found in northern and western Alaska and in some mountain valleys. Wet tundra is a flat wetland that is very important for birds. Millions of birds nest and raise their young on wet tundra. Caribou, arctic fox, wolves, arctic hares, and lemmings also live on the wet tundra.

Draw arrows showing what eats what in the drawing below. This is called a food chain. Animals that eat plants are called herbivores. Color the herbivores green. Animals that eat other animals are called carnivores. Color the carnivores blue. Animals that eat both plants and animals are called omnivores. Color the omnivores orange. (Hint: You may need to talk to an elder or a biologist, or look in a book to find out what these animals eat.)

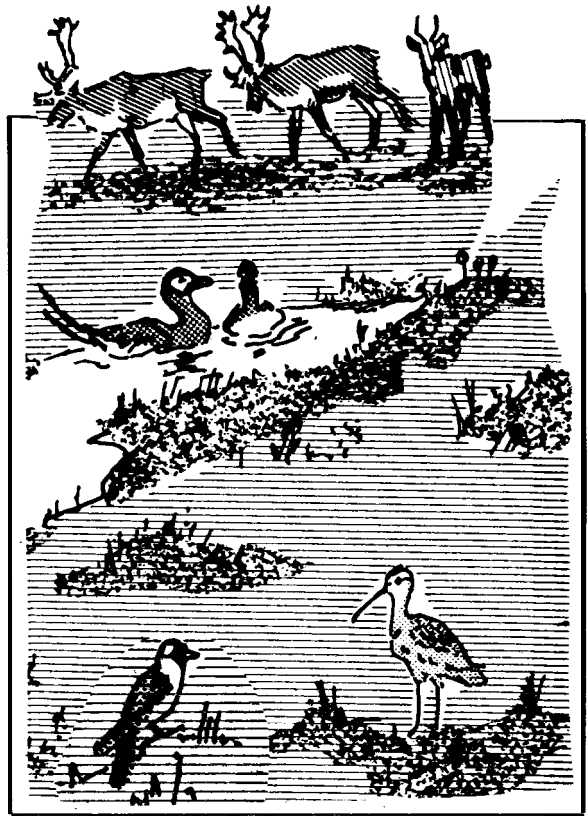


In winter, there is not much wildlife on the tundra. Caribou paw out craters in the snow to reach lichens, sedges, and shrubby plants that are buried beneath wind-drifted snow. Lemmings and voles tunnel beneath the snow and also eat the previous summer's plant growth -- grasses, sedges, willows, and mosses. Ptarmigan, tundra hares, and beaver also over-winter, as well as predators including wolves, foxes, weasels, ravens, and gyrfalcons.

In summer, however, the wet tundra areas teem with life. Cotton-grass and other sedges, berry plants, and other tundra plants grow quickly during the 24-hour daylight of the arctic summer. Insects, including blackflies, mosquitoes, and springtails, flourish, using the ample ponds and puddles for their larval stages.



These insects are the prime source of protein for the millions of migratory birds that raise their young on the tundra. Alaska's wet tundra areas are important nesting grounds for brant, Canada and greater white-fronted geese, three types of eiders, oldsquaw, and other ducks. During years of drought, even more ducks, millions of them that usually nest in Canada, come north to Alaska's wetlands. Without our wetlands, these birds could not survive dry summers.



Wet tundra is critical habitat for many waders, such as western and semipalmated sandpipers, phalaropes, dunlins, and whimbrels. These birds lay eggs and raise their young in just two short months.

Other nesting birds on wet tundra include swans, loons, parasitic jaegers, snowy owls, and short-eared owls.

Wet tundra is also crucial for thousands of geese after the nesting season. Brant, Canada geese, and greater white-fronted geese migrate to large wet tundra lakes to molt their wing feathers. During the few weeks they are unable to fly, the geese feed on the rich sedge meadows and escape predators by swimming offshore in the lakes.

(The above description was adapted from Sue Quinlan's Water, Wetlands, and Wildlife, p. 6.)

