Learn About Seabirds

DEAR EDUCATOR,

The U.S. Fish and Wildlife Service believes that education plays a vital role in preparing young Alaskans to make wise decisions about fish and wildlife resource issues. The Service in Alaska has developed several educational curricula including "Teach about Geese," "Wetlands and Wildlife," and "The Role of Fire in Alaska." The goal of these curricula is to teach students about Alaska's natural resource topics so they will have the information and skills necessary to make informed decisions in the future.

Many species of seabirds are found in Alaska; about 86 percent of the total U.S. population of seabirds occur here. Seabirds are an important socioeconomic resource in Alaska. Seabirds are vulnerable to impacts, some caused by people and others caused by animals. The "Learn About Seabirds" teaching packet is designed to teach 4-6 grade Alaskans about Alaska's seabird populations, the worldwide significance of seabirds, and the impacts seabirds are vulnerable to.

The "Learn About Seabirds" teaching packet includes:

* A Teacher's Background Story
* 12 teaching activities
* A Guide to Alaskan Seabirds
* Zoobooks Seabirds
* A full color poster - Help Protect Alaska's Seabirds

Topics that are covered in the packet include seabird identification, food webs, population dynamics, predator/prey relationships, adaptations of seabirds to their habitats, traditional uses by people, and potential adverse impacts to seabirds and their habitats. The interdisciplinary activities are sequenced so that important concepts build upon one another.

Training workshops can be arranged in your region to introduce these materials to teachers and other community members. Please contact the Education Coordinator at the address below to request a workshop. Those schools receiving a workshop will also receive one copy of each of the following:

* A seabird slide set
* "Trashing the Oceans" video
* A NOAA marine debris information packet

As we developed this packet we solicited ideas and information from many different sources. We contacted seabird specialists, land managers, and school districts in coastal areas across Alaska. They were invited to participate in the development of the packet so that the materials would accurately portray Alaska's seabird resources and issues. Draft materials were piloted in a variety of schools and suggestions were incorporated in the final version. We would like to find out how the packet worked in your teaching situation. Suggestions will be incorporated in future printings of this packet.

Your comments are important. An evaluation sheet is included on the following page. Please fill it out and let us know what you think!

We hope that "Learn About Seabirds" will benefit young Alaskans and our seabird populations for many years to come. If you have questions or suggestions about this packet, please contact: Education Coordinator, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, Alaska 99503.

Thank you for teaching about Alaska's seabirds!

(Second printing, May 1995)

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Alaska's Seabirds

A Teacher's Background Story

Can you imagine what your students will say if you ask them to name all the Alaskan communities with populations of a million or more? It's almost a secret that Alaska has some communities with a million residents along its coast. Communities that are four to five times the size of Anchorage. And not one automobile in any of them — all the residents are flyers. Know the secret? These are seabird communities!

Each summer birds that live the rest of the year on the open ocean come ashore to nest, often in noisy high rise cliff communities where each kind of bird returns to its own special neighborhood — boulder beaches, ledges, log piles, cliff tops, old trees, even caves or crevices inside the rocks and earth of the cliff.

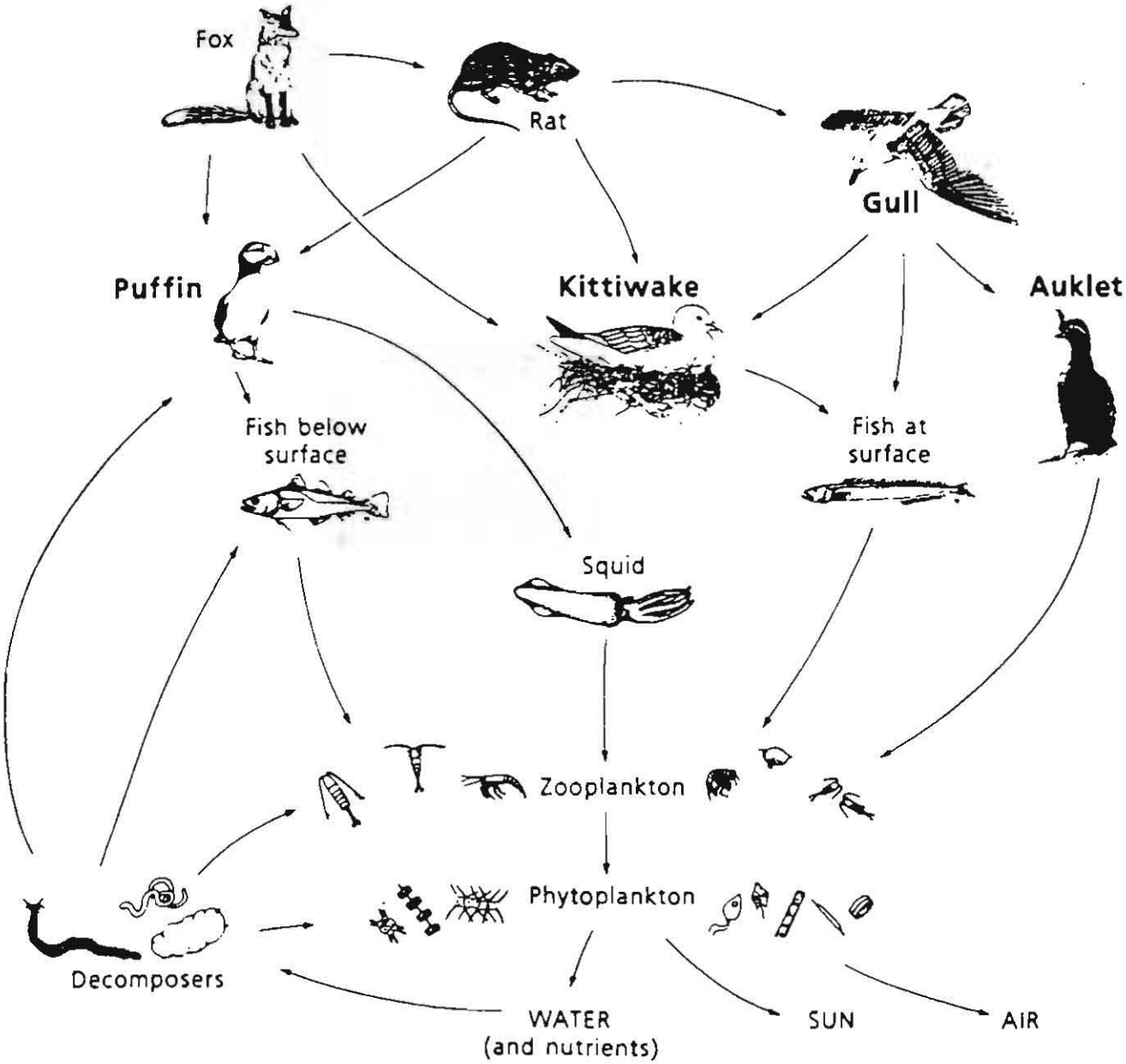
As the accompanying *Zoobooks Seabirds* (page 1) says, seabirds are birds that spend most of their lives at sea, in the marine environment. Unless it is nesting, a seabird needs nothing from land. Its food, water, and daily shelter (basic requirements of all life) come from the ocean. Some large seabirds (albatroses) may even spend three years at sea before touching land. But no one has figured out how to hatch an egg on an ocean wave ... so, to survive as a species, seabirds must find solid, dry places to nest. While nesting, a seabird returns frequently to the ocean for food for itself and soon for its hungry chick. Seabirds know the ocean currents and the air currents above the waves as we humans know our grocery store aisles and subsistence places.

Alaska has 35 kinds of seabirds that try to raise families along its coastline. Eight of these are found only between Alaska and the Asiatic coast. All of these and five more "visiting" seabirds are illustrated and described in the accompanying red booklet, *A Guide to Alaskan Seabirds.*

FOOD WEB

Where do seabirds fit in the marine ecosystem? Here is an illustration of part of Alaska's marine **food web**. As on land, all energy begins with the sun. A food web weaves together many **food chains** (who eats what) to form the Big Picture of what happens as energy passes through the ecosystem. This web shows the relationship between **producers** (plants make their own food by transforming light energy) and **consumers** (organisms that carry this transformed energy up the food chain) and between **predators** (who hunt) and **prey** (who are hunted).

This web goes full circle, from life to death, by showing the **decomposers** (bacteria and worms) that feed on all dead plants and animals, releasing energy and nutrients – all matter is recycled in an ecosystem. Shellfish include crabs, mussels, and clams. Note that seabirds help to recycle marine nutrients through their guano which fertilizes the water and land around their nesting colonies.



Marine Food Web
Arrows point to what each species eats.

Habitat

Summer Nesting

When it's nesting time, what do seabirds need? A place close to the ocean (except for some gulls, murrelets, and the arctic tern that can nest and find food far inland). Coastal bluffs, rocky cliffs, and islands free of land predators are necessary. There's safety in their remoteness and isolation. And wind currents are strong in these places — important for birds that are graceful in their ocean environment but clumsy on land. They have a hard time landing and taking off, so a cliff gives them clear sailing (or falling) until they can catch a wind current.

And they choose places where hundreds, thousands, or even millions can all nest, packed together — because there is safety in numbers. And the mass of activity helps to encourage nesting behavior. These closely packed groups of nesting birds are called **colonies** (see the accompanying poster).

How do so many seabirds sort themselves out in those huge colonies? Each has staked its own preferred **habitat** (see next page), often returning to the exact place it nested last year! Some prefer beaches, hiding among rocks or drift wood (guillemots). Some like wide ledges where many of their kin can nest wing to wing (murres). Others prefer narrow, single family ledges (kittiwakes, fulmars). One kind of puffin (tufted puffin) digs a dirt burrow for its nest chamber while its cousin (horned puffin), usually hatches its egg inside cracks in the cliff face or in piles of boulders.

Several seabirds avoid the mob scene of cliff colonies, but two in particular do things really differently. Kittlitz's murrelet pairs nest alone inland in rocks found on mountainsides. The marbled murrelet, in the news recently (see clippings), may nest more than 10 miles inland in a most unusual spot — on the broad, mossy branches at the tops of ancient trees in old growth forests and on the ground. Its numbers are decreasing as those old growth forests are logged.

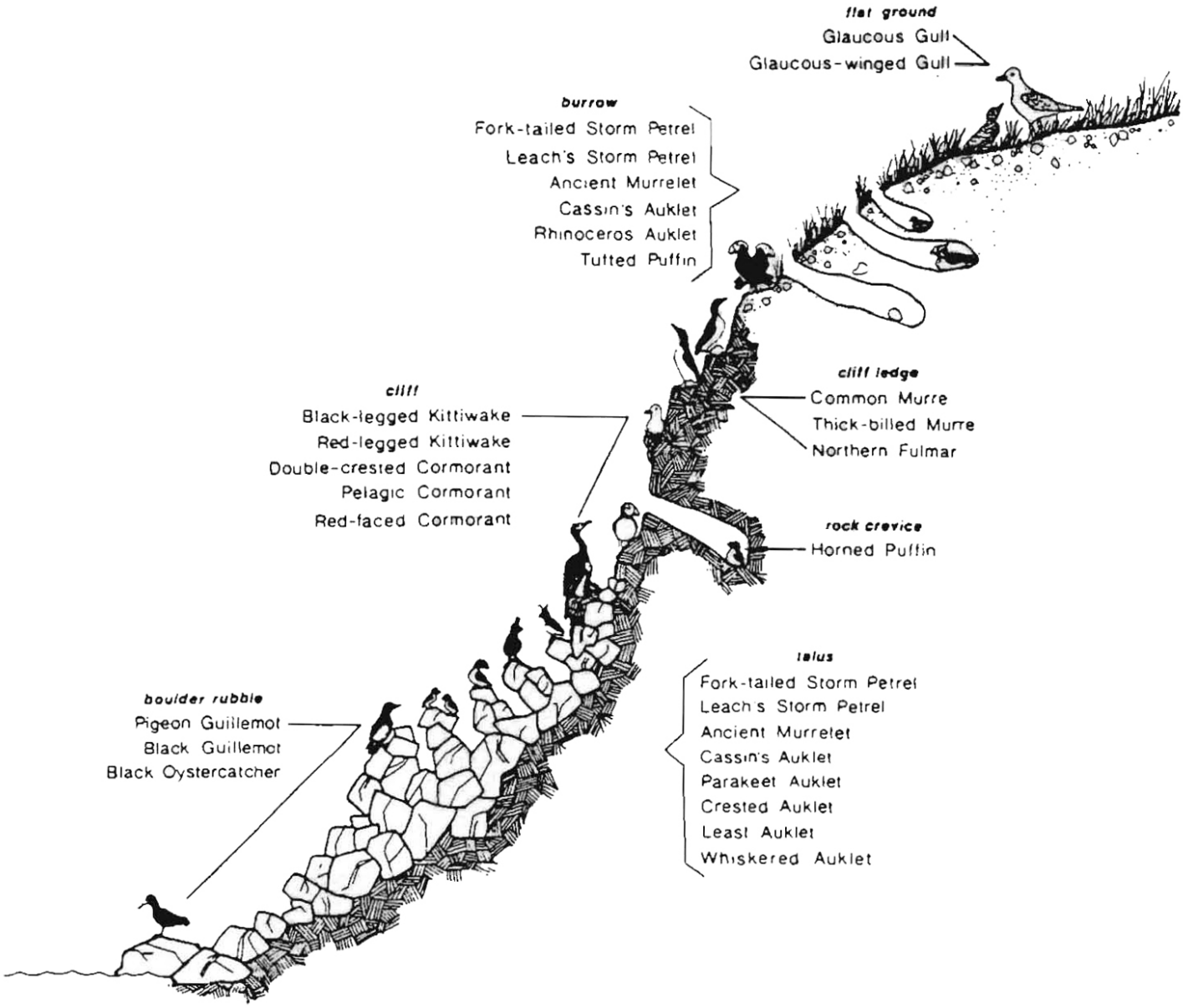
The Rest Of The Year

For eight or nine months of the year, all those seabird nesting habitats are silent and empty of birds. Most seabirds are **pelagic**: they live on the ocean, often far offshore, with no need to set their webbed feet on dry land for the majority of the year.

On the ocean they also seek their most favorable **habitat** — wherever their favorite food is easy to find. Once at a spot where currents and tides concentrate fish and other foods, the seabirds further specialize by feeding at different levels in the water column. Big flocks of gulls, terns, or kittiwakes will jostle each other for fish at the surface. Cormorants, guillemots, and auklets will dive to the middle depths. The deepest fish are left for the murres and puffins.

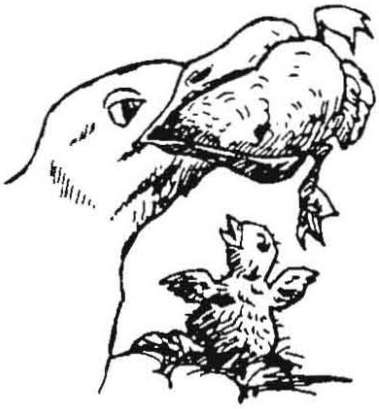
Not as much is known about seabirds in their winter habitat. In fact, some birds' winter hangouts are still a mystery!

HABITATS OF COLONIAL SEABIRDS



PREDATORS

Although most seabirds choose nesting sites inaccessible to land predators, no places are free from **predators** looking for a meal. Typically, seabirds are ready to defend themselves from airborne predators — eagles, falcons, ravens. Some seabirds (some gulls and jaegers — *YAY-grr*) turn to robbing other seabirds of food being carried to a chick or they steal an uncovered egg or grab a tiny chick. But all the neighbors start calling and defending their territories and together can sometimes drive away bird intruders before they get a meal. When birds gang up on a predator in their midst, it's called **mobbing.**



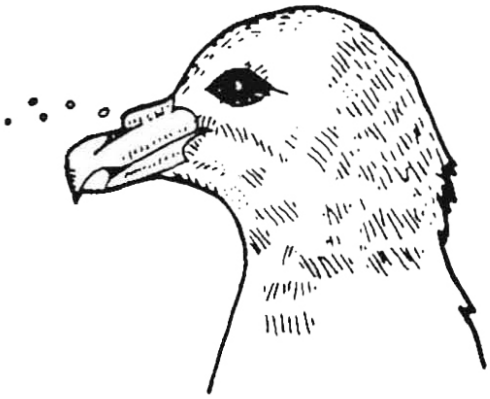
Mammal predators usually get their meal. In the arctic, it's the arctic fox (blue fox) that is agile as a circus tightrope walker and can reach all but the narrowest ledges. Most of the Aleutian Islands and most islands south of the Alaska Peninsula and Gulf of Alaska used to be almost free of foxes. That is where many big seabird communities historically have been. But fox trappers, first Russian then American, thought those islands were cheap places to raise foxes for their fur. Seabirds were free fox food! Some whole colonies were wiped out, and these introduced arctic and red foxes continue to prevent the return of many seabirds even today.

Another predator threatens seabirds just by the fact it <u>might</u> arrive on more islands: rats! See the "Human Threats" section and news clippings for details.

ADAPTATIONS

We talked earlier ("Habitat" section) about how seabirds have adapted to living on islands and cliffs safe from land predators, each preferring a special place to nest. In the ocean, the seabirds continue to separate themselves. Horned puffins look for food closer to the nest site while tufted puffins feed farther out to sea. Kittiwakes like small fish and auklets choose zooplankton. Murres dive deep while storm-petrels feed at the surface. Each seabird shares the marine resources and avoids competition by specializing — each has its own **niche**.

Zoobooks Seabirds shows how each seabird's bill is adapted for the kind of food it eats (page 2). It also shows how seabirds' bodies are built for flying — in air or underwater (pages 2-7). Some seabirds can fly so easily that they migrate 10,000 miles to Alaska each summer to nest (arctic terns from Antarctica) or to vacation (shearwaters, escaping the southern hemisphere winter after nesting near New Zealand and Australia). Some seabirds (auklets, puffins, murres) are built like insulated torpedoes and can fly underwater. The cormorant mixes flying above and swimming below the ocean surface; but its feathers are not as waterproof as all the other diving birds, so it must stand on shore with wings outstretched to dry them after each mealtime.



The salt gland of a Northern Fulmar enables it to drink sea water, later expelling the salt.

"Water, water everywhere, and not a drop to drink." That's what humans would say of the salty ocean environment of seabirds. We would die if we had only saltwater to drink. But these birds have a special **salt gland** that lets them drink sea water — and later expel the salt.

Traditions

Long ago, according to Eskimo folklore, Sedna, the daughter of the chief, was wooed by a fulmar. The fulmar won her heart and she left the comforts of her father's lodge and followed the fulmar to the ocean.

Soon, Sedna became unhappy. The fulmar was not kind to her. The other fulmars resented and mistreated her. Her father, the chief, heard that his daughter was unhappy and treated badly. He journeyed to the place of fulmars, killed her fulmar husband, and took his repentant daughter home. All the other fulmars followed, making such pitiful cries. And this is the reason, so Eskimos say, that fulmars have such a mournful cry.

Seabirds have always been a part of the life of Native peoples of Alaska. Their bones are found in the **middens** (waste piles) of ancient camps. Ceremonial robes made from the feathered skins of hundreds of small seabirds still exist as cultural treasures (check your nearest museum). Native hunters went to seabird colonies to gather eggs and to catch some birds with nets to provide fresh food after long arctic winters. Whalers and explorers also killed seabirds for food.

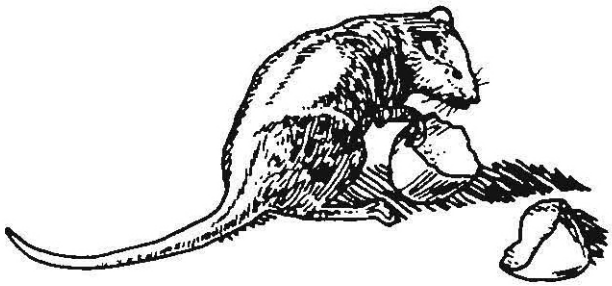
Some villages today make a special time for traveling to nearby seabird cliffs to gather eggs early in the season. Others seek eggs from birds nesting on flat ground near their villages. These first eggs of the season still provide a welcome change from a winter diet and give families a chance to share traditional activities.

Human Threats and Natural Dangers

As remote as they are, seabird communities are not safe from hazards. Ships may run aground, dump plastics and other garbage, leak fuel, or become abandoned wrecks. **Oil** spilling from such a ship is the first thing we think about, especially here in Alaska where many seabirds have died in such disasters. Oil coats feathers so birds cannot swim or keep warm. Seabirds are poisoned when they swallow oil — by cleaning their feathers, eating contaminated food, or drinking oily water. Oil on an eggshell can poison the chick growing inside.

Can anything be worse for seabirds than an oil spill? Yes! That grounded or wrecked ship might be infested with **rats** and those rats could escape to shore. Once rats infest large islands, nothing can wipe them out. They can devastate some seabird colonies by killing seabirds in even the smallest hiding places. Generally, only preventing rats from ever getting onto an island can save its seabirds.

Weather is also a killer that seabirds cannot escape, but at least it is not permanent. Low temperatures, rain, and wind together can kill unprotected chicks. Severe storms can wash a nest off a ledge or cause a whole neighborhood to disappear in a rock slide.



Humans walking in some seabird colonies can scare birds off their nests, exposing them to rain and wind. While the parent birds are gone, a gull can grab unguarded eggs or chicks. **Aircraft** flying too low can cause birds to fly, knocking off eggs in their panic to escape. **Boats** cruising too close to the cliffs can do the same thing. Aerial predators then have a feast on unguarded eggs and chicks.

The parent seabirds must be able to find **enough food** for themselves and their chick within a timely distance from the nesting colony or the chick will starve waiting. Sometimes ocean currents move fish away from islands, or fishermen in the area catch too many fish, forcing the adults to fly farther and farther. Sometimes even adult seabirds starve to death.

People catching fish sometimes set their nets or lines right where seabirds are looking for food. Birds can get caught in **fishing nets** and drown.

Ocean pollution also can be deadly. Seabirds starve to death when they become **tangled** in things people throw away — fishing line and and nets, plastic six-pack rings, for example.

Or seabirds may eat small pieces of trash (such as **plastic pellets** that fall out of styrofoam) mistaking it for food. This plastic collects in their digestive system, eventually killing them.

Many of these threats to seabirds are illustrated on the poster that accompanies this packet.

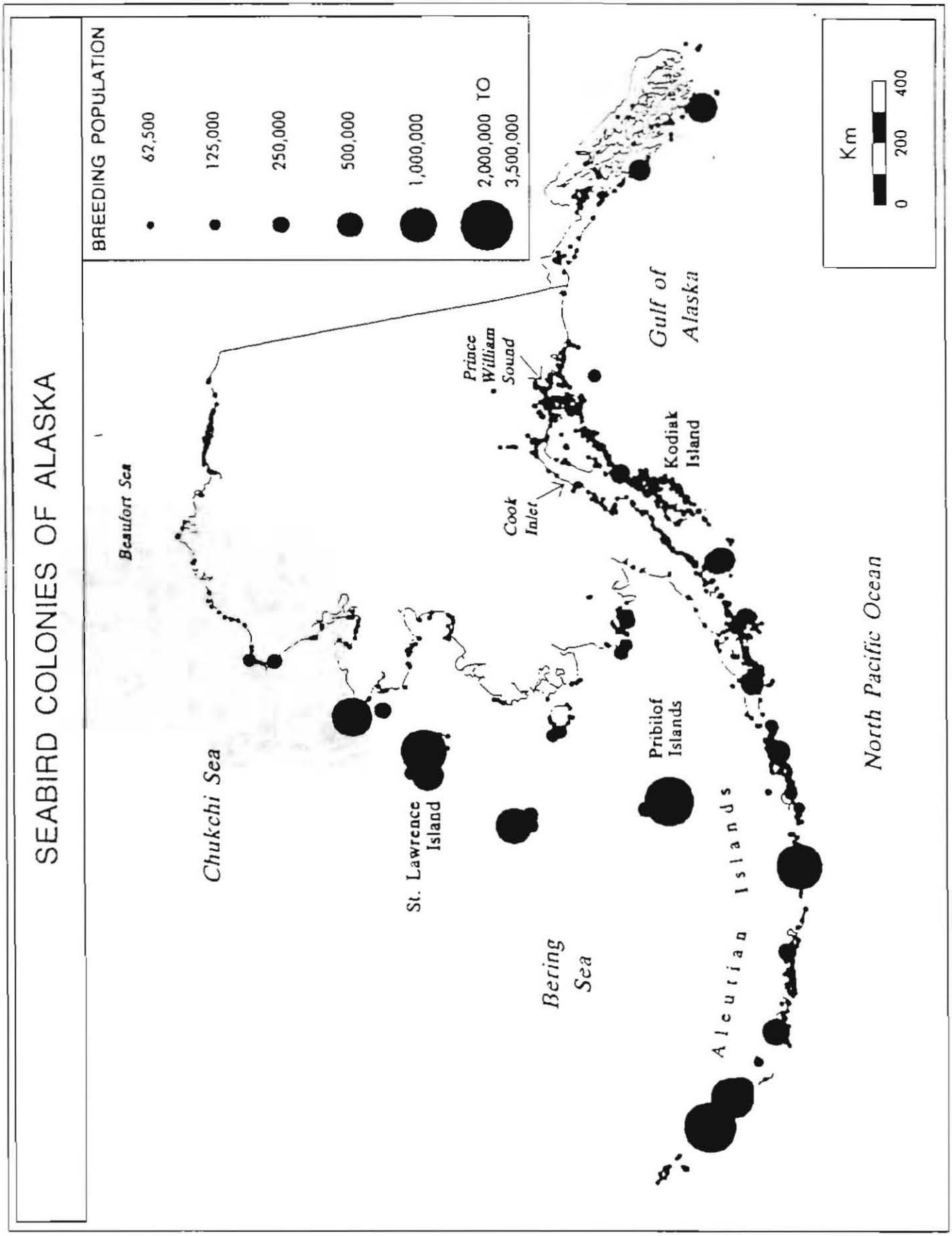
You Can Help

Life for a seabird has many threats. Humans have control over only a few — but seabirds need all the help they can get! Challenge your students to think of ways to help, from local action around seabird colonies to suggestions for community and government leaders. Many seabirds lay only one egg each year. The chances are slim that each egg will hatch and produce an adult. You can improve those chances.

A list of ideas appears in the activity "Can Do!" on page 52.

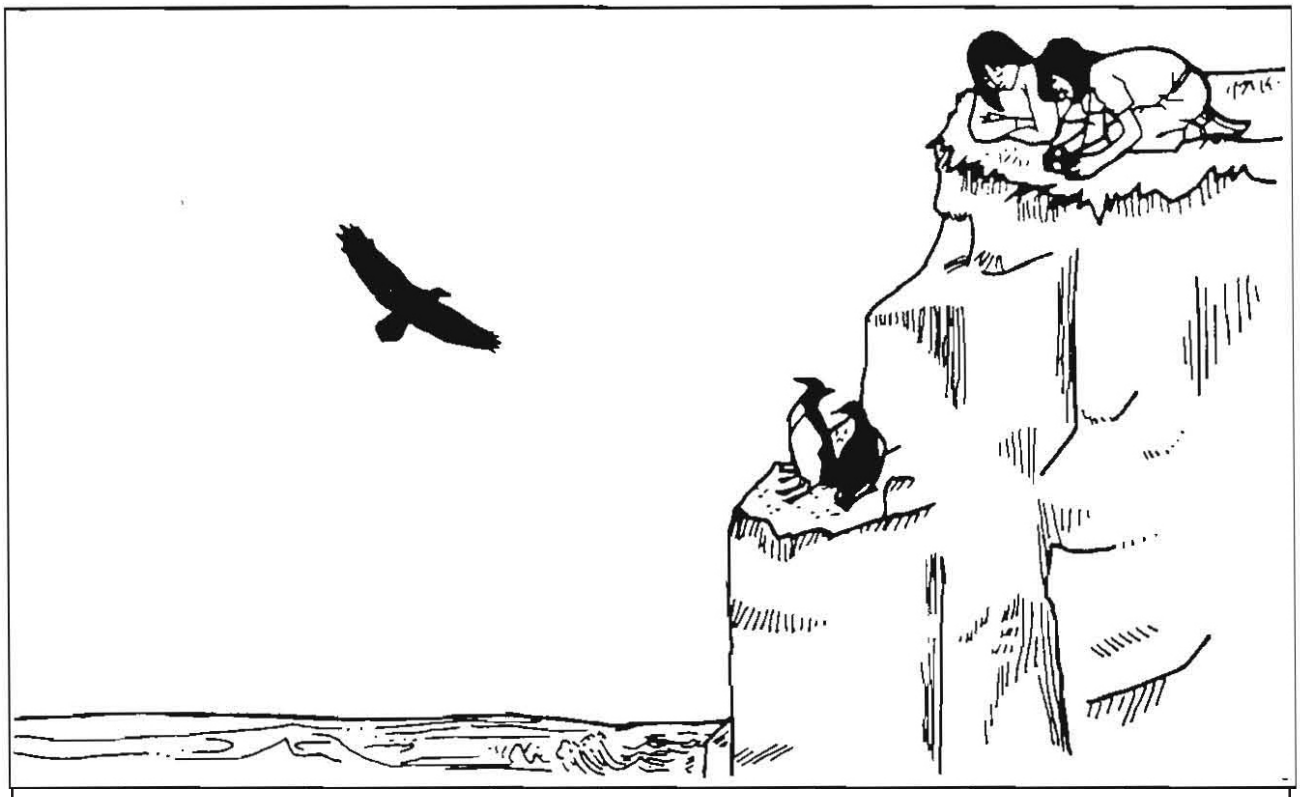
Some communities have already become active protectors of their seabirds and the marine ecosystem. Many colonies are part of state or federal wildlife refuges — ask someone from a nearby refuge to come to your classroom. Biologists often spend the summer studying the health of seabird colonies: whether numbers of birds or chicks are changing; what the birds are finding to eat, for example. Encourage your students to talk with these scientists and share information.

A list of people to contact at federal agencies in Alaska appears in the "For More Information" section on page 56.



This map was produced by the Alaska Seabird Colony Catalog computer database, U.S. Fish and Wildlife Service, 1994. *For more detailed maps showing bird colonies in your area, contact Dr. Vivian Mendenhall, Migratory Bird Management, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503. Phone: (907)786-3517.*

GOIN' BIRD WATCHING



PROCEDURE:

1. Assign students in your class to each of the "parts" in the cast of "Goin' Bird Watching". Their role is to say their line (words in parentheses) whenever their part is mentioned.

CAST:

wildlife photographer (say cheese! click)
kittiwakes (kittiwake, kittiwake)
waves (crash, crash)
puffins (silently flap arms very quickly like a puffin)
raven (caw, caw)
murres (bruaaa, bruaaa)
wind (wooooooosh)
guano (pee-u!) (while holding nose)

2. Read the story on the following pages aloud, pausing for the sound effects of the cast.

Goin' Bird Watching

One summer day, my friend and I planned to get up very early for our hike to (name of a local seabird colony) near (name of your village or town). My friend was determined to become a **wildlife photographer** (say cheese! click). At the crack of dawn – well, it was really more like 10 a.m. – we headed out. As we got close to our destination, we heard the faint sound of **kittiwakes** (kittiwake, kittiwake). A small flock of **kittiwakes** (kittiwake, kittiwake) flew towards us overhead, calling noisily to each other. As we got closer to the ocean, the **wind** (wooooosh!) became stronger. It was blowing right in our faces and was very refreshing, except that the **wind** (wooooosh!) also carried the fishy smell of **guano** (pee-u!). We knew we were getting close to a big colony of seabirds! Even though the **guano** (pee-u!) was really smelly, we knew the **guano** (pee-u!) is good fertilizer for the surrounding ocean.

We slowly crept up to the top of the cliff, being very careful not to get too close to the edge. As we peeked over the edge, we saw the **waves** (crash, crash) crashing on the rocks below. We found a safe spot to sit down, and my friend the **wildlife photographer** (say cheese! click) got her camera ready. To our left we could see a whole bunch of **murres** (bruaaa, bruaaa) standing very close to each other on a narrow cliff ledge. It sounded to me like the **murres** (bruaaa, bruaaa) were telling jokes to each other and laughing. Just as my friend the **wildlife photographer** (say cheese! click) was about to take a picture of the **murres** (bruaaa, bruaaa), a big, black **raven** (caw, caw) flew by, soaring on the **wind** (wooooosh!). The **raven** (caw, caw) is one of the few predators that can reach seabirds nesting on cliffs. The **raven** (caw, caw) was looking for dinner. The **murres** (bruaaa, bruaaa) were frightened and jumped from the ledge and flew out over the **waves** (crash, crash). Today was not the **raven's** (caw, caw) lucky day – no eggs were to be found.

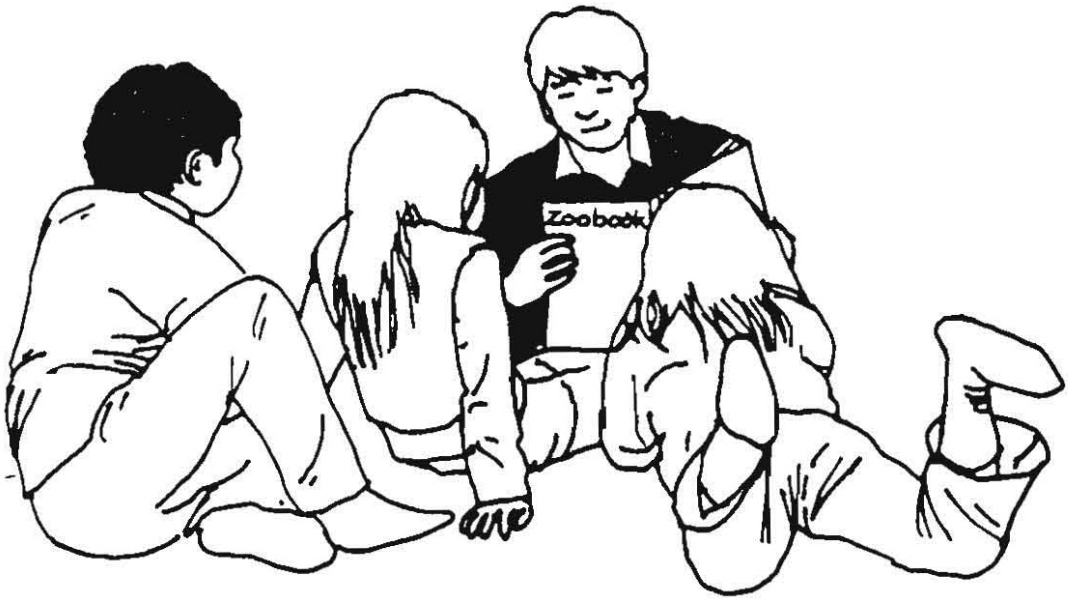
Suddenly my friend the **wildlife photographer** (say cheese! click) got very excited. She had spotted a **puffin** (flap arms) flying towards us. I

just had to laugh because with its short stubby wings and short stubby body that **puffin** (flap arms) was flapping so hard it looked more like a flying potato than a bird! But my friend said that the **puffin's** (flap arms) wings are so short because it can fly really well under water to chase and catch fish. I was amazed. Imagine that! A **puffin** (flap arms) flying under the **waves** (crash, crash).

My friend the **wildlife photographer** (say cheese! click) was very happy because she got several good pictures of the **puffin** (flap arms) as it landed on the cliff near us. In fact, she took so many pictures that soon she ran out of film. Finally, we just laid back in the grass and looked up at the sky. The **wind** (wooooooosh!) blew over our faces, and we could still smell the **guano** (pee-u!), though believe it or not we had kind of gotten used to the smell. As we looked at the sky, it turned beautiful shades of pink and gold as the sun began to set. Another flock of **kittiwakes** (kittiwake, kittiwake) flew overhead, and we waved goodbye to them. What a great day we'd had with the seabirds.

Adapted from: *Wetlands and Wildlife*, U.S. Fish and Wildlife Service.

ZOOBOOK SEABIRDS



OBJECTIVE:
Students will gain an introduction to seabirds through observing, listening, sharing and note taking.

BACKGROUND:
Alaska has a huge population of seabirds, the largest in North America. The accompanying red booklet, *A Guide to Alaskan Seabirds*, can be used as a *Who's Who* for the 40 kinds of seabirds in our marine environment. The booklet tells where you might see each bird, identifying characteristics, and interesting facts about its life.

Zoobooks Seabirds also included with this curriculum gives an overview of seabirds found throughout the world. Many of the species pictured in *Zoobooks Seabirds* do not live in Alaska; however, their habits and life histories are similar to more familiar Alaskan species. Thus the booklet provides a colorful and fun base for discussion and comparison, especially when used with the "Help Protect Alaska's Seabirds" poster. This lesson outlines just one way a teacher or instructor could present the information in *Zoobooks Seabirds* to a group of students.

MATERIALS:
- large sheet of bulletin board paper
- markers of several colors
- copy of *Zoobooks Seabirds* (included in this packet)
- copy of *A Guide to Alaskan Seabirds* (included in this packet)
- "Help Protect Alaska's Seabirds" poster (included in this packet)

More copies of Zoobooks Seabirds and A Guide to Alaskan Seabirds may be purchased from the Alaska Natural History Association using the order form included at the end of this curriculum.

PROCEDURE:
1. Seat students on floor so they can see *Zoobooks Seabirds*. Ask students to describe in detail what they see on the cover. The object is observation, not identification (i.e. "How long is its beak

compared to its head? Describe the beak", etc.) Acknowledge good observation skills.

2. Ask the question, "How is a seabird different from other birds?". Use a bubbling or cluster form of diagramming to record students' answers on a large sheet of bulletin board paper. Put the word "Seabird" in the center and paraphrase some of the rays or bubbles into Habitat, Food, and Adaptations. Adaptations may be further broken down into subcategories, such as feeding, flight, swimming/diving, and nesting. Ask elaborating questions. Do seabirds live at sea all the time? When do they not live at sea? Why? Ask students to make an inference (an informed guess) about what the birds on the cover are doing.

3. Tell the students that you are going to show the pictures from each page for 15 seconds, but you are not going to read the text to them. Ask them to look for clues about what seabirds eat, where they nest, and seabird colors. Show the pictures. Go back to the diagram and record. What do seabirds eat? How do seabirds eat? Where do they live? Where do they nest? What are the most common seabird colors? Where would you put this information on our diagram? Why do you think seabirds are usually lightly colored below and darker on top?

4. Point out to students that seabirds live all around the world. Some of the birds will be familiar, some strange and some will be related to birds they know. Write the word "Pelagic" on the diagram. Tell the students that this is a word that describes many seabirds. Ask them to listen for its definition. Inform them that the first two pages deal with amazing seabird facts. Read aloud all the text on the first two pages. Record favorite facts. Ask students to point out Alaska species, and non-Alaska species. Explain that the Atlantic puffin is related to our horned puffin and tufted puffin. Record the definition of pelagic on the diagram. ("Pelagic" means "open ocean". Pelagic seabirds spend almost all of their life in the open ocean and come ashore only to raise their young.)

5. Read aloud pages 2-3. Point out that the only Alaska seabirds represented are the albatross and gull. Have students list some facts about seabird flight to record on the diagram.

6. Pages 4-5 talk specifically about how seabirds not only survive but thrive by living on the sea. After reading the text aloud, ask elaborating questions focusing on the adaptations of vision, underwater flight, and salt removal. Record responses on the diagram.

7. On pages 6-7 the most prominent drawing about feeding is the pelican - a bird the students are not likely to see in Alaska. However, all other birds pictured demonstrate feeding behaviors used by Alaskan seabirds. Read the text aloud, ask questions, and record answers on the diagram. This is a good time to ask students to share stories. Have you ever seen a bird feed in one of these ways?