Worksheet 6E

Rivers, Lakes, and Marshes

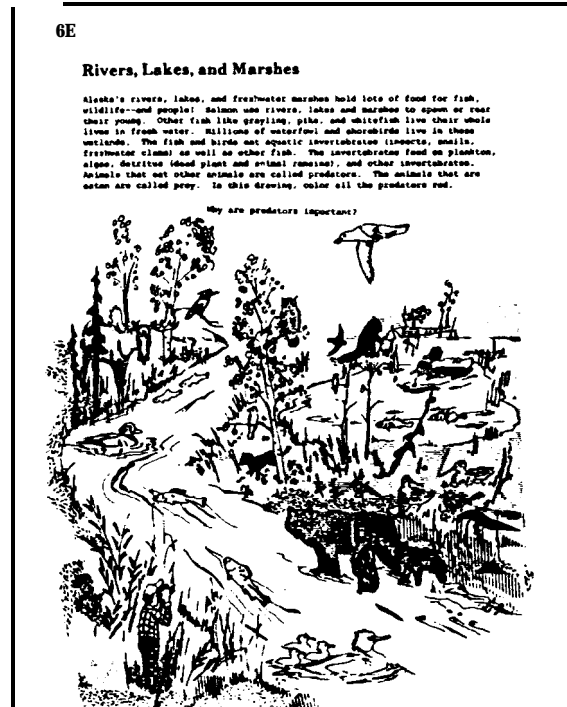
Water from Alaska's vast expanses of muskeg and wet tundra seeps and flows into low-lying areas to form rivers and lakes. Freshwater marshes form along the riverbanks and lake shores. Detritus from these marshes provides nutrients for the plants and animals that live in the rivers and lakes.

This detritus is eaten by aquatic invertebrates such as snails, clams, and the larvae of mayflies, stoneflies, blackflies, and caddisflies; They are also eaten by some fish, such as rainbow trout and Dolly Varden. Young silver salmon feed on detritus, algae, and plankton. Other kinds of fish, such as red, pink, and king salmon fry, feed on detritus-eating animals. Since most salmon fry spend one to three years in fresh water before migrating out to sea, their survival depends on detritus in our streams.

Other wildlife that depend on this aquatic food chain include river otters, mink, brown bears, water shrews, spotted sandpipers, yellowlegs, bald eagles; ospreys, and kingfishers. Although these animals live mainly on land, they need the food resources of rivers and lakes in order to survive.

Algae are the most common lake and river plants. Pondweeds are found in the slower sections of rivers, throughout ponds, and along the shallower portions of lakes. Marshes are characterized by soft-stemmed plants: grasses, sedges,

and rushes. Cattails are common in Interior Alaska. Beavers create a lot of marsh habitat as they dam up streams and sloughs.



Rivers, lakes, and the surrounding marshes have been used as important sources of food throughout human history. Villages are traditionally located along river banks or lake shores. Today, as they always have been, rivers and lakes are vital avenues of transportation, for boats and floatplanes in the summer, and for dog teams, snowmobiles, and ski-planes in the winter. Commercial, sport, and subsistence fishing depends on the salmon runs up Alaska's network of mighty rivers and lakes. These wetland areas support a tourist industry as well; people travel from all over the world to photograph, fish, hunt, and observe wildlife.

(This description is based on Sue Quinlan's Water, Wetlands, and Wildlife, p. 9.)

Worksheet 6F

Muskeg

Muskeg is another word for bog. It is a type of freshwater wetland that occurs below tree line on low-lying lands in Alaska. Lakes and ponds are scattered throughout the muskeg.

Common muskeg plants include sphagnum moss, blueberries, cranberries, willows, Labrador tea, sundews, dwarf birch, and small trees like black spruce in Interior Alaska, mountain hemlock in south-coastal Alaska, and lodgepole pine in southeast Alaska--all plants that thrive in areas where the ground is covered or filled with water. The muskeg ground is composed of a thick layer of peat (decayed plants, primarily sphagnum moss), which in some places may be 40 or more feet thick. Peat soaks up water, so walking on muskeg in summer has a spongy quality.

Millions of ducks, especially northern pintails, American wigeon, lesser scaup, surf scoters, and white-winged scoters nest in and near the muskeg of the Yukon Flats, Minto Flats, and Tetlin. These areas are among the most important duck-breeding areas in North America. During years when the prairie potholes are dry; even more ducks than usual arrive from Canada and the northcentral United States.

Many Canada and greater white-fronted geese, as well as loons, grebes, and mergansers make their nests on muskeg lakes. Sandhill cranes dance their courtship displays and raise their young on

6F

Muskeg

One sign of a muskeg or bog is lots of sphagnum moss. As the sphagnum moss dies and decays, it turns into peat. This peat is sometimes 40 or more feet thick! Walking on a muskeg in summer is like walking on a great big sponge. You sink in and the ground goes "squish." Common muskeg plants are sphagnum moss, blueberries, cranberries, willow, sundew, sedge, Labrador tea and small trees like black spruce. Small ponds, puddles, and lakes are common in muskeg. The water is often acidic. As in most habitats, birds and animals tend to blend in with their surroundings. We say they are camouflaged. Color this drawing so that the birds are camouflaged.



muskeg wetlands, too.

Muskeg wetlands provide habitat for black bears, moose, muskrat, mink, beaver, red fox, marten, wolves, coyotes, and deer. People go to these areas to pick berries, fish, hunt, trap, and to observe and photograph wildlife.