8. Pages 10-11 on bird communication feature Alaska birds only on the sidebars. If your community is located near a seabird colony the students might be familiar with some forms of seabird communication, but it would be likely that many subtle displays such as skypointing may be missed by all but the most careful observer.

9. The pelican takes center stage for pages 12-13, but Alaska birds are featured along the perimeter. What is the difference between a puffin's nest and a murre's nest? Why is a murre egg shaped that way? What is a colony?

10. Pages 14-15 highlight different threats to seabirds. What is the major threat to seabirds in your area? In Alaska introduced species, such as foxes and rats, are among the biggest threats. Are these two animals threats to seabird colonies you know about?

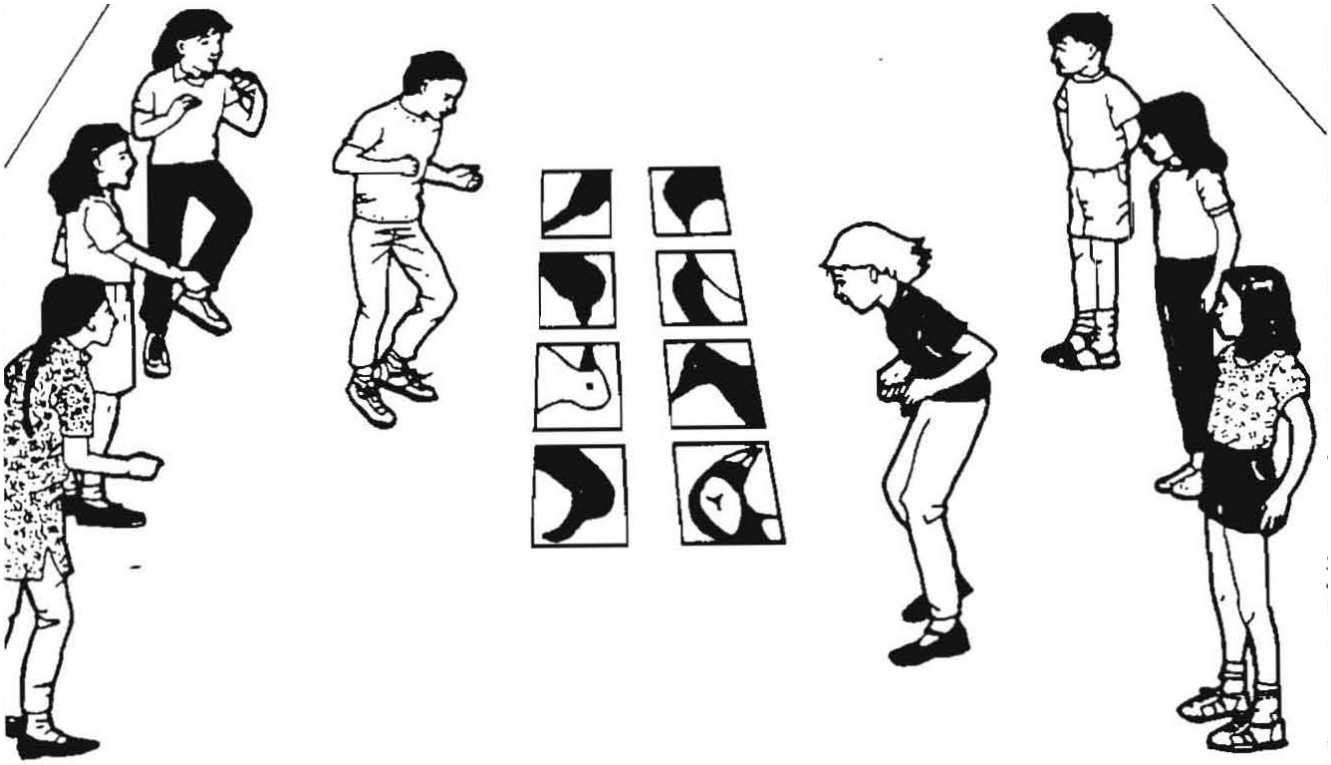
EXTENSIONS:

1. Hang your bulletin board diagram in the class. Ask students to add facts in the appropriate place when they learn something new.

2. During discussion of one of the topics, such as feeding or bird communication, many students may want to share. Their stories and observations can be written as a language arts assignment.

3. In the activity "Create A Cliff", students will research a seabird. Have them collect information on their bird using the bubble diagramming technique used in this activity. Encourage them to use the class notes as a model for their own bird notes.

Seabird Identification Line Game



Objective:
To reinforce seabird identification skills and knowledge about seabirds.

Background:
Seabirds are unlike any bird you would find on land. Their bills, bodies, and coloration are **adapted** for life in three worlds – water, air, and land. Some of the seabirds fly underwater as well as in the air. That means they must be streamlined in shape yet compact enough to conserve their body temperature in the cold ocean. They must be able to catch slithery food in the water and, in the summer, carry it while flying many miles to their hungry chicks.

All these adaptations are reflected in the seabirds' shapes. By studying and coloring the seabird images, students can begin to see these adaptations as well as learn to identify a variety of seabirds. They can use these pictures for the line game described below or to illustrate a story they write about seabirds.

This activity is best used as a review or for further depth after students have become familiar with seabirds. For winter observers, please note: Some of the seabirds' identifying features (the puffin's colorful, parrot-like bill or its punk feather tufts) are present only in summer to help attract mates. Refer to the range maps in the red booklet, *A Guide to Alaskan Seabirds*, to learn which seabirds might be in your vicinity.

Materials:
- one set of seabird coloring pages for each student, masters provided

Procedure:
1. Have students color their seabird pages, using the correct colors as indicated in the key. Point out and discuss the distinguishing features of each bird. When they have finished coloring, the students may put them together as a booklet to be used as a field guide to use during a visit to a colony.

Or any of the pictures could be used to illustrate a story they write about seabirds.

2. For the identification line game, you will need two pictures of each seabird species. You may wish to begin with just 3 or 4 common species and gradually add more species as the students' knowledge improves. Use pictures colored by students or make your own, making sure the name of the bird is not on the picture. You may wish to laminate them.

3. Form two equal teams and line them up, one team facing the other, 15 feet apart. Put the pictures, 2 of each species, in a row on the ground between the two teams. Be sure everyone can see the pictures. The teams count off separately, so that each team has a player number one, two, three, etc. Like numbers from each team face each other.

4. When the teams are ready, call out the name of a bird pictured on the cards lying between the teams, then call out a number. (To add to the surprise, call the numbers out of sequence.) For example, "tufted puffin, number three". Say the number after the bird name, so that everyone is looking for the correct answer, not just the people whose number is called.

5. As soon as the "threes" hear their number called, they race to the cards, trying to be the first to pick up the card with the picture of the tufted puffin. After picking up the card, they return to their team. The team should agree that the correct picture has been chosen. If not, player three can go back and get another card. Every successful player earns a point for his or her team. Since there are two cards of each species, it is possible for both teams to earn a point each round.

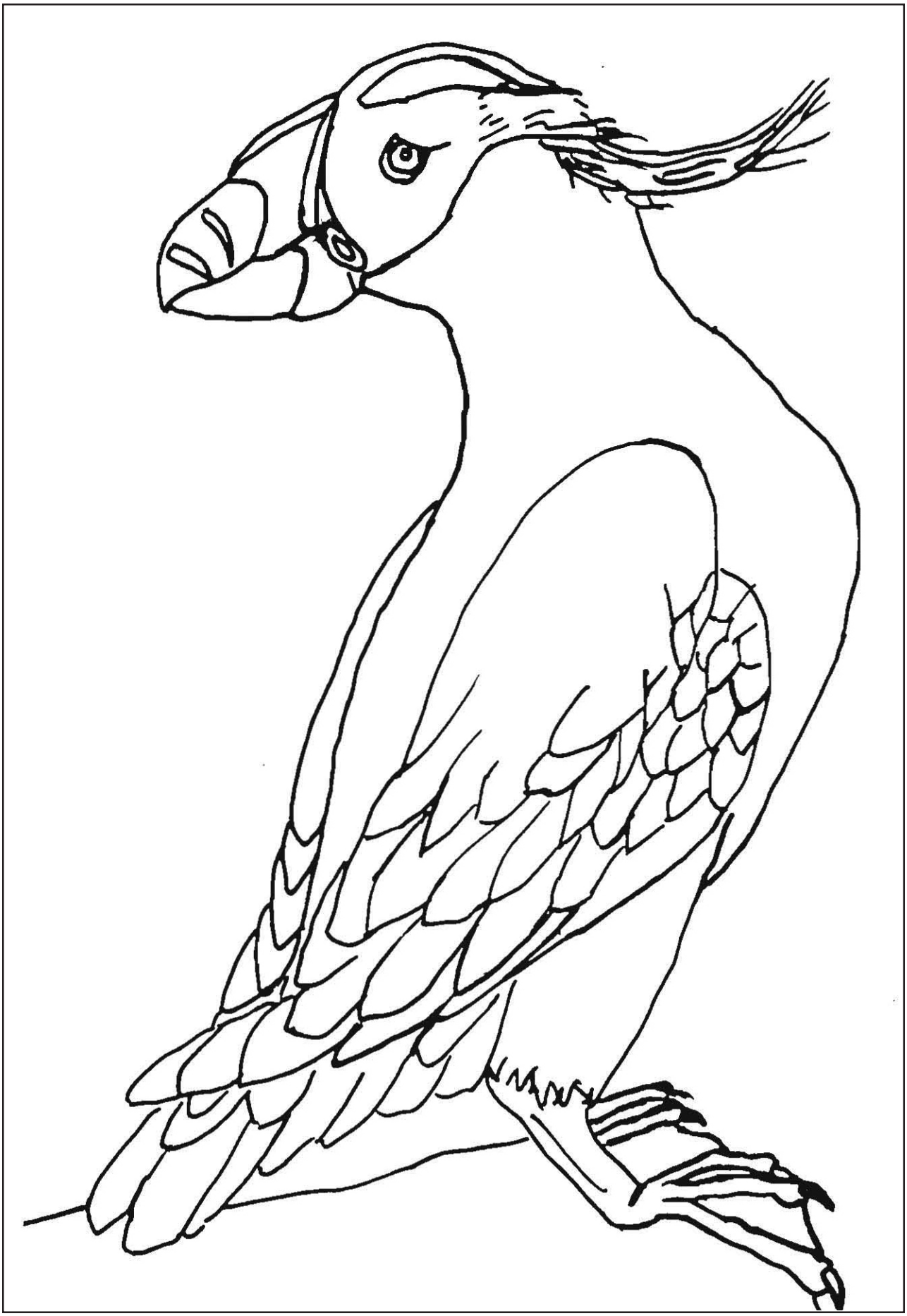
6. Facts about the birds can also be reviewed by making statements such as: "The seabird that has a very large orange bill, yellowish tufts on its head, and nests in burrows" (Tufted Puffin); "Ninety-seven percent of the world's population of this seabird nests on St. George Island in the Pribilofs" (Red-Legged Kittiwake); "This seabird makes a very high-pitched whistle, and the inside of its mouth is bright red" (Pigeon Guillemot); "This seabird nests in large, tightly-packed groups on cliff ledges and does not build a nest" (Common Murre); "In some areas of Alaska this bird is called the Sea Parrot" (Horned Puffin); "This seabird feeds on zooplankton, which it gathers by swimming underwater with its wings" (Parakeet Auklet); "This seabird chases fish underwater by swimming with its feet. Its feathers are not waterproof so it must hang them out to dry" (Pelagic Cormorant); or "This bird has the longest known migration, travelling 11,000 miles to winter in the Antarctic" (Arctic Tern).

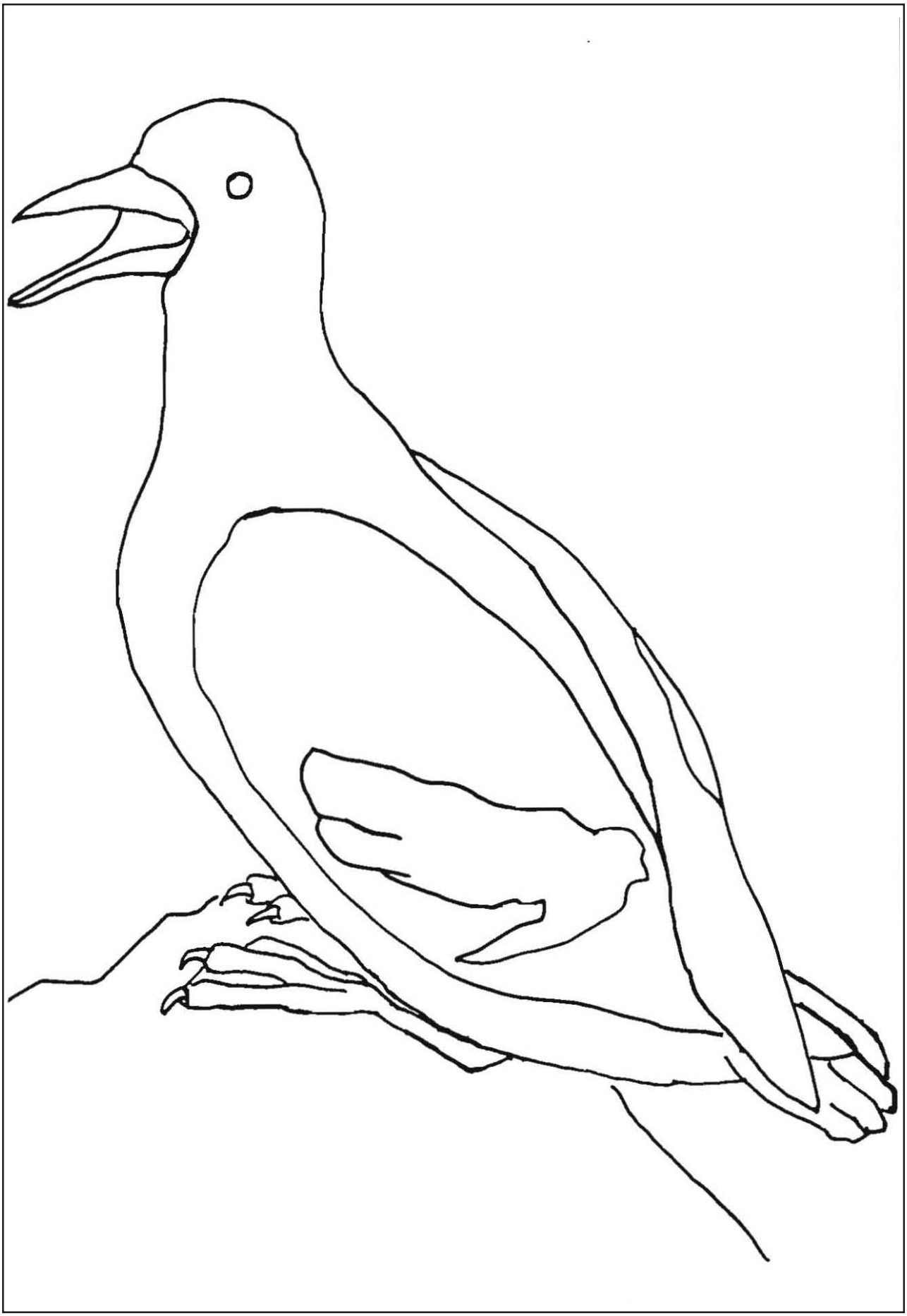
Names of the birds in Native languages may also be used. Refer to the chart of Native names for seabirds on pages 46 and 47.

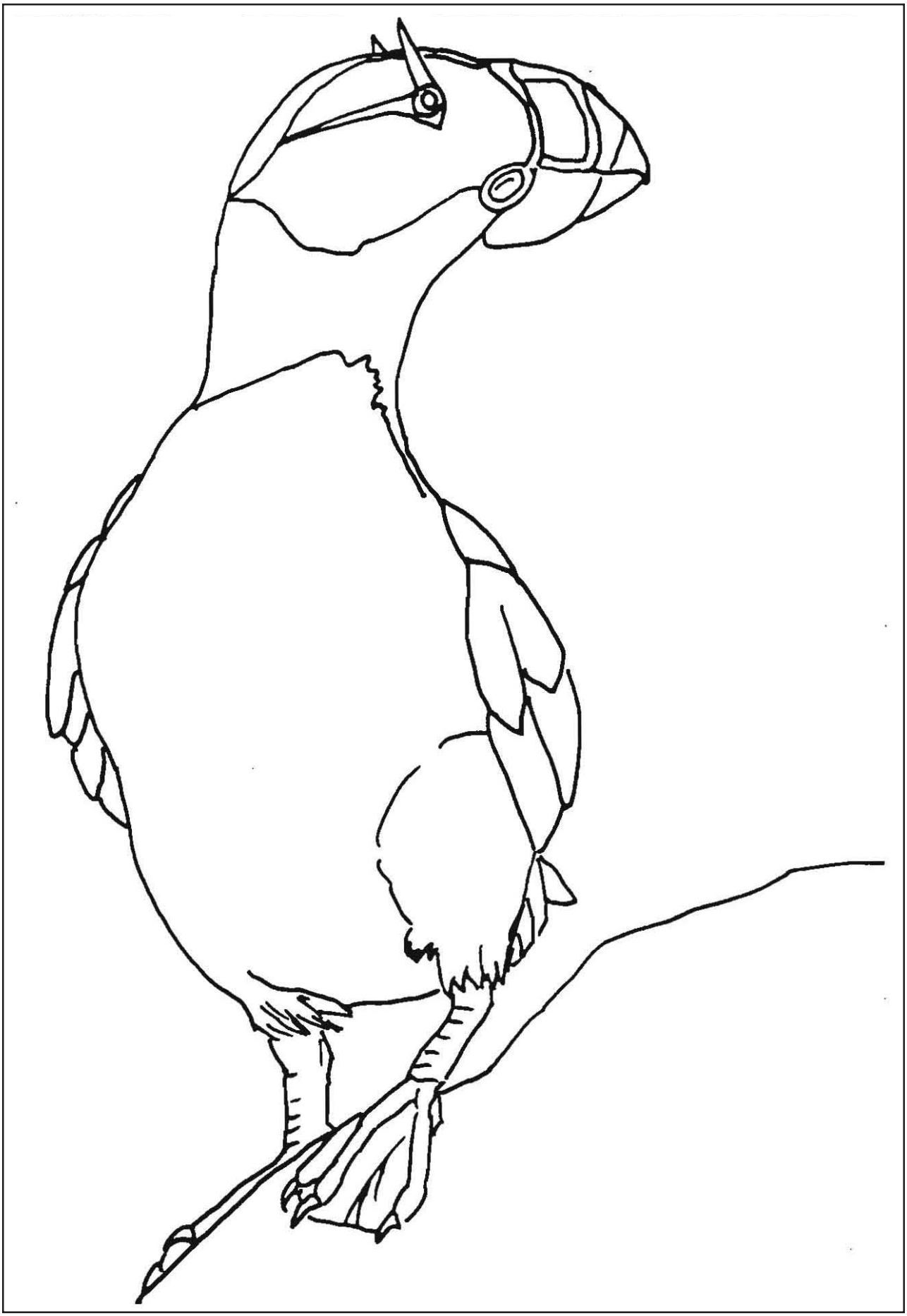
EXTENSIONS:

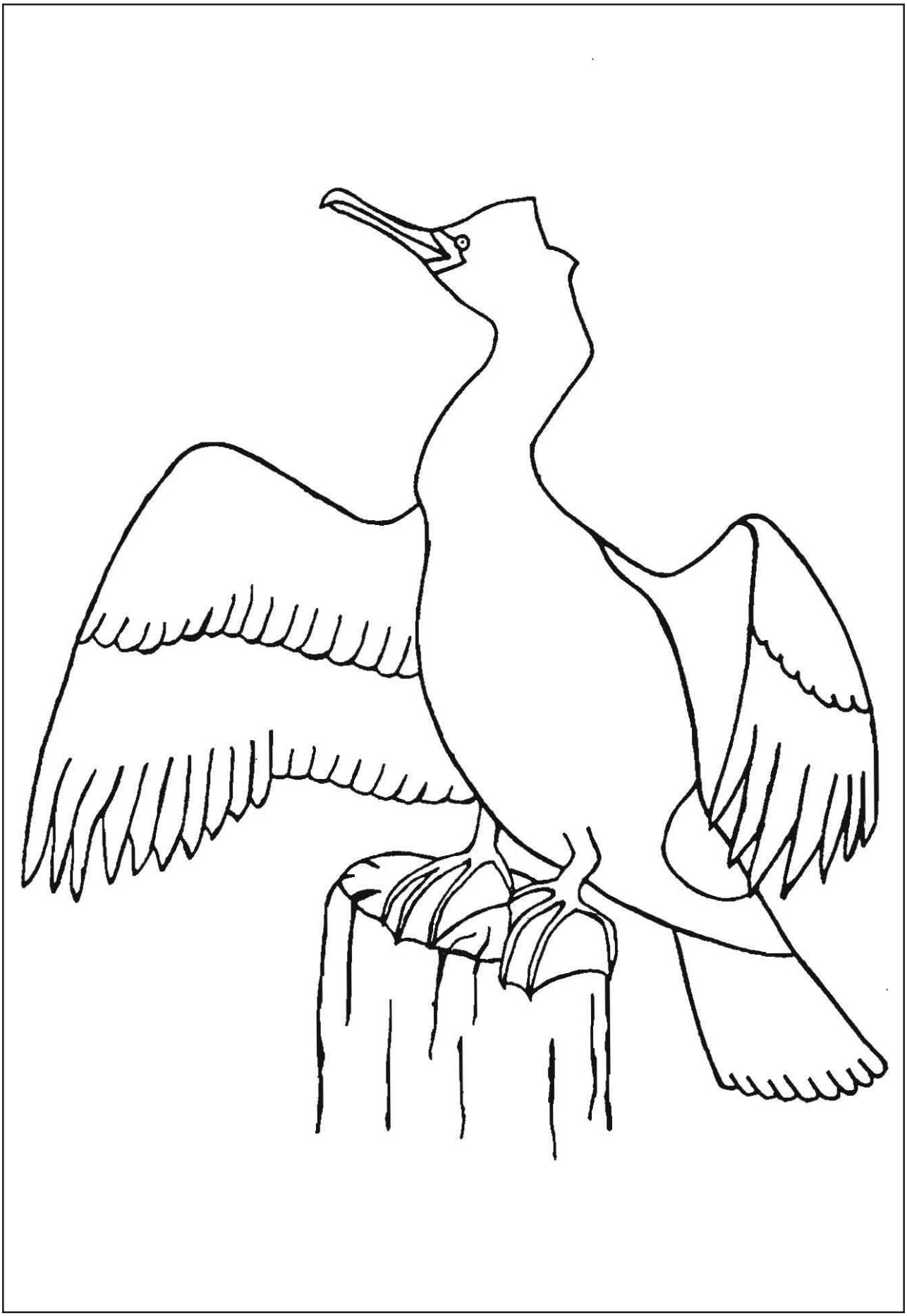
If possible, visit a seabird colony. Bring binoculars and identification books. Record and sketch observations using the Seabird Checklist included with this activity. The Seabird Checklist is designed to help students observe birds and record identifying characteristics, including bird size, bill shape, wing shape, tail shape, nest site, coloration, and feeding method.

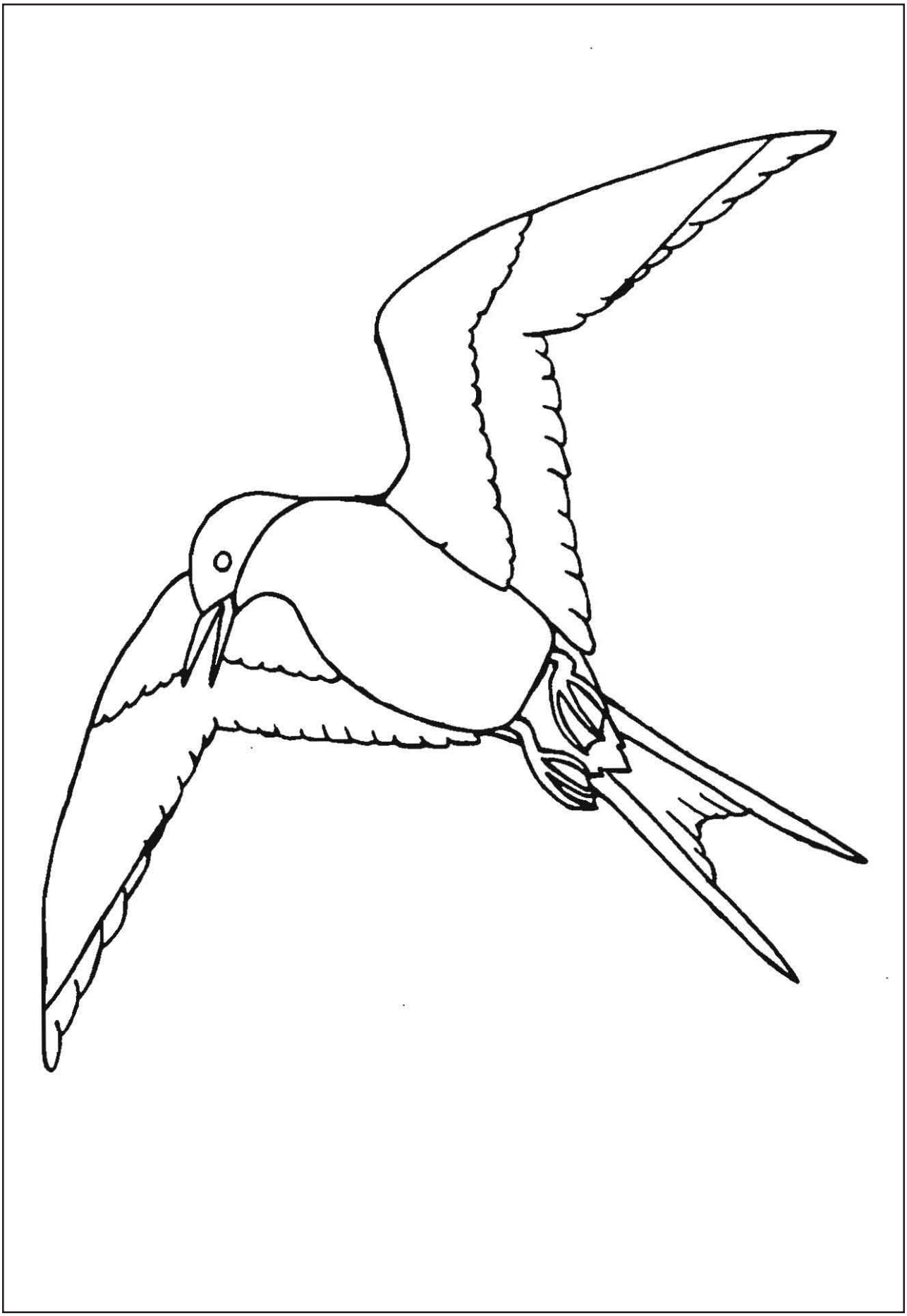
Adapted from: *Teach About Geese,* U.S. Fish and Wildlife Service.

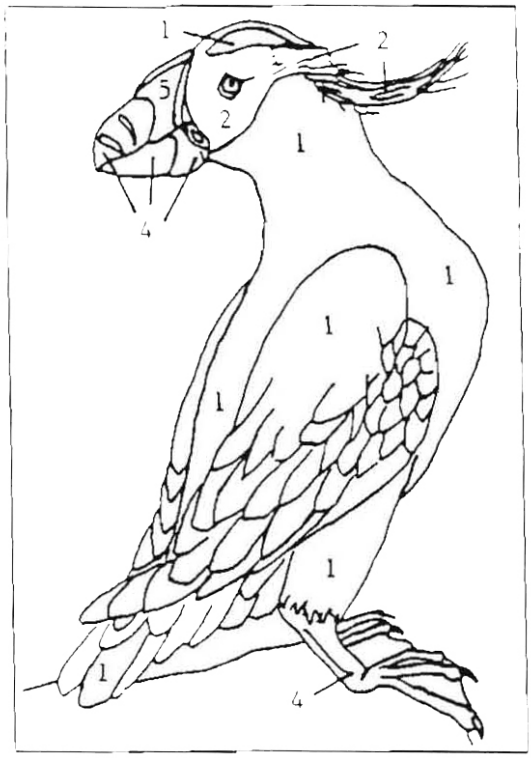




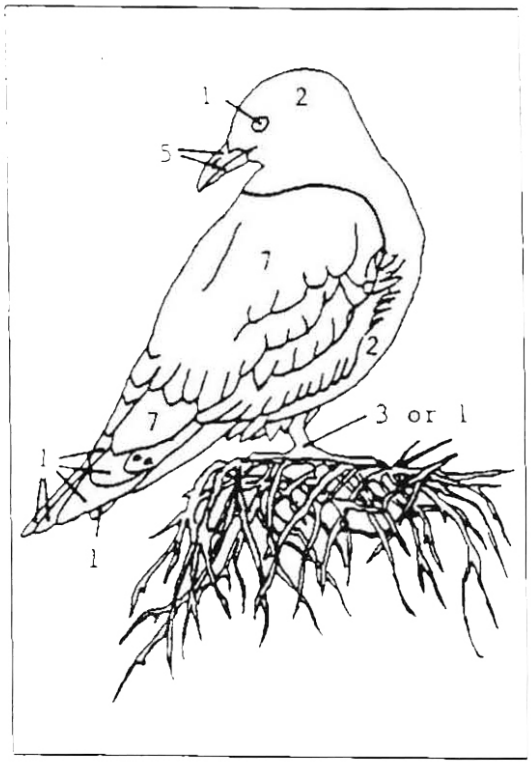




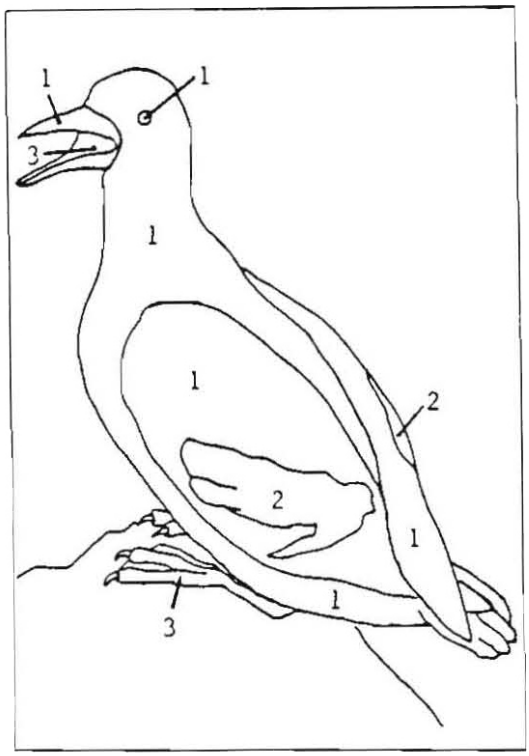




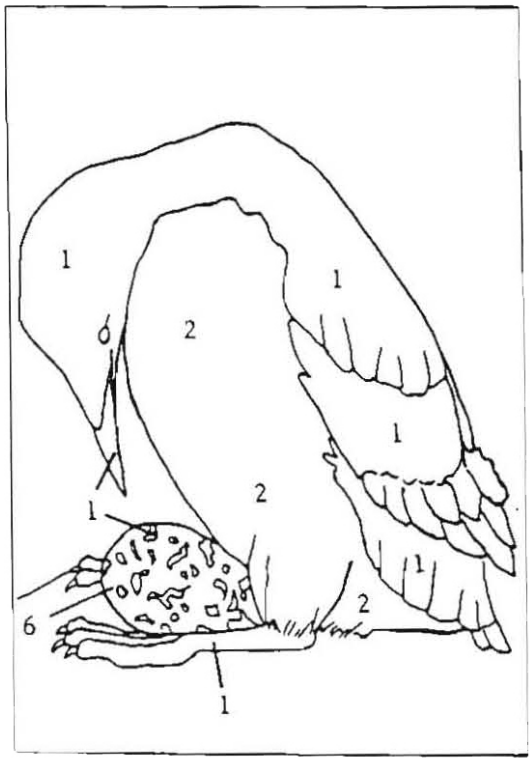
Tufted Puffin



Red-legged or Black-legged Kittiwake

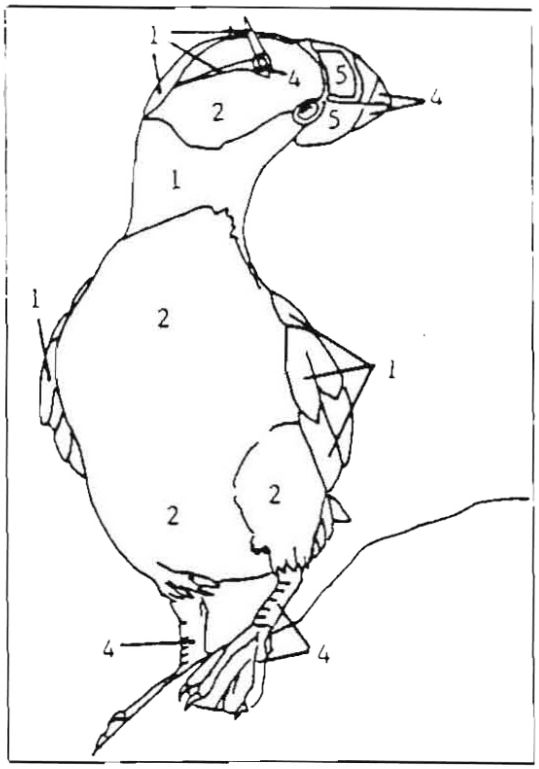


Pigeon Guillemot

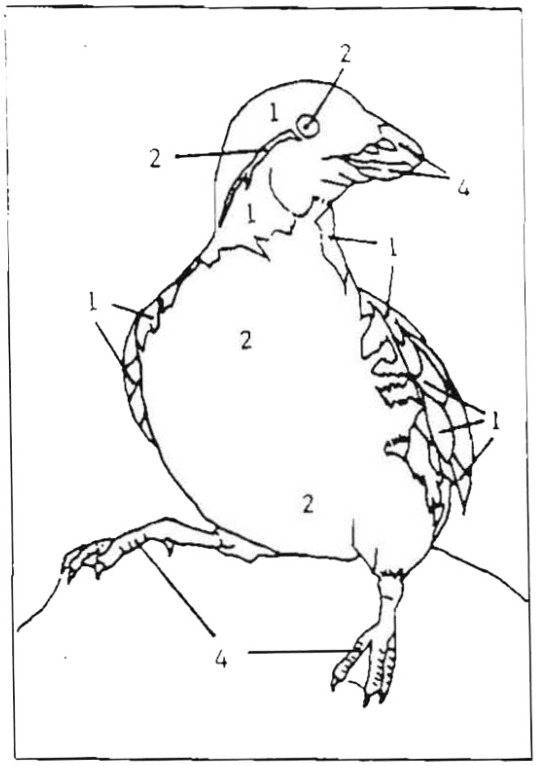


Common Murre

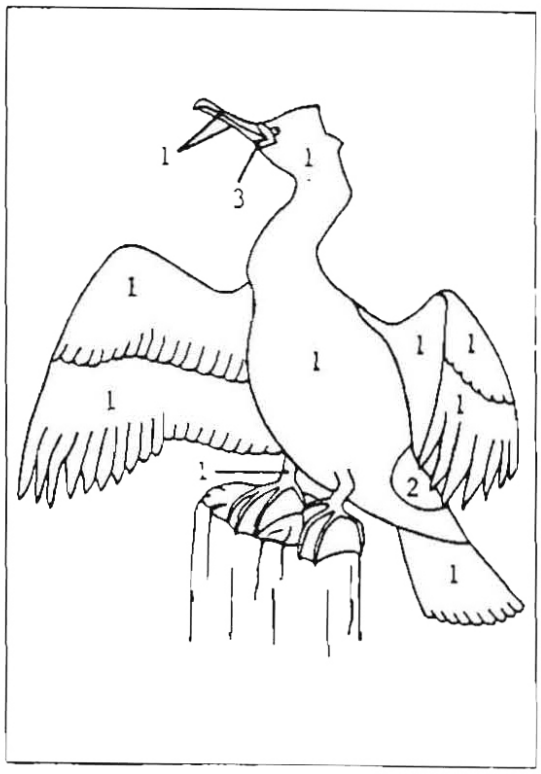
1 = black 3 = red 5 = yellow 7 = gray
2 = white 4 = orange 6 = blue/green



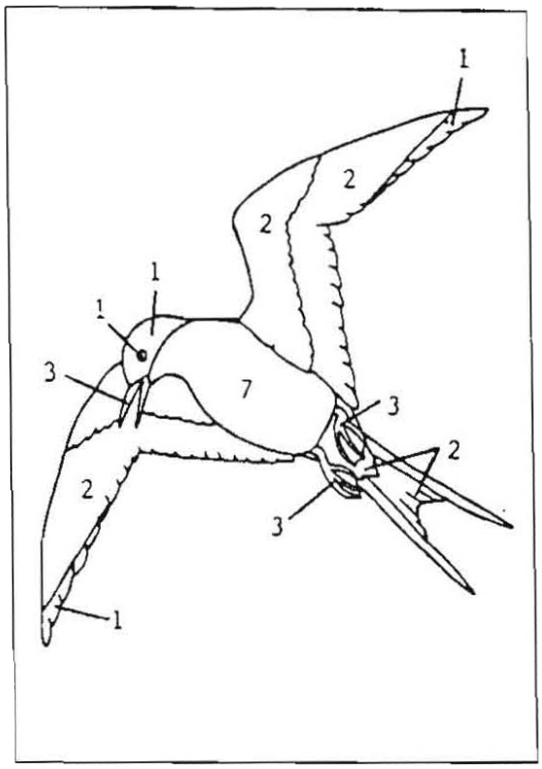
Horned Puffin



Parakeet Auklet



Pelagic Cormorant



Arctic Tern

1 = black	**3 = red**	**5 = yellow**	**7 = gray**
2 = white	**4 = orange**	**6 = blue/green**	

Seabird Identification Checklist

Bird Size	Bill Shape	Wing Shape	Tail Shape	Feeding Method	Nesting Site	Bird Name

Draw or write the shape of the bill, wing, and tail in the space above with the help of these examples:

Bill Shape:

Long, pointed — Short, stubby

Long, hooked — Long, tube nose

Wing Shape:

Short, round — Long, pointed

Tail Shape:

Rounded — Forked

Square — Long feathers in center

Draw the whole bird on the back of the page, if you'd like.

Write the bird's size, feeding method and type of nest site in the space above with the help of these examples:

Bird Size:

Smaller than a duck
Duck size
Larger than a duck

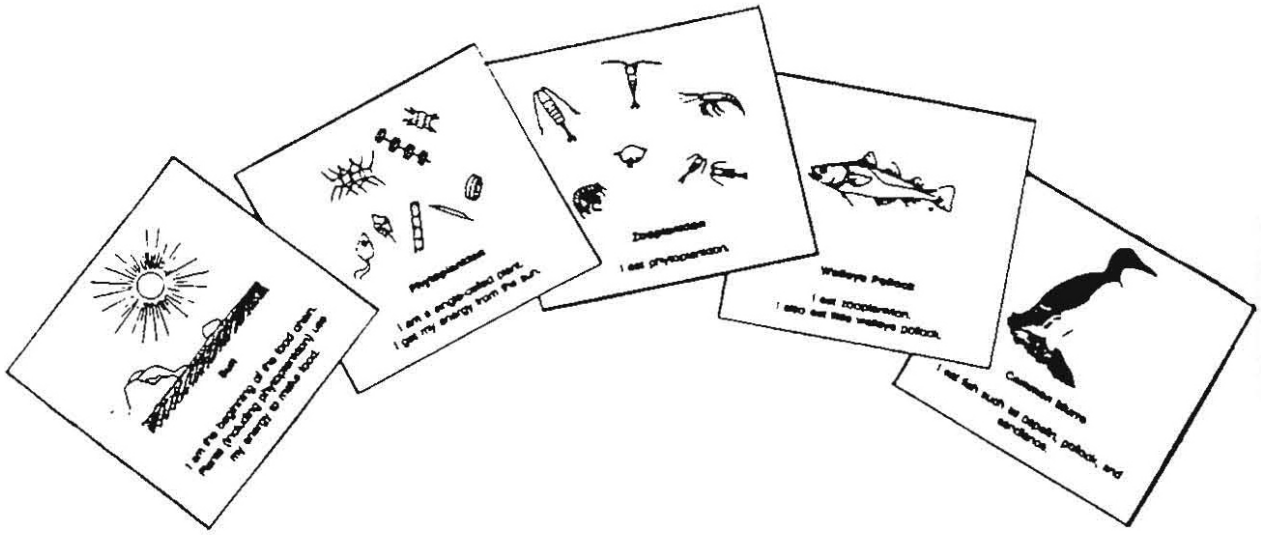
Feeding Method:

Dives from air to surface
Sits on surface and feeds
Dives under water
Other

Nest Site:

Flat ground
Burrow or crevice
Ledge of cliff
Rock piles
Forest
Other

FOOD CHAIN RUMMY



OBJECTIVE:
Students will develop an understanding of marine food chains and food webs by playing a card game in which food chains including seabirds are assembled.

BACKGROUND:
Life at sea (as on land) is an eat or be eaten world. Organisms being eaten are **prey** and the hunters are the **predators.** A **food chain** is the simplest way of showing who eats whom and the transfer of energy from the sun, through plants, to animals.

All food chains start with the sun. Plants are able to use the sun's energy (through **photosynthesis**) to make chemical energy and store it as a source of food. Because plants can produce their own food, they are called **primary producers**. In the ocean, most primary producers are single-celled plants called **phytoplankton** (which includes diatoms and dinoflagellates).

Animals that eat plants are called **primary consumers**. In the ocean, most primary consumers are tiny animals called **zooplankton** which include small crustaceans such as krill, amphipods, and copepods. **Secondary consumers** eat primary consumers. Some seabirds, mainly auklets, are secondary consumers because they feed directly on zooplankton. Many fish are also secondary consumers. Seabirds, such as cormorants, that eat these fish are call **tertiary** or third level **consumers**.

Decomposers are the recyclers at the end of each food chain, breaking down dead plant and animal material to return the nutrients to the system.

Each kind of seabird eats just a few kinds of food (**prey**). A food chain for a cormorant might contain:

Sun — Phytoplankton — Zooplankton — Sandlance (or Capelin or Pollock) — Cormorant — Glaucous-winged Gull — Worms or Bacteria.

The cormorant does not eat zooplankton, which is too small for it, and it does not eat other seabirds — but the gull does! (Gulls can eat eggs and chicks as well as fish and mussels). Humans are part of a marine food chain when we eat clams, crab, fish, or a seabird egg. Combining all the food chains makes a **food web**. A marine food web is illustrated in the Teacher's Background Story.

MATERIALS:

- one deck of 60 food chain cards for each group of 3–4 students (two copies of masters provided)

PROCEDURE:

1. Using the masters provided, make sets of 60 cards. Each master must be copied twice for each set. Glue the cards to heavy stock paper. Laminate them if possible. Make sure each group has a set containing all 60 playing cards.

2. Place students in groups of 3 to 4. Each group receives one deck of 60 cards. Dealer shuffles and deals out five cards to each player and herself and places the rest of the cards face down in the center.

3. The dealer then takes the top card from the deck. She must discard either the card picked up from the top of the deck or one from her hand and place it face up in the discard pile.

4. The next player can take the top card on the discard pile or a card from the top of the deck. He checks his hand and must discard one card.

5. If a player draws a "Death Card" (rat) from the deck, he must immediately declare that rats have invaded his colony. The player then must sit out for the rest of the game. If a player is dealt a rat card in the opening hand, he may discard it without penalty.

6. The game continues until one person gets a hand consisting of five cards that make a true food chain and announces "Food Chain Rummy!" Each card lists what that animal eats. Refer to the foods listed on the cards to check the hand and make sure that it is a believable food chain. Every food chain must include the sun, a primary producer (phytoplankton), a primary consumer (zooplankton), a secondary consumer (herring, pollock, capelin, sandlance, squid, parakeet auklet, crested auklet, or least auklet), and a tertiary consumer (common murre, horned puffin, thick-billed murre, cormorant, tufted puffin, northern fulmar, human, glaucous-winged gull, raven, fox or bald eagle). Note that the *only* seabird in this game that preys on other seabirds is the glaucous-winged gull. In no other instance does one seabird feed on another seabird. If a student declares a winning hand and the food chain is not believable, that student must wait out two turns before she can draw a card. If the declared food chain is possible, she is declared the first winner and sits out while play continues.

7. Play continues until the second, third and fourth winners have completed a food chain.

8. At the end of the game, have the students connect their food chains into a food web.

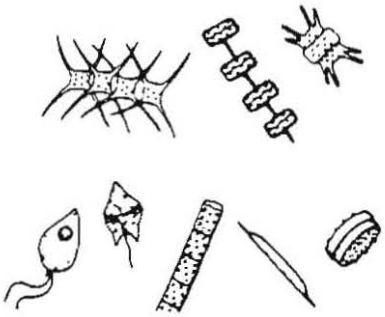
EXTENSIONS:

1. Discuss the predator-prey relationships within the food chains. What happens when a predator population or prey population increases or decreases? (Seabirds may abandon their nests or die when prey is scarce.)

2. Discuss competition for food sources. Do all seabirds compete for the same food? (No. Different species have different feeding methods. Some take food at the surface, some dive very deep, some eat zooplankton, some eat different species of fish.) What other animals compete with seabirds for food?

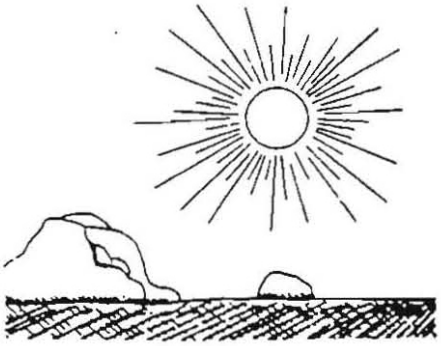
3. Humans are an intricate part of most marine food webs. We obtain many food items from the sea. In what ways might we compete with seabirds for food? Do we compete with other animals too?

Adapted from: *Wetland Activities,* Louisiana Department of Wildlife and Fisheries, Louisiana Sea Grant College Program.



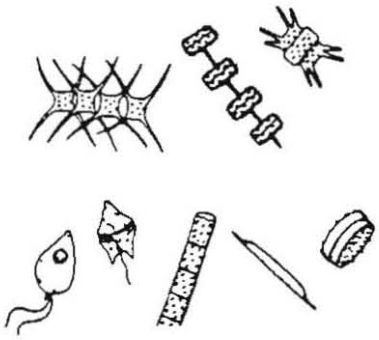
Phytoplankton

I am a single-celled plant.
I get my energy from the sun.



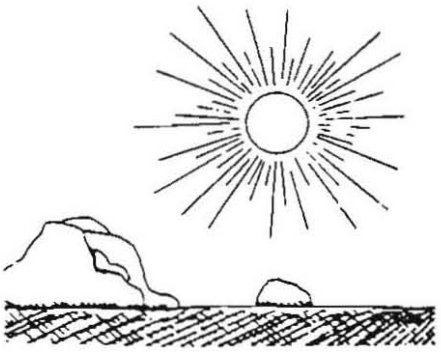
Sun

I am the beginning of the food chain.
Plants (including phytoplankton) use
my energy to make food.



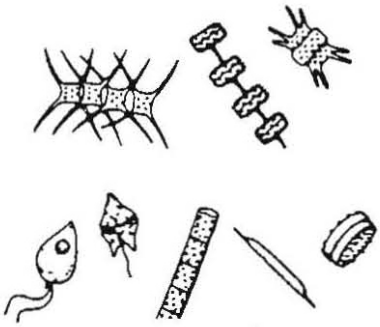
Phytoplankton

I am a single-celled plant.
I get my energy from the sun.



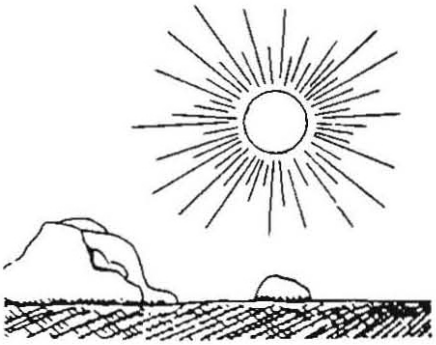
Sun

I am the beginning of the food chain.
Plants (including phytoplankton) use
my energy to make food.



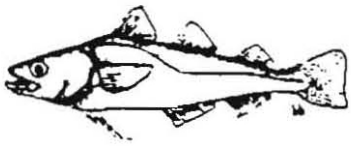
Phytoplankton

I am a single-celled plant.
I get my energy from the sun.



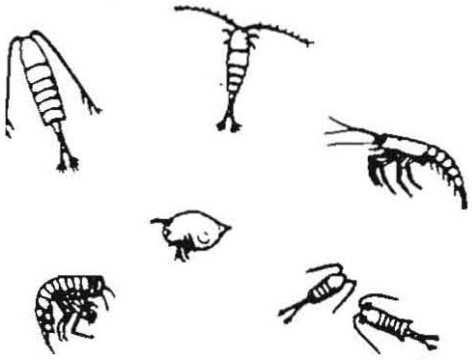
Sun

I am the beginning of the food chain.
Plants (including phytoplankton) use
my energy to make food.



Walleye Pollock

I eat zooplankton.
I also eat little walleye pollock.

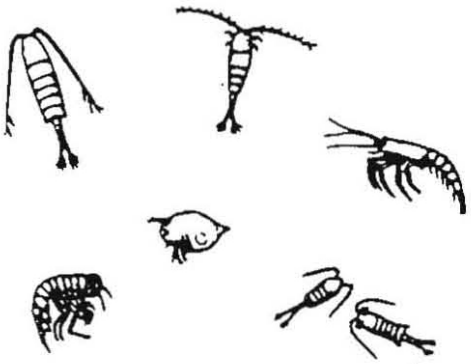


Zooplankton

I eat phytoplankton.

Pacific Herring

I eat zooplankton.

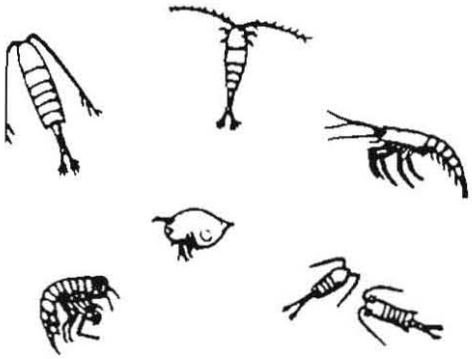


Zooplankton

I eat phytoplankton.

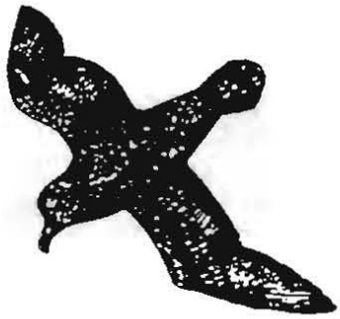
Squid

I eat zooplankton.



Zooplankton

I eat phytoplankton.

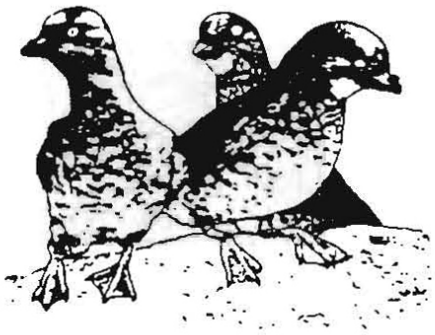


Northern Fulmar

I eat fish such as capelin, sandlance, and pollock. I also eat squid.

Crested Auklet

I eat zooplankton.

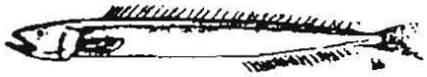


Least Auklet

I eat zooplankton.

Parakeet Auklet

I eat zooplankton.

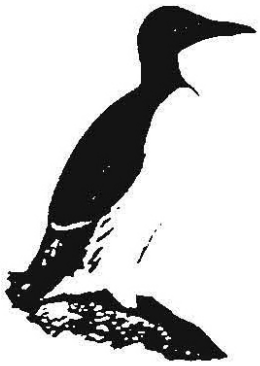


Sandlance

I eat phytoplankton and zooplankton.

Capelin

I eat zooplankton.

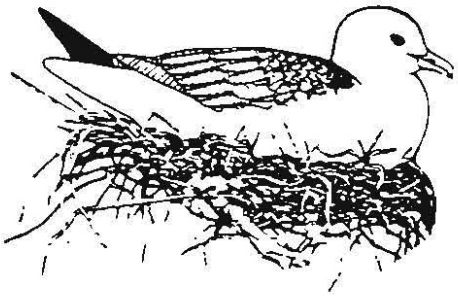


Common Murre

I eat fish such as capelin, pollock, and sandlance.

Tufted Puffin

I eat fish such as capelin, sandlance, and pollock.
I also eat squid and zooplankton.



Kittiwake

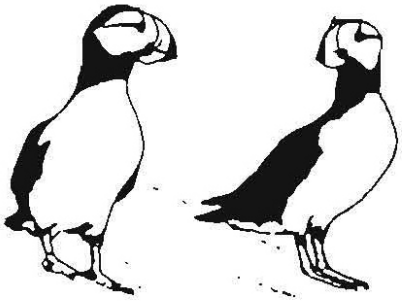
I eat fish such as sandlance, capelin, and pollock.

Cormorant

I eat fish such as sandlance, capelin, pollock, and others.

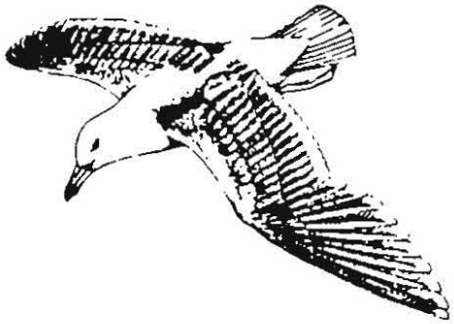
Marbled Murrelet

I eat fish such as sandlance, pollock, and capelin.



Horned Puffin

I eat fish such as capelin, sandlance, and pollock.
I also eat squid and zooplankton.



Glaucous-winged Gull

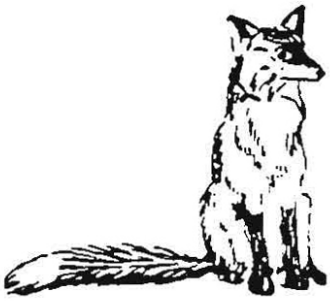
I eat many kinds of fish including pollock, capelin and sandlance. I also eat other **seabirds and their eggs** (even though I am a seabird too).

Human

I eat many things from the sea including pollock, herring, and **seabirds and their eggs.**

Raven

I eat small rodents, dead animals, garbage from humans, and **seabirds and their eggs.**



Fox

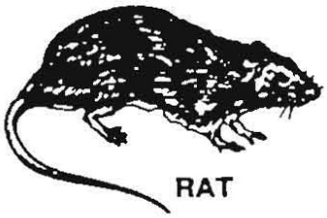
I eat small rodents, garbage from humans, and **seabirds and their eggs.**

Bald Eagle

I eat small rodents and other birds, including **seabirds.**

DEATH CARD

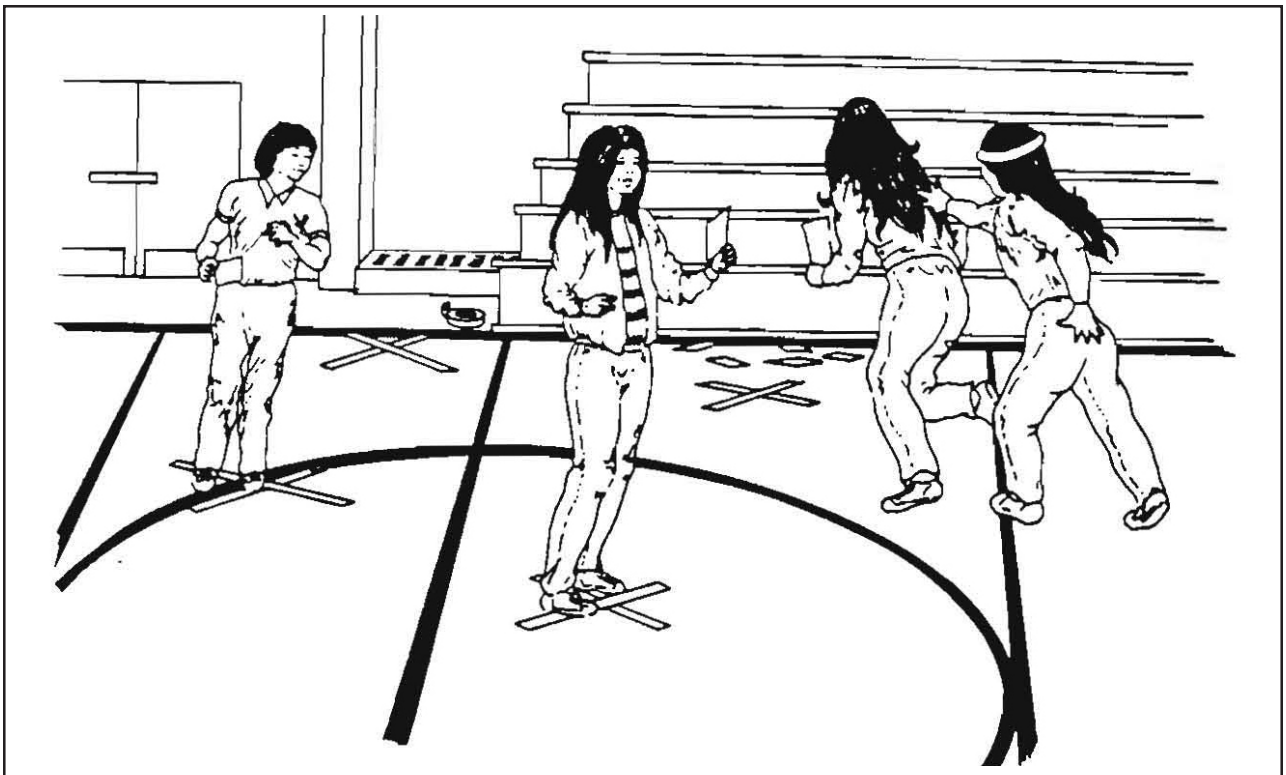
Rats have invaded your seabird colony! The food chain is in trouble and you are out of the game.



RAT

I eat many things, including **seabirds and seabird eggs.**

Habitat Tag



Objective:
In a highly active game, students will learn that all animals including seabirds must have food, clean water, shelter and space to survive, and about the impact humans can have on habitat and wildlife species.

Background:
Every living creature requires specific kinds and quantities of food, water, shelter and space in a suitable arrangement. These needs are called **habitat requirements**. Different birds and animals live in different habitats because they have different habitat requirements. For seabirds, the open ocean provides all habitat requirements during winter. During the summer nesting season seabirds require the shelter of land, usually protected cliffs and coastal areas, to raise their young.