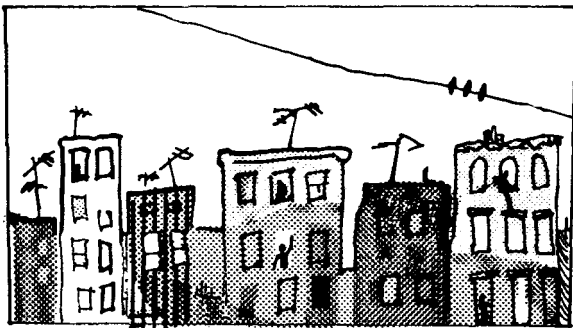
(Again this description is based on Sue Quinlan's Water, Wetlands, and Wildlife, p. 6.)

Worksheet 6G

Other Bird Habitats

Birds are found everywhere. Discuss with students the fact that different birds prefer different habitats--just like people. Some people like Interior Alaska best, other people like coastal Alaska, and others like the lower 48 states, Hawaii, or foreign countries. Similarly, some birds live deep in the forest, others are found only high in the mountain tundra, and others live on cliffs. Although we have emphasized wetlands habitat in this book, both because wet lands make up the bulk of Alaska and because wildlife tends to be heavily concentrated in wetlands, students who want to look for woodpeckers will have to look in the woods, and those who want to see wheatears will have to go up into the dry mountain tundra where wheatears build their nests.













Wildlife tends to be most abundant on the border between two types of habitat--where the forest touches the edge of a marsh, for example. At the junction you will find birds and animals from both types of habitat. This is known as the "edge effect," and is a good concept to introduce to students.

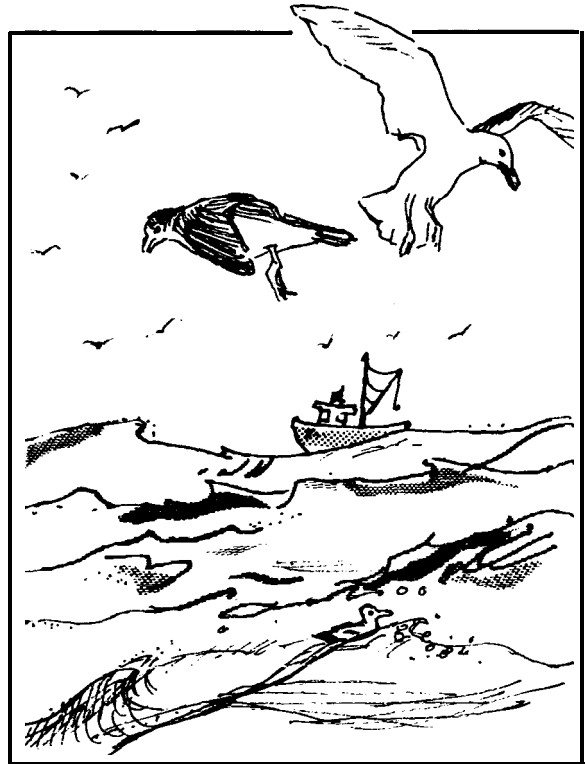


6G

Other Bird Habitats

In addition to wetlands, there are other kinds of bird habitats in Alaska. Match the pictures of these habitats with their descriptions--and with the birds that live in them (color matched sets, or cut out and paste, or connect with lines).

<p>Alder and willow are found along rivers and creeks. Birch-elder-willow thickets are found in mountain areas.</p>		 <p>Rain Forest</p>
	 <p>Cliffs and Rocky Areas</p>	<p>Some seabirds and diving ducks spend all their life at sea. They just come ashore to nest.</p>
 <p>Man-made Areas</p>		<p>White spruce, birch, aspen and spruce-fir trees--mixed with alder and willow bushes--are found in Interior Alaska. They provide some sites and food for a great variety of birds.</p>
	<p>Rocky islands and cliffs along the shoreline provide safe nesting sites for seabirds and shelter for sea mammals.</p>	 <p>Ocean</p>
	 <p>Shrub Thicket</p>	<p>White spruce are the great trees of this coastal forest. Sometimes they grow more than 200 feet high--baldock, alders, poplars and hemlock also grow among the white spruce.</p>
 <p>Spruce-Hardwood Forest</p>	<p>People built roads, homes, schools and stores to make this habitat.</p>	