In this tag game, each bird must find its habit requirements in order to survive. Predators get food by capturing (tagging) prey. The habitat component in shortest supply determines the number of animals that can survive. This is known as the **limiting factor**. Humans can change the available habitat in many ways. They can damage food and water sources, introduce disease and parasites, destroy shelter, overfish, kill predator and prey species, or introduce (accidentally or intentionally) new predator species such as rats and foxes.

The greatest threat to Alaska's seabirds is NOT an oil spill; it is the escape of rats onto seabird nesting islands. Since rats are not native to Alaska, seabirds have no way to defend themselves from this highly effective **predator**. Rats could escape from visiting boats or barges, or from vessels that have run aground. Rats are capable of wiping out seabird colonies because their size and agility lets them go wherever seabirds nest. Some seabird colonies are still empty after foxes, another introduced predator, were dropped onto seabird islands before the 1930s by people hoping to make money from later trapping the foxes for their fur.

Many traditional societies adopted rituals, rules, and accepted behavior to ensure that their required resources would always be available. Today we have habitat protection laws, hunting and fishing regulations, and predator control programs to prevent habitat destruction and over-exploitation of wildlife. One of our **habitat requirements** is to see that wildlife continues to thrive.

MATERIALS:

- cards labeled "food" and "water" (one each per student plus a few extra)
- bases for shelter/nesting areas (tape Xs on the floor, carpet squares, or paper plates)
- optional: tags or vests to differentiate players

PROCEDURE:

1. Place "food" markers on one side of the room or yard and place "water" markers on the other. Scatter several bases around the playing area which will serve as shelter (nesting areas) for students to stand on. Designate a few of these as predator shelter.

2. Explain that for any animal (including birds and fish) to survive, it must have food, water, and shelter (a place to hide). The object of the game is to get a food and a water marker and reach shelter before being caught by a predator. Predators get food by tagging a prey. Predators must get a water marker, tag a prey and return to the predator shelter bases. Only one person may be on a base at a time. If a prey does not have food and water, he may only stand on a shelter for the count of 10. If a prey has food and water, she may displace a thirsty or hungry prey player with only one marker (food or water). Predators cannot touch prey players when they are on a shelter base.

3. Select a few students to be predators. The rest will be prey. Possible predator/prey examples to use are foxes/kittiwakes or puffins/pollock. Start the prey on one side of the room or yard and the predators on the other. After saying 'start', play for 3-5 minutes.

4. At the end of the round, stop activity and discuss what happened. Explain that for seabirds, especially in winter, the open ocean serves as "shelter." Those prey who obtained food, water, and shelter survived. Those prey who did not survive become predators. Original predators become prey.

5. Play more rounds, adding variations. Possibilities include varying the distance between shelter spots, limiting the number of food or water markers or players, or changing the ratio of predators to prey. Students will learn the importance of the arrangement of habitat components and that the resource in shortest supply (food, water or shelter) will limit the number of animals that survive (limiting factor).

6. After students have played the game with varying numbers of predators, food, water, and shelter markers, introduce a new type of predator - a "super-predator" - representing rats or foxes. Rats can catch prey even if they are on shelter markers and they can catch as many as they wish. They can also catch predators. Anyone caught by a rat is out of the game. The game is over when there is no more prey. What happens when rats (or other "super-predators") are introduced to a seabird colony? How can we prevent rats from ever reaching our seabird colonies? (See "Can Do!", to implement your students' ideas in your community.)

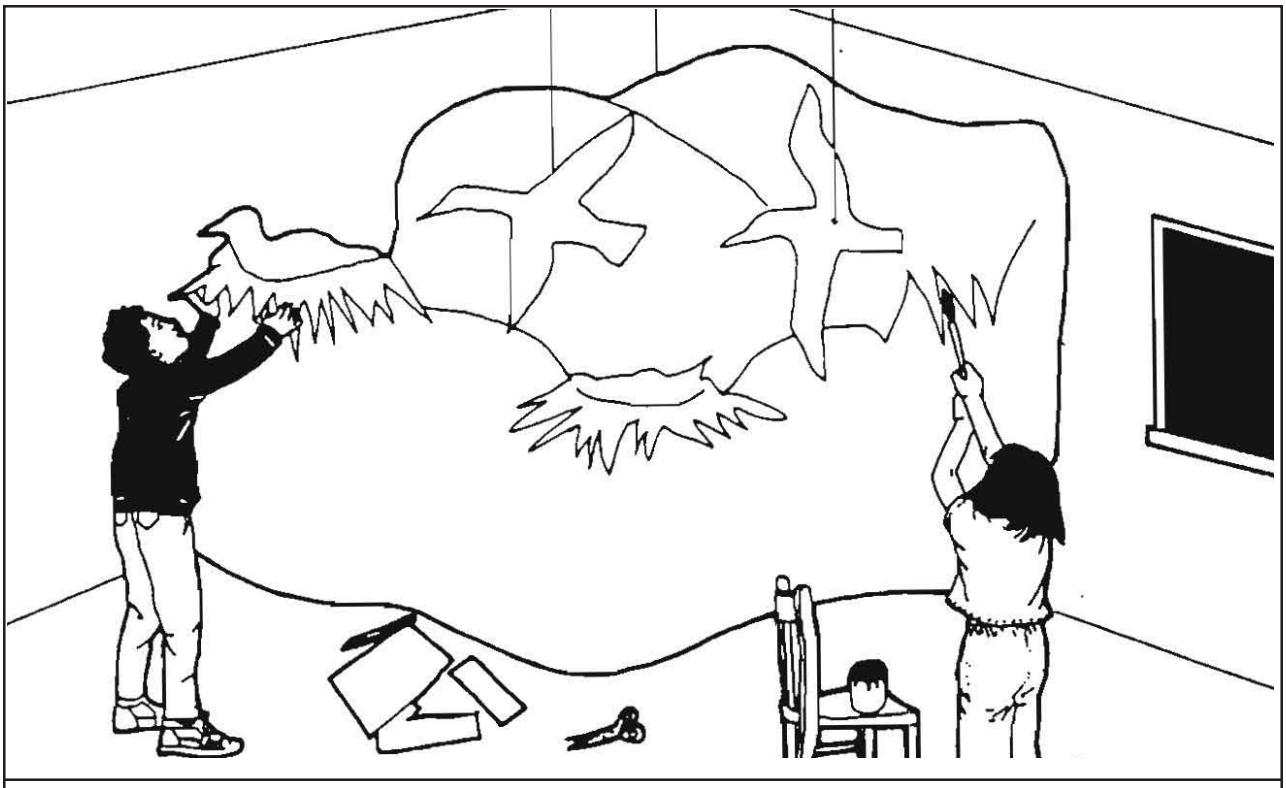
EXTENSIONS:

Introduce a new twist - humans. Humans can catch predators or prey, and they may catch as many as they wish. Anyone caught by a human is out of the game. The game is over when there is no more prey. What happens when humans catch too many prey or predators? In what other ways do humans harm seabird habitat? (Oil spills, plastic trash and other pollution, overfishing, etc.) Ask the students how they could keep the game going and still have humans. They

may make new rules, perhaps limiting the number of predator or prey players they can catch. They might limit the amount of time the human players can play, perhaps to 30 seconds per round. This simulates creating habitat protection laws, and hunting and fishing regulations and quotas. These regulations are designed to ensure that humans don't destroy too much habitat or take too many animals. Traditional cultures also maintain rules that protect wildlife resources, for example, collecting seabird eggs only early in the season so the birds can re-lay successfully. Do any such rules exist in your community? What kinds of rules could be made to protect seabirds?

Adapted from: *Alaska Wildlife Week 1983*, Alaska Department of Fish and Game.

Create A Cliff



Objective:
Students will apply knowledge of seabirds and their nesting habitats to create a model of a seabird colony.

Background:
Think like a seabird. Where would you choose to lay your egg? This art activity turns the concept of a seabird colony into a tactile learning experience by actually building one in the classroom. This indoor activity can be conducted over several days. Some students may only know seabird cliffs from photographs. Many coastal Alaskan students, however, may have seabird communities for neighbors. Building a cliff takes both kinds of students into the close up living arrangements that allow a dozen different kinds of seabirds to live together in this premium space.

Seabird colonies are complex and dynamic. Each species occupies a specific **niche** in the community. Where a bird nests in the colony helps to identify it and tells important facts about its life. A diagram of a typical seabird community with all its "neighborhoods" can be found in the Teacher's Background Story and the red booklet, *A Guide to Alaskan Seabirds*. The accompanying poster also illustrates colony arrangements.

Some seabirds make a **nest** to keep their eggs safe and warm. Kittiwakes and cormorants build a nest of sticks, grass, and mud. But some seabirds, such as gulls and murres, lay their eggs right on the **bare ground**. Others go inside the cliff to lay their eggs in the soil of **burrows** (tufted puffins) or in rock **crevices** (guillemots, horned puffins, auklets). When building your model colony, pay special attention to creating distinct **niches** for each species represented.

Some seabirds can raise a family of several chicks each year. Gulls and cormorants often lay three eggs. But many seabirds can lay just one egg each year — murres, puffins, and auklets, for example. (Sometimes

a murre can lay another egg if a person or predator takes the first egg right after it is laid.) The small size of seabird families means that it is very important to do all we can to help the birds raise most of their young each year. See the activity "Can Do!" for ideas.

MATERIALS:

- bulletin board paper
- paints
- markers
- glue
- string
- paper mache
- reference material such as *A Guide to Alaskan Seabirds,* U.S. Fish and Wildlife Service, *Zoobooks - Seabirds,* and others listed in the Teacher's Background Story.

PROCEDURE:

1. As a group look at pictures of seabird colonies. Examine the individual features of the colonies. Where do each of the bird species nest? What is that section of the colony like?

2. Assign groups of children to research and build models of individual species of birds, such as puffins, murres and kittiwakes. Create a plan with your students for how to build the cliff structure. Possible materials to be used include fishing net, chicken wire, chairs, desks, bulletin board paper, paper mache, etc. Encourage plans which have the cliff possess three dimensions. Some assistance may be needed to provide the infrastructure to support the cliff. Allow children to build models or paper cut-outs of birds. Encourage the production of enough birds to mimic an actual bird colony.

EXTENSIONS:

1. Visit an actual bird colony and talk about features of the colony not present in your model. These will undoubtedly include smell, noise, and guano. Which of these features could reasonably be included in the classroom model? Are you able to record the sounds of the bird colony on your visit? Note the differences between nesting habits of different species. Who nests where and why?

2. Several special seabirds found in Alaska won't be found on a cliff. Research which ones, and learn about their special nesting habitats.

3. Watch the video *Chain of Life*, available on loan from Alaska Maritime National Wildlife Refuge, 2355 Kachemak Bay Drive, Homer AK 99603, (907)235-6961.

Foxes And Kittiwakes

Objective:
Students will gain an understanding of seabird **predator/prey relationships**, population growth and limits, and the utility of colonization through a highly interactive, capture-the-flag style game.

Background:
While seabirds are on the ocean, they are the **predator** hunting for **prey** (small fishes and other tiny marine life) to eat or to carry back to feed their chick. When seabirds come onto land, they cease being predators and become potential prey for land animals such as foxes and rats, and birds that hunt other birds — falcons, jaegers, ravens, eagles, and some gulls.

How can seabirds protect themselves? One **adaptation** is to nest in huge communities with thousands of other seabirds so a hungry predator might eat all it wants long before reaching <u>your</u> nest. All those neighbors set up an alarm too, so no predator can sneak into the colony and catch you off guard. Kittiwakes and gulls will even try to attack the predator in flights of dive bombing or **mobbing**.

Another adaptation is to hide. Some seabirds nest underground in burrows or in cracks and crevices between rocks. Some choose nest sites on sheer rock cliffs, inaccessible to most predators. However, rats can go almost everywhere and foxes too have few barriers, making them both the most feared predators on seabirds.

Materials:
- seabird eggs (crumpled newspaper, foam balls, or strips of cloth), one for each student
- strips of cloth to mark predators, about ten each of two different colors - one color (such as red) for juvenile predators, and another color (blue) for adult predators.

Procedure:
1. Play in a gym or all-purpose room. Choose a local seabird (such as kittiwakes)

and a local predator of seabirds (such as foxes) to be represented in this activity. To begin, all students will be kittiwakes (or other seabird you have chosen). Pass out one egg to each student. You (the instructor) will be the adult fox (or other local predator). Place the fox markers at one location in the room which will be the fox den site.

2. Explain that the object of the game is for the kittiwakes to have more eggs than the fox at the end of a two minute round. The kittiwakes may lay their egg wherever they wish, but once their egg is laid it cannot be moved. The fox can take only unguarded eggs. The fox can also take kittiwakes by tagging them. Once a fox tags a kittiwake it must willingly go with the fox to the den. The fox must take the kittiwake to the den before returning to its nest site for the egg. The captured kittiwake now becomes a juvenile fox and puts on a red scarf. The juvenile fox can capture only unattended eggs. Once a juvenile fox captures four eggs it becomes an adult fox and puts on a blue scarf. It can now capture kittiwakes.

3. Kittiwakes have only limited defense. If four or more kittiwakes hold hands and encircle a fox, the fox must return to its den before hunting again. A fox may not touch the banded kittiwakes unless the number of kittiwakes holding hands becomes less than four. In that case a fox may only capture one kittiwake at a time.

4. Begin the game by telling the kittiwakes to go find a place to lay their egg using a broad sweep of your arm which suggests nesting throughout the gym.

5. At the end of the first two minute round count how many eggs were captured by the fox, and how many kittiwakes survived. (If the kittiwake nest sites were scattered, most eggs and kittiwakes were probably easily taken.) Discuss the results. Was it easy for the fox to take eggs and kittiwakes? Why? How might the kittiwakes defend themselves better? Encourage the students to come up with strategies for defense and safety such as nesting closely together in a colony.

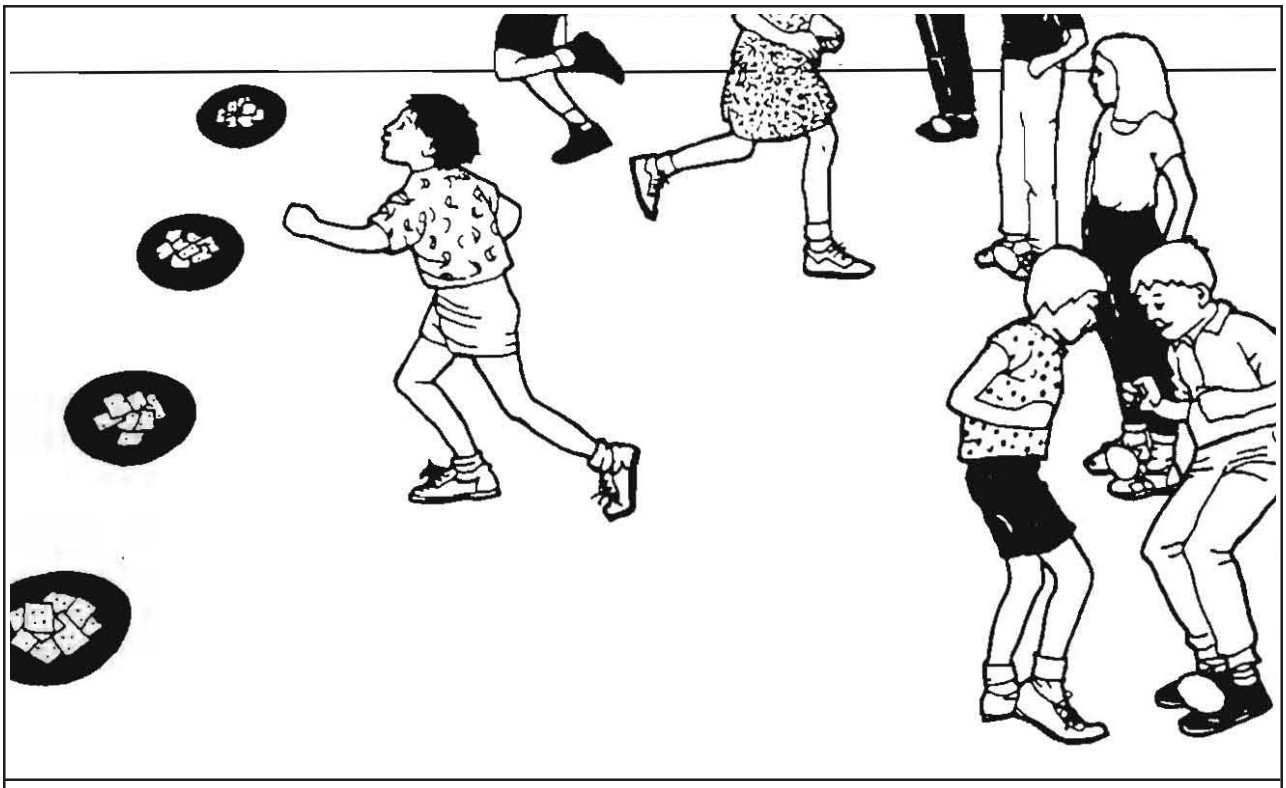
6. Play another round, allowing the kittiwakes to nest together in a colony. At the end of the round, discuss the differences between the two rounds. Were more kittiwakes and eggs able to survive? Discuss actual examples of colonial nesting in seabirds. What other nesting habits protect seabirds from predation? (Nesting on sheer cliffs, on islands, and in deep burrows.) What were the limits to fox population growth?

EXTENSIONS:

1. When on a field trip to a seabird colony, look for predators or signs of predators (scat, den sites, broken egg shells, parts of birds such as wings and feathers).

2. At a seabird colony, conduct a study on the rate of predation over a period of several days or weeks. Choose and mark with stakes a section along the edge of the colony or the top of the cliff 100 feet or so in length. At regular intervals (every day or once a week), collect all broken egg shells found in your study plot. If you notice another area near the colony where predators spend a lot of time (such as a roost of ravens or gulls, or a fox den), include this place in your study. Count and record the number of shells, and sort by size and color if desired. Can you determine the type of predator leaving egg shells in your plot? Look for clues such as fox scat, gull "pellets", black raven feathers, etc. Did the number of shells collected vary a lot during your study? Why?

Murre Egg Relay



Objective:
Students will learn about the nesting habits of murres, the uniqueness of their eggs, and experience the challenges seabirds face in raising their young. The activity consists of two parts – making paper mache eggs, and an active relay game.

Background:
The seabirds called murres must be students of daring and physics. Daring, because they each lay their one egg on an open rock ledge (or open ground if their island has no land mammal predators) and build **no nest**. Their egg could roll off the ledge and plunge to the rocks below except for its shape — and physics. Their large **egg is shaped like a pear**, narrow at one end and wide at the other. This causes the egg to roll in a tight circle, making it less likely to roll over the edge.

Murres incubate their egg by holding it on top of their feet and against their belly, under a loose fold of feathers and skin. While one parent feeds offshore, the other sits on the ledge, incubating the egg. Occasionally the parents will switch roles, carefully passing the egg between them.

Murre eggs vary in color from a pale blue-green to dark turquoise with black spots. The color helps to camouflage any unguarded eggs from air-borne predators looking down at the cliffs. The pattern of black splotches varies on each egg and may help adults recognize their own egg.

Materials:
- Items to make paper mache eggs:
  - small water balloons, one for each student
  - newspaper torn in strips
  - flour and water
  - several bowls
  - blue, green and black paint
  - paint brushes
- Goldfish crackers
- Paper plates, one for every two students

Procedure:
This is a two part activity and will extend over several days.

Part 1: Making paper mache murre eggs

1. Blow up small water balloons to approximately the size of a large pear and tie off. Mix flour and water in a bowl to make a paste. Dip newspaper strips in paste. Use fingers to remove excess paste and press strip to balloon. Continue until balloon is completely covered. Apply 2-3 layers of strips. Allow to dry for 2-3 days.

2. When the eggs have dried, paint them. Mix blue and green to obtain a turquoise color for the background. Decorate with black dots. Allow the paint to dry for 1-2 days. While making the eggs, discuss the unique shape and coloration of murre eggs. Have the students try to roll their egg off the edge of the table.

Part 2: Relay game

1. In a gymnasium or other large room, divide the group into pairs. Each pair of "murre" parents will need one egg.

2. Line up the "murres" along one side of the room. This side of the room represents the cliff ledge. Opposite of each pair on the other side of the room place a paper plate with six goldfish crackers on it. There should be one plate for each pair. This represents the ocean offshore where the birds feed.

3. Begin with one member of each pair holding the egg on the top of their feet. Stress that the egg cannot touch the cold floor, so must stay *on top* of the feet, not just between them.

4. At the signal "Go!", the other member of each pair must run to the "feeding area", take <u>one</u> fish from his/her pair's plate and eat it, and return to the cliff.

5. Now the pair switches roles, and must carefully pass the egg from feet of one to the feet of the other, *without using their hands*. Once the egg is securely on the feet of the other partner, the feeding partner now goes to the "ocean" to get a fish. Play continues until the food is all gone.

6. In the next round, play the same as above, except have two players be "rats" (or other predators such as ravens or foxes). The "rats" move around the cliff area and look for unattended eggs. If an egg rolls off the feet of the murre, it can be snatched by a rat. The rats can use their hands to grab the eggs, but they cannot steal the eggs off the feet of the murre. The murres must hold the egg on top of their feet, and not allow it to rest on the cold ground. If a murre pair loses their egg, they are out of the game.

7. Play several more rounds, varying the number of rats.

8. For the final round, show the effects of low-flying aircraft on a bird colony. Have someone pretend to be an airplane, buzzing low over the cliff. As the airplane flies past the birds, it frightens all of the murres and they jump off the cliff and fly out to the ocean, leaving their eggs unguarded on the cliff. The murres must touch the far wall of the room before returning to the cliff ledge. The rats try to gather as many eggs as they can before the murres circle back and land again on the cliff ledge. Did any eggs survive? Discuss what might happen if this occurs over and over again during the nesting season.

EXTENSIONS:

1. Test how well the camouflage of your murre eggs works in the playground. Hide all of the eggs around the playground in plain view. Have the students pretend they are predators such as ravens, rats or foxes. Allow them 3 minutes to collect as many as they can find.

2. Put all of the eggs together on a "ledge" (or on the floor). Have the students try to find their own egg.

3. During a field trip to a seabird colony, observe murres. Look for eggs, or see if you can tell which birds have eggs or chicks. The poster illustrates a murre feeding its chick.

Community Interviews

Objective:
Students will be able to give examples of traditional knowledge or stories from their community related to seabirds, wildlife, or the environment.

Background:
Your community members have knowledge about seabirds (or the coastal environment, or marine issues) that goes back generations and perhaps into prehistoric times. While working on the other activities in this packet, questions may arise that can only be answered by elders and adults outside of school. This activity can tap into your community's heritage and promote the sharing of information at another level.

In predominantly white communities the journalistic skills of interviewing spring out of the culture's ideals about knowledge acquisition. Pointed and direct questions such as "Who?", "What?", "Where?", "When?", "Why?", and "How?" are the tools that will solicit in-depth answers.

Many Native communities may find those same direct questions offensive or at least intrusive. These cultures have a strong tradition in a different style of learning based not on detailed questions, but on observation, guided practice, and story. The effectiveness of the interview for a Native student may lie in the student's ability to minimize the use of western journalistic skills, and apply the forms of inquiry traditionally respected in the community.

Materials:
- paper for taking notes and/or tape recorders and tapes
- information about local laws and regulations affecting wildlife

Procedure:
1. Start a discussion about a local topic that involves wildlife, hopefully seabirds. Are there different points of view in the community about this topic? Are there other topics that interest the students? List them.

2. Teach the western journalism skills. Get a large sheet of bulletin board paper and divide into three columns. In the first column write the six basic questions "Who?", "What?", "Where?", "When?", "Why?", and "How?". Label this column "Journalist's Questions." Select one of the discussion topics from above and generate specific questions. List these questions in the second column.

3. Ask the students how their grandmother or aunt would react to them coming over with a tape recorder and asking these direct questions. The point of this discussion is to see if the students can come to a consensus on what the community standards are regarding children asking direct questions. To help guide the discussion you might ask questions such as: "Would (name a younger adult in the community who is in a leadership position) feel comfortable answering these questions?" "What is the best way to get an older person to tell you a story?" "What is the respectful way to show you are interested and listening to an elder?" "If you still don't get the information you want or need, are there others (intermediaries) who could find out information for you?" Summarize student's responses in column three. State clearly that both ways of gaining information are valid. The goal is for them to be able to use both methods in the appropriate circumstances.

4. Before going out into the community, have the students "interview" each other for practice using the questions generated above. Have them write or tape record their responses so that they may be compared later with responses received from community members.

5. Next, ask the students, working alone or in groups, to interview at least one longtime resident of their community. The students should be prepared to take notes, or to tape the interviews. Instruct the students to be sure to take time to listen to any of the stories the people might tell that are slightly off the subject; out of courtesy, and also in recognition that the slightly divergent topics will also be interesting and pertinent in some ways. Optional: interview other categories of people; e.g., family members, wildlife managers or researchers, members of the city council.

6. Compile the results of the interviews. This might be done in a time-consuming way, where the interviews are transcribed, analyzed, summarized, and discussed. Shorter approaches may also be taken: each group of students summarizes the results of its interviews in a one-page format, and then a small group of students volunteers to prepare a summary representing the findings of all the students.

7. Discuss the findings, including what different points of view were identified, and factors which might contribute to people having different points of view.

EXTENSIONS:

1. Identify a local controversial issue involving or affecting seabirds, wildlife or other natural resources. Find out the facts. What is the issue? How did it develop? What attitudes and information are involved? What possible solutions are available?

2. Start this activity by pretending you were living 100 or 200 years ago. What animals did you see? How did you live? Day to day, week to week, season to season? After imagining yourself at that time, discuss what your attitudes might have been toward natural resources and the environment. Might they be different today? In what ways?

3. Translate the names of birds in your area into the local Native language. Use the blank column in the chart of seabird names on the next page to record the bird names in your local dialect.

4. Make a class "newsmagazine" which compiles the student interviews and/or showcases students' seabird art.

Adapted from: *Teach About Geese*, U.S. Fish and Wildlife Service.

SEABIRD NAMES

ENGLISH	TLINGIT	ALUTIIQ	UNANGAX̂ ALEUT	CENTRAL YUP'IK	INUPIAQ	SIBERIAN YUP'IK	put your dialect here
Northern Fulmar			Aaglu-x̂, Saayu-x̂			Aghqulluk	
Shearwaters			Aduya-x̂, Saquya-x̂			Kaputaghaq	
Storm-petrels	Ganook		Lividriiqa-x̂				
Double-crested Cormorant			Txax	Uyalegpak			
Pelagic Cormorant	Yook		Agayuux̂ Kanuliisigi-x̂	Agasuuq Uyalek	Pautuk	Ngelqaq	
Red-faced Cormorant			Ingatu-x̂				
Jaegers			Aligdusix̂, Kiiyux	Yunaq	Isungngaq	Yuungaaghaaq	
Glaucous Gull				Naruyarpak	Nauyavasugruk	Naghuyapik	
Glaucous-winged Gull			Sluka-x̂	Naruyarpak	Nauyavasugruk	Ugraaq	
Herring Gull	Keitlyudee		Slukaada-x̂		Ṫagium nauyaq	Ugraaq	
Mew Gull				Naruyak	Nauyatchiaq		
Black-legged Kittiwake			Tiigilgaada-x̂ Gidaax̂	Arliaq, Naryacuaq Tengaurta		Qagsungiq	
Red-legged Kittiwake			Qaĝaya-x̂			Qagsungiq	
Bonaparte's Gull				Nacallngar			
Sabine's Gull				Nacallngar	Aqargigiaq	Nasallenguq	

SEABIRD NAMES

ENGLISH	TLINGIT	ALUTIIQ	UNANGAX̂ ALEUT	CENTRAL YUP'IK	INUPIAQ	SIBERIAN YUP'IK	put your dialect here
Arctic Tern	Kichyat		Qitiqda-x̂	Teqiyaar	Mitqutailaq	Tekeyiighaq	
Aleutian Tern							
Common Murre			Ulux̂txa-x̂, Sakita-x̂	Alpaq	Atpa, Akpak	Kuwaaq, Alpa	
Thick-billed Murre			Ulux̂txa-x̂ Sakita-x̂	Alpaq		Aqevgaghnak Alpa	
Black Guillemot				Qayagpagayuli	Sigvaq	Samseghhaghaq	
Pigeon Guillemot			Siihmlu-x̂, Qachiida-x̂	Qayagpagayuli		Samseghhaghaq	
Marbled and Kittlitz's Murrelets	Ch'eet, Keel			Cigur		Tagituwiiq	
Ancient Murrelet			Qidanga-x̂			Tagituwiiq	
Cassin's Auklet			Umaxchiida-x̂				
Parakeet Auklet			Qihmuugda-x̂		Sayuguyuuq	Suklugraq	
Crested Auklet			Kunugyu-x̂			Sukilpaq	
Least Auklet			Chuuchiix̂			Akmaliighaq	
Whiskered Auklet			Kdiix, Tuhmu-x̂				
Rhinoceros Auklet	Xik						
Horned Puffin	Xik		Qagida-x̂	Quengacuar		Quprughaq	
Tufted Puffin	Logun		Uxchu-x̂	Qilangaq	Tunngaq	Pagrugaq	

No Water Off A Puffin's Back

Objective:
Students will be able to: 1) identify ways oil spills can affect seabirds adversely, and 2) describe possible negative consequences to wildlife, people, and the environment of human-caused pollutants.

Background:
The impacts of environmental pollution often are difficult to see. A major oil spill, however, provides dramatic evidence of potential impact to wildlife, especially seabirds. Examples include damage to feathers, killing of embryos by poisoning when oil seeps into eggs, and death by ingesting food and water contaminated by oil.

People are involved in efforts to prevent oil spills and to "clean up" after spills take place. Such actions are well-intentioned but sometimes have consequences as well. For example, the process of using detergents to clean oil from the feathers of birds caught in spills may also damage the birds' feather structure and arrangement. The feathers thus cannot insulate and waterproof the birds adequately. Birds may get sick more easily because of stress and become too weak to find food or clean their feathers. Obviously, the food and water sources of birds may also be affected by oil.

Oil spills are just one example of the kinds of pollutants that can have adverse short and long-term effects on wildlife, people, and the environment. The impact of DDT on the food chain is well-known, causing the thinning of egg shells in bald eagles and other birds. Habitat destruction, such as the logging of nesting habitat of murrelets, can combine with the effect of pollutants to threaten the existence of species.

The major purpose of this activity is for students to examine some of the possible consequences of human-caused pollution for seabirds.

Materials:
- cooking oil
- shallow containers, 1 for each group of 3-4 students
- small bowls, 1 for each group

- eye droppers
- hand lenses, at least 1 for each group
- feathers, at least 1 for each group
- dishwashing liquid or other liquid detergent
- hard-boiled eggs, 3 for each group

PROCEDURE:

1. Divide the class into groups of three or four. Each group needs a shallow pan partially filled with water. Add a known amount of oil to the pan, one drop to one dropper full, depending on the size of the container. Observe the interaction of oil and water. Measure the area covered by the oil. Using this information, estimate the area that might be affected by an oil spill involving:

1) A tanker truck holding 8,000 gallons.
2) A ship holding 300,000 gallons.
3) A supertanker holding 83,000,000 gallons.

Conversion factors you may need:

76 drops = 1 teaspoon
768 teaspoons = 1 gallon
1296 square inches = 1 square yard
4840 square yards = 1 acre
640 acres = 1 square mile

Discuss and compare estimates with other groups. Graph estimates and compute average figures.

2. Put enough oil in a small container to submerge three hard-boiled eggs. Add the eggs. Put the eggs under a good light and watch closely. Remove one egg after five minutes and examine it – before, during, and after peeling off the shell. Try to remove the excess oil from the outside before attempting to peel the egg. Remove the second egg after 15 minutes and the third egg after 30 minutes, repeating the procedure, examining each carefully. Discuss observations. What effect could oil have on the eggs of birds nesting near the water?

3. Examine a feather with a hand lens. Sketch what you see. Dip the feather in water for one or two minutes, and examine again with a hand lens. Sketch and compare to the original observations. Place the feather in oil for one or two minutes, and then examine with a hand lens, sketch, and compare with other sketches. Clean the feather in detergent, rinse in water, and dry it. Examine with a hand lens, sketch, and compare with previous sketches. Discuss changes in the feather after exposure to oil and then to detergents. What effect could these changes have on normal bird activity?

4. Discuss other possible effects on birds from an oil spill. Discuss possible impacts on other wildlife species, on humans, and on the environment. What trade-offs are involved? Do we have to choose between oil and birds, as well as other wildlife? What are some alternatives? What are other examples of human-caused pollutants that can have negative consequences for wildlife, people, and the environment? What is being done or can be done about these as well?

5. Optional: Ask each student to write a report, summarizing the findings of the experiment as well as making recommendations.

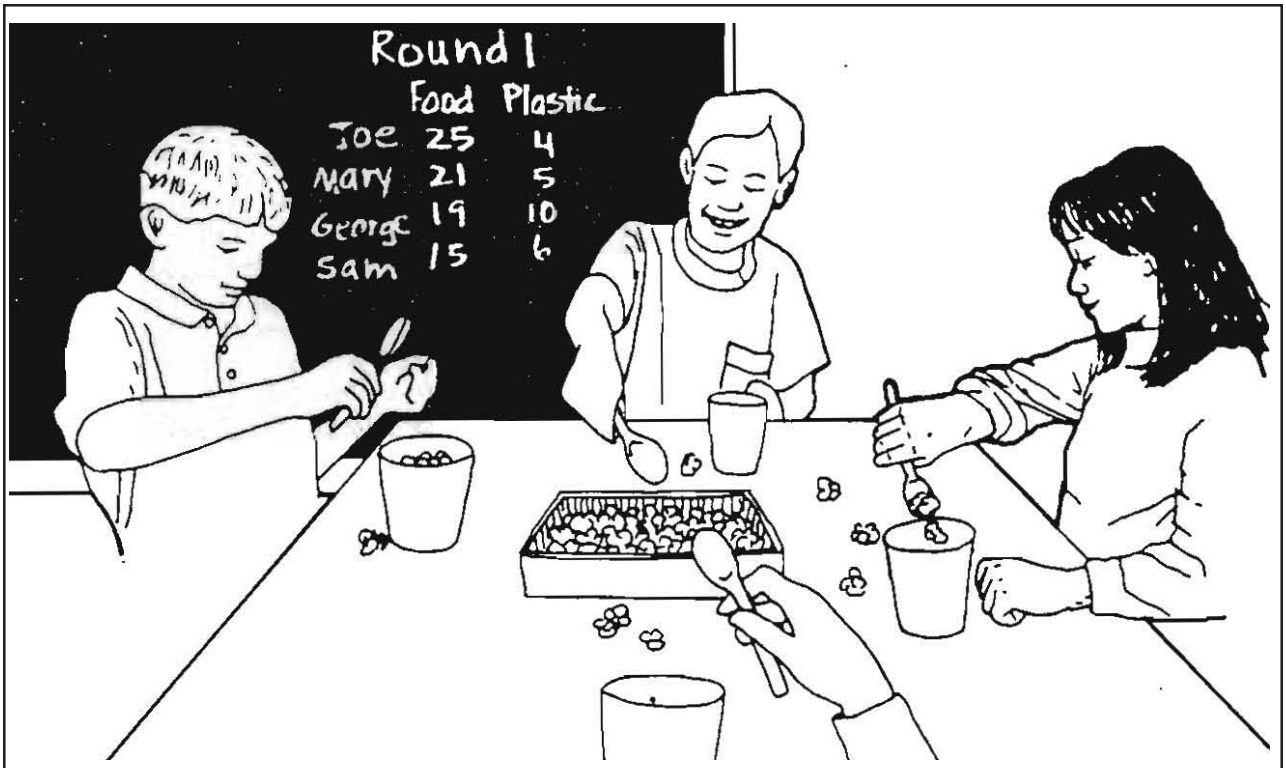
EXTENSIONS:

1. A variety of oils – cooking oil, clean motor oil, baby oil – could be used, with effects compared. Be sure to dispose of these items properly.

2. Other pollutants can be used to see what, if any, effects they have on eggs and feathers. Exercise caution, however: do not use any unusually dangerous substances.

Adapted from: *Project Wild,* Western Regional Environmental Education Council.

FEEDING FRENZY



OBJECTIVE:
Students will see how easily seabirds and other animals can mistake plastic for food, and how concentration and proximity of food resources affects feeding success.

BACKGROUND:
Think about the variety of plastic litter and packing material you've seen along the ocean shore: food containers, foam cups and coolers, six-pack rings, fishing line and corks. When these items are carelessly tossed into the ocean or blow from a shoreside garbage dump, they become a hazard to marine life.

The plastics eventually are broken into smaller pieces and concentrate in the same currents and tide rips where fish and other marine prey can be found. Seabirds seeking a meal in that concentration of prey may swallow some plastic trash, mistaking it for food in their rush to catch as much as possible before the school of fish or swarm of zooplankton moves out of reach. Seabirds cannot digest the plastic, so it builds up in their stomach, taking the place of real food. The birds slowly starve.

Seabirds may also starve or drown if they become entangled in fishing line, nets, or plastic six-pack rings. They have no way to escape from such trash. Even a six-pack ring or fishing line on the beach is a threat to them because it will soon be blown into the ocean or may trap birds if they come ashore to rest.

Human fishing activities, pollution, and natural lows in a prey species cycle may cause seabird food sources to be in short supply. Seabird chicks will be the first to starve if their parents must fly too far from nesting areas for the right kinds of fish or zooplankton. Seabirds may be forced to abandon their nests in such a bad year. Sometimes even the adult birds will starve.

MATERIALS:
- trays or shoe boxes (1 for every 4 students)
- plastic foam packing pellets, 1/2 cup for each tray
- popcorn, 1 1/2 cups for each tray
- a spoon and cup (clear plastic, if possible) for each student

PROCEDURE:

1. The object of the game is to collect as much food as possible in the time allotted. In each tray, mix plastic pieces with popcorn. Do not tell the students that the plastic pieces are not food. Give each student a "stomach" (cup) and a "beak" (spoon) and place them in groups of four around each tray.

2. Explain that the birds must pick up their food using only their beaks and put it into their stomachs. Food may not be scooped or thrown into the stomach.

3. Allow the birds to feed for 30 seconds. When time is up, all feeding must stop. Have each bird count and record the total number of pieces of popcorn and plastic eaten. Explain that the plastic pieces cannot be digested, so that any birds having mostly plastic in their stomachs would be starving. Return the popcorn to the feeding trays, but have each bird keep the plastic it collected in its stomach to simulate how plastic accumulates and is not digested.

4. Play several more rounds to illustrate how the plastic accumulates. Tally the popcorn and plastic pieces after each round. Some birds may eventually have stomachs filled entirely with plastic. Explain that these birds would not survive.

5. For an additional round, play in a gym or large room if possible. To represent a year in which food resources are located a long distance from the nesting area, place the food trays at one end of the room and have the students line up in pairs on the other side of the room. Again, allow only 30 seconds for feeding, but this time the students must run to their food tray. Only one bird in each pair may feed, because the other must stay on the nest to incubate eggs. The feeding bird must share its catch with its partner. At the end of feeding time, again have each bird count and total the number of pieces of food and plastic. Compare with the results of the previous round.

6. For another additional round, scatter the contents of half of the trays around the room. Explain that the food in the other trays is no longer available because it was taken by other animals or people, or was killed because of pollution. Again, allow all the birds to feed for 30 seconds. Again, count the number of pieces obtained. Was it harder to get enough food when it was scattered around?