Worksheet 6H Habitat Choice

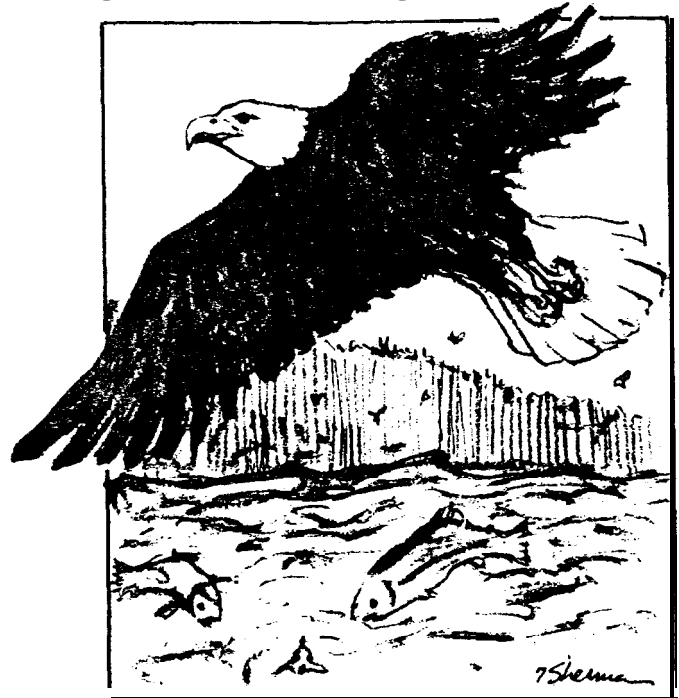
This activity provides students a chance to do some writing on their own, and to review what is covered in this unit.

Additional Activities:

1. **Art, Science, Language Arts:** Divide class into small groups to investigate wetland habitat types. Make murals of local wetland types, labeling cover (shelter or nesting site), food and water. Use string to connect the food with the organisms that eat it. Draw the sun, which provides energy to plants.
2. **Language Arts, Science:** Draw a chart on the board comparing two different wetlands--wet tundra vs. muskeg; estuary vs. freshwater marsh; and so on.
3. **Physical Education, Science:** Eagles eat fish, and fish eat insects. Let students choose to be insects, fish, or eagles. On a signal from the teacher, the eagles try to tag the fish, while the fish try to tag the insects. If an eagle catches a fish, the fish turns into another eagle, and if the fish catches an insect, the insect turns into a fish. After a few moments, stop the play. Any of the original eagles who have not caught a fish die and fall into the stream, where they are eaten

by the insects; in the next round of play, they turn into insects. Start game up again.

What happened? If you started with lots of eagles, were they all able to get enough food? Have the students reassign themselves in a way that will result in having some of each creature at the end of the game. They should discover that there needs to be a lot of insects, some fish, and a very few eagles. Not only do the eagles need the fish, but the fish also need the eagles. If there weren't any eagles to control the fish population, the fish would wipe out their food source (the insects), and starve. Similarly, without fish to keep their numbers in check, the insects would overpopulate and wipe out all the plants that make up their food source. Discuss how this game reflects the situation in the real world. What are the game's shortcomings?



4. **Language Arts, Art, Science:** Have students each choose a bird they would like to have live in their area. Have them list the habitat needs of that bird (refer to student bird guide). From this list have them write an ad for the newspaper or make a poster advertising their neighborhood or village as a prime site for a home-hunting bird.
5. **Physical Education, Science:** You'll need blindfolds, chalkboard, chalk, string, a sign that says "predator," and a sign that says "prey." Ask the class to name some regional predators and their prey. Write these pairs on the blackboard. Have two volunteers play the role of one of these pairs. Each person must wear the appropriate predator or prey sign. Clear a large space in the middle of the room. Blindfold the student who is acting as prey and place her some distance from the predator. Have the predator try to approach its prey stealthily. If the prey senses the approaching predator, she should point in his direction. If the predator is thus "spotted," the game ends and a new pair is chosen. A variation of this game would be to place the blindfold on the predator, spin her around, and tell her to locate the rabbit (hare) who must remain in place (al though she may make squeaky, scratchy rabbit (hare) noises if she wishes.)

A particularly rousing and uproarious version of the game follows: clear a large space in the middle of the roan.

Have the students form a large circle. In the middle of the circle place a blindfolded predator and a blindfolded prey. Gently spin each around. The predator will then begin to stalk the prey. The predator must occasionally make hungry noises (growls and lip smacking) and the prey must also make appropriate animal noises from time to time. These auditory cues will help them alternatively approach and avoid each other. After four or five pairs of students have played the predator-prey game, interest will be high for a class discussion concerning the qualities of successful predators (especially quick reflexes, good hearing and smell, overall physical strength). Also discuss ways in which prey protect themselves (speed, immobility, protective coloration, offensive odors). (Described by Barb Tervo, Selawik Elementary School, Selawik.)

6. **Language Arts:** Have students try to find as many names as possible for wetland habitats and define these names. Their list should include:

Freshwater wetlands - -marsh, swamp, bog, muskeg, pond, lake, river, stream, creek, brook, island, mudflat, point, peninsula.

Saltwater wetland- -tideland, reef, island, cove, inlet, bay, point, estuary, salt marsh, peninsula, lagoon, slough.