EXTENSIONS:

1. Birds may also become entangled in plastic trash, especially fishing nets and 6-pack rings. To simulate this, for one round tie the arms of a few students to their bodies at the elbows so that it is more difficult to feed.

2. Watch the video *Trashing the Oceans*, available on loan from U.S. Fish & Wildlife Service, Resource Support, 1011 E. Tudor Road, Anchorage AK 99503, phone (907) 786-3351. This video and other information on marine debris may also be purchased from NOAA's Marine Debris Information Office in San Francisco, California. An order form is included at the back of the curriculum.

3. Conduct a beach cleanup and record the different types of trash collected. How might these items harm seabirds and other wildlife?

4. Encourage your students to cut up 6-pack rings before throwing them in the trash. This will prevent birds or other animals from becoming entangled in them at the dump.

Adapted from: *Ripples: A Big Sweep Elementary Activity Guide,* North Carolina Wildlife Resources Commission, 1990.

CAN DO!

OBJECTIVE:
Students will: 1) identify a problem involving seabirds, 2) suggest and evaluate alternative means to either solve the problem or improve the situation, 3) undertake the project to solve the problem, and 4) analyze and describe the process by which they successfully solved the problem or improved the situation.

BACKGROUND:
This activity is designed for students to identify a local situation in which they can help seabirds. The situation can either involve actual "hands on" experience, like a beach clean-up, or it may involve a political action project in which the students learn how to influence people in authority to carry out a desirable action for wildlife.

Each of us can make constructive contributions to improving the environment in which we live. Sometimes our actions can improve the environment for people, sometimes for wildlife, and sometimes for both. Sometimes we can get more done if we work with other people sharing ideas, information, and skills. A working knowledge of the following terms will be useful to students in this activity:

Problem: a difficult situation to be improved, or an opportunity to make things better. Problems cannot always be "solved", but situations usually can be improved.

Authority: an individual or group of people with the power to make changes.

Compromise: a way to settle a problem in which both "sides" usually give a little.

Given that it is important for young people to learn that they "can do" for people, wildlife, and the environment, use your judgement in the course of this activity to assist students in selecting a project that is realistic, constructive, and possible. If not, the students may experience an activity that contributes to their thinking that they "can't do." The major purpose of this activity is to provide students an opportunity to experience success in taking constructive actions to improve the environment for people and seabirds.

MATERIALS:

– writing materials

PROCEDURE:

1. Ask the students to think of some ways to improve local areas as homes for seabirds. They might generate a list of activities in their community that have a negative impact on birds. The list might include: litter that poses a hazard for birds (fishing line, fish nets, six pack rings); the possible introduction of rats from ships or boats; disturbance from humans, dogs, feral cats, or low-flying aircraft; catching birds in local fishing nets; pollution of streams or the sea; need for information on local birds; etc.

2. Look at the list of possible bird habitat problems and the suggestions for ways to improve bird habitat. Ask the students to select one they think they could realistically do something constructive about in a realistic amount of time. If they have difficulty deciding, and reasonable support has been offered for each, the students might vote to decide. Students could also make speeches in support of the problem they want to tackle, in hopes of swaying the class vote.

3. Once the problem has been selected, ask the students to work alone or in small groups to begin to generate ideas for possible solutions to the problem and ways to implement the project. Each individual or small group could come up with a plan, including written descriptions and sketches illustrating how to accomplish the project, step by step.

4. Ask the groups to present their plans to the rest of the students. Students may ask questions of the group. Once all the plans have been presented, ask the students to select the plan that seems most: a) constructive, b) realistic, c) helpful to birds, and d) likely to make a lasting contribution.

5. Ask the students to select one or more alternative plans, in case their first choice is not acceptable to authorities at the school or village.

6. Once a plan (with alternatives for "back-up") has been selected, ask the students to select a delegation to present their proposal to the school principal or the appropriate authority. Remember to include janitors, grounds keepers, school board, etc. (anyone who would be physically and/or officially involved). A practice session before the students and any interested parents or other groups of students would be helpful. At the practice session, the student delegation would make their presentation as they plan to do before the principal (janitor, council, etc.), responding to any questions from their audience that might be raised.

7. The students should make an appointment to present their proposal, make the presentation, and report back to their classmates. If their plan is accepted, they should make sure they know whom to contact next in order to successfully complete their project.

8. Making sure they have all necessary permissions secured, the students should proceed to successfully accomplish their project.

9. Once accomplished, ask the students to analyze their results. Did things work out the way the students wanted them to? Were there any surprises? Any unforeseen problems? How might they have been any more effective?

Possible Community Projects Related To Seabirds

– Start a "Trashbusters" program. Conduct beach clean-ups and anti-litter campaigns.

– Research existing rat control programs in the community. Develop ways to assist and/or improve the programs.

– Design a better rat trap for use on mooring lines. Current traps work well keeping rats from moving from shore onto boats, but not vice versa (the rats simply jump off the line and swim ashore).

– Gather data during different seasons on which species migrate through your area, which breed there, and if any spend the winter there. Have students provide observations about the dates different bird species are first sighted each spring, the date certain plants are first observed turning green or flowering, the date the first eggs are observed of the different species, etc. This information can be compiled over several years, average dates calculated, and changes plotted on graphs and compared.

The data you collect can be useful to the U.S. Fish and Wildlife Service! If you would like to contribute your data to the Alaska Seabird Colony Catalog database, please contact Dr. Vivian Mendenhall before you begin, at Migratory Bird Management, 1011 East Tudor Road, Anchorage, Alaska 99503, phone (907)786-3517. She will help you set up your project.

– Develop a seabird calendar. Interview people in the community or make observations to find out when the different species return and leave, when they nest, etc.

– Develop a map of good local birdwatching areas and the types of birds that can be found there at different seasons.

– Develop an information program for the community about seabirds and any problems facing them: leaflets, posters, videotapes, newspaper articles, displays at local events.

– Produce a classroom newspaper with articles about marine life and seabirds.

– Write a letter or article for the local newspaper, and try to get it published.

– Research water use in your community. Where does it come from? Where does it go? How is it used? Are things added to it or to sewage before discharging it back into water? Where is pollution occurring? Have students make personal, household and community inventories of water use and brainstorm ways to reduce use and pollution.

– Survey the community about the abundance of seabirds in local areas, and their use of the birds. Be sure to include older people and Native elders to determine how the areas and use has changed over their lifetime.

EXTENSIONS:

Document the entire process on video tape.

Adapted from: *Teach About Geese,* U.S. Fish and Wildlife Service.

For More Information...

The federal agencies below manage public lands containing seabird habitat. Contact them for more information about your area, or for assistance in planning field trips.

U.S. Fish & Wildlife Service

Migratory Bird Management
Dr. Vivian Mendenhall
1011 E. Tudor Road
Anchorage, AK 99503
Phone: (907) 786-3517

This office coordinates and conducts seabird studies around the state, and maintains a computer database on Alaska seabird colonies. They can provide you with maps and population data for most colonies in your area. ***You can help keep the database up-to-date by counting birds in your area. If you would like to set up a bird counting project, contact Dr. Mendenhall.***

Contact the refuges for local assistance

Alaska Maritime National Wildlife Refuge
Poppy Benson
2355 Kachemak Bay Dr., Suite 101
Homer, AK 99603-8021
Phone: (907) 235-6546

Alaska Peninsula/Becharof National Wildlife Refuge
Angie Terrell-Wagner
P.O. Box 277
King Salmon, AK 99613
Phone: (907) 246-3339

Arctic National Wildlife Refuge
Tom Edgerton
101 12th Avenue, Box 20
Fairbanks, AK 99701
Phone: (907) 456-0250

Izembek National Wildlife Refuge
Susan Schulmeister
P.O. Box 127
Cold Bay, AK 99571
Phone: (907) 532-2445

Kodiak National Wildlife Refuge
Diana Brooks
1390 Buskin River Road
Kodiak, AK 99615
Phone: (907) 487-2600

Selawik National Wildlife Refuge
Janet Warburton
P.O. Box 270
Kotzebue, AK 99752
Phone: (907) 442-3799

Togiak National Wildlife Refuge
Carol Wilson
P.O. Box 270
Dillingham, AK 99576
Phone: (907) 842-1063

Yukon Delta National Wildlife Refuge
Lorrie Beck
P.O. Box 346
Bethel, AK 99559
Phone: (907) 543-3151

National Park Service

Cape Krusenstern National Monument
Bradley Shults
P.O. Box 1029
Kotzebue, AK 99752
Phone: (907) 442-3890

Glacier Bay National Park and Preserve
Chief of Interpretation
P.O. Box 104
Gustavus, AK 99826
Phone: (907) 697-2230

Katmai National Park and Preserve
Susan Savage
P.O. Box 7
King Salmon, AK 99613
Phone: (907) 246-3305

Kenai Fjords National Park
Jim Pfeiffenberger
P.O. Box 1727
Seward, AK 99664
Phone: (907) 224-3175

Wrangell-St. Elias National Park
Margie Steigerwald
P.O. Box 29
Glennallen, AK 99588
Phone: (907) 822-5234

U.S. Forest Service

Chugach National Forest
Anchorage Headquarters
3301 C St., Suite 300
Anchorage, AK 99503-3998
Phone: (907) 271-2500
Direct inquiries to a specialist of interest, such as a wildlife biologist or plant ecologist.

Chugach National Forest
Cordova Ranger District
Sandy Frost/Mary Anne Bishop
P.O. Box 280, 612 2nd Street
Cordova, AK 99574
Phone: (907) 424-7661

Chugach National Forest
Glacier Ranger District
Jo Ellen Lottsfeldt
P.O. Box 129
Girdwood, AK 99587
Phone: (907) 783-3242

Chugach National Forest
Seward Ranger District
Bill Shuster
P.O. Box 390
Seward, AK 99664
Phone: (907) 224-3374

Misty Fjords National Monument/Wilderness
Jackie Canterbury
3031 Tongass Avenue
Ketchikan, AK 99901
Phone: (907) 225-2148

U.S. Forest Service
Alaska Region
Macky McClung
P.O. Box 21628
Juneau, AK 99802
Phone: (907) 586-7904

For More Information...

The following books are recommended for further reading and as field trip aids. Several are available by mail order from the Alaska Natural History Association as noted. An order form is included at the back of the curriculum.

Field Guides

Familiar Birds of Sea and Shore by Simon Perkins (National Audubon Society/Random House, 1994). A pocket-size guide describing selected seabirds, shorebirds and waterfowl, with photographs and range maps. 191 pp. ISBN 0-679-74921-7

Field Guide to the Birds of North America from National Geographic. An excellent field guide with descriptions, range maps and full-color illustrations of both seabirds and landbirds. 464 pp. *Available from the Alaska Natural History Association.* ISBN 0-87044-692-4

A Guide to Alaskan Seabirds (U.S. Fish and Wildlife Service/Alaska Natural History Association). A 44-page booklet with illustrations, range maps and habitat information for seabirds found in Alaska. A copy is included with this curriculum. *Additional copies can be ordered from the Alaska Natural History Association.* ISBN 0-9602876-4-7

Guide to the Birds of Alaska by Robert H. Armstrong (Alaska Northwest Publishing Company, Anchorage, 1995). Another good field guide with photographs and Alaska distribution information. 342 pp. *Available from the Alaska Natural History Association.* ISBN 0-88240-462-8

A Guide to the Natural History of the Birds of St. Lawrence Island, Alaska by Paul R. Ehrlich et al. (Center for Conservation Biology, Stanford University, 1993). A 28-page booklet with descriptions of each species found on St. Lawrence Island, including Yupik names.

Ocean Birds of the Nearshore Pacific: A Guide for the Seagoing Naturalist by Rich Stallcup (Point Reyes Bird Observatory, Stinson Beach, California, 1990). Detailed descriptions of 80 seabirds, plus other marine animals. Includes behavioral information and photographs. 214 pp. ISBN 0-962591-807

Seabirds, An Identification Guide by Peter Harrison (Houghton Mifflin Company, Boston, 1985). The definitive guide to seabirds. Includes range maps, color plates and detailed descriptions of each species worldwide. 448 pp. ISBN 0-395-60291-2

Reference Books

Atxam Sangis, Atkan Birds by Moses Dirks (University of Alaska, Materials Development Center). A description of birds found on Atka Island, in both Unangax Aleut and English. 78 pp.

Seabirds by Paul Sterry (Raintree Steck-Vaughn, Austin, Texas, 1994). A visual exploration of seabird adaptations, written for 4th-5th graders. 32 pp. ISBN 0-811-461882

Seabirds by John P.S. Mackenzie (NorthWord, Ashland, Wisconsin, 1987). Beautiful photographs with general descriptions of the families. 142 pp. ISBN 0-942802-52-7

Seabirds of Eastern North Pacific and Arctic Waters edited by Delphine Haley (Pacific Search Press, Seattle, 1984). A well-illustrated and interesting account of the birds of this region, with photographs and range maps. 214 pp. ISBN 0-914718-86-X

Seabirds of the World by Eric Hosking (Facts on File, New York, 1984). An in-depth discussion of the seabird families of the world, with photos. 159 pp. ISBN 0-87196-249-7

Zoobooks Seabirds. A colorful and informative booklet, included with this curriculum. *Additional copies can be ordered from the Alaska Natural History Association.* ISBN 0-937934-66-6

Children's Stories

Nights of the Pufflings by Bruce McMillan (Houghton Mifflin, New York, 1995). A charming story about children in Iceland who rescue young puffin chicks stranded in their village. 32 pp. ISBN 0-395-70810-9

Puffin, A Journey Home by Jim Tilly (Misty Mountain Publishing, Eagle River, Alaska, 1993). Written and published in Alaska, a beautifully illustrated story explaining why puffins are so brightly colored. 32 pp. ISBN 0-9635083-4-2

Puffin by Naomi Lewis (Lothrop, Lee and Shepard Books, New York, 1984, ISBN 0-688-03783-6) and **The Puffins Are Back!** by Gail Gibbons (Harper Collins Publishers, 1991, ISBN 0-06-021603-4). Two delightful stories about the lives of Common Puffins on the Atlantic Coast.

Where Are My Puffins, Whales, and Seals? by Ron Hirschi (National Audubon Society/Bantam Books, New York,1992). A photographic journey along the coast, with a conservation message. 44 pp. ISBN 0-553-0783-8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POSTER KEY

HELP PROTECT ALASKA'S SEABIRDS

1 Gill Net: Fish are being caught in this gill net. If people catch too many fish, birds cannot find enough food for themslelves and their chicks. The net has also caught birds. The birds will drown.

2 Barrel: This barrel is leaking oil. Oil ruins the feathers of seabirds so they die of cold.

3 Plankton: Plankton are tiny plants and animals living in the seawater. Many fish eat plankton, and so do some birds.

4 Auklet: Auklets are small seabirds that eat plankton, which they chase while swimming underwater.

5 Cormorant: Cormorants feed near the bottom of the sea. They swim with their feet.

6 Kittiwakes and terns fishing: Kittiwakes and terns fly down and catch fish at the surface of the water. These birds cannot dive below the surface, so they need schools of fish that come to the surface where the birds can reach them.

7 School of fish: Some kinds of fish swim in very dense groups (schools). These schools are important for seabirds because the birds can catch the fish easily in schools.

8 Murre and puffin fishing: Murres and puffins catch fish by chasing them underwater. These birds swim underwater with their wings.

9 Gull nest: Gulls nest on gentle slopes. They sometimes eat eggs or chicks of other seabirds.

10 Puffin colony: Tufted puffins usually make their nests in burrows underground, where each female bird lays one egg.

11 Kittiwake colony: Kittiwakes build nests on the cliffs and lay one or two eggs (or sometimes three, if they have plenty of food).

12 Murre colony: Murres nest on narrow ledges. Each female bird lays one egg on the bare rock. Murres nest very close together for protection from predatory birds like gulls. One murre is feeding a chick.

13 Auklet colony: Auklets nest in crevices under rocks. Each female bird lays one egg.

14 Disturbance: People can hurt seabirds by making loud noises or moving fast near the colonies. If parent birds are scared from their nests, their eggs or chicks may be hurt or killed.

15 Plastic on the beach: This six-pack ring and other plastic trash can injure seabirds.

16 Rat: Rats can run or swim off boats and move into seabird colonies. Rats kill many small birds and eat eggs. They are very dangerous to seabirds.

17 Gull eating egg: The gull is eating an egg which it stole from the murres or kittiwakes. Gulls are seabirds, but they also are predators on other birds.

18 Seabird colony: Many seabirds nest together in large colonies.

SLIDE SHOW

(All photographs were taken in Alaska, except slides 19, 28 and 29)

	Title on Slide	Long Description
1	**Common murres with eggs** (Could be anywhere in Alaska)	These common murres are incubating eggs which they laid on the bare rock ledge. One murre egg is lying to the left of the birds. If a gull sees this egg before the parent returns to protect it, the gull will eat the egg.
2	**Thick-billed murre with chick** (Pribilof Islands, Bering Sea)	This thick-billed murre is standing on a ledge with its downy chick. When the sun is not shining it will brood the chick with its body to keep it warm.
3	**Black-legged kittiwake on nest** (Buldir Island, Aleutians)	This black-legged kittiwake is standing on the edge of its nest. There are two eggs in the nest.
4	**Glaucous-winged gull** (Could be anywhere in Alaska south of Norton Sound)	This glaucous-winged gull is a seabird that sometimes preys on (eats) the eggs or chicks of other seabirds.
5	**Horned puffins** (Cape Thompson, south of Point Hope, Chukchi Sea)	These three horned puffins are sitting near their nest crevices in the cliff.
6	**Tufted puffin** (Could be anywhere in Alaska)	The tufted puffin sometimes nests in crevices in the cliff, sometimes in burrows which it digs in the ground.
7	**Crested auklets** (Could be anywhere from lower Alaska Peninsula islands to Aleutians, Bering Sea or Diomede Islands)	These crested auklets are named for the long curved feathers that grow out of their heads.
8	**Least auklet** (Could be anywhere from lower Alaska Peninsula islands to Aleutians, Bering Sea or Diomede Islands)	This least auklet weighs only 3 ounces and is Alaska's smallest seabird.
9	**Double-crested cormorant** (Probably Lake Louise, near Glenallen)	The double-crested cormorant, like all cormorants, has a pouch of colored skin at its throat.
10	**Common murres in colony** (St. Paul Island, Pribilofs, Bering Sea)	These common murres are standing on the cliff ledge where they will lay their eggs. Murres always try to nest very close to other murres, which helps protect their eggs from predators.

	Title on Slide	Long Description
11	**Common murre colony** (Square Rock, near Bluff, Norton Sound)	These common murres are nesting all over the top of the rock island, and also on ledges on the side of the island.
12	**Murres,kittiwakes, puffins, and gull in a colony** (Puffin Island, Kotzebue Sound)	Common murres, thick-billed murres, black-legged kittiwakes, horned puffins, and a glaucous gull are nesting together in one colony. Murres and kittiwakes are close together on ledges. Some kittiwake nests have chicks in them. The horned puffins are standing near the top of the cliff. A glaucous gull is looking down on all the other birds; it might be looking for a chick or egg to eat, or maybe it is just guarding its own nest.
13	**Common murres and black-legged kittiwakes in colony** (Gull Island, near Homer in Kachemak Bay)	Common murres and black-legged kittiwakes are nesting together in one colony. The murres have their nests on the bare rock; they are sitting on eggs. The kittiwakes have built nests of grass and mud; many nests have kittiwake chicks in them.
14	**Tufted puffin colony** (Middleton Island, Gulf of Alaska)	These tufted puffins are standing near the burrows they have dug in the soil in their colony. You can also see a common murre on the far left.
15	**Least auklet colony** (Could be anywhere from lower Alaska Peninsula islands to Aleutians, Bering Sea, or Diomede Islands)	These least auklets are standing on the rocks in their colony. The auklets make their nests in crevices under the boulders. They like to stand on the rocks above their nests and call to each other. One crested auklet is on the upper rock.
16	**Red fox** (Cape Peirce, northern Bristol Bay)	Red foxes live all over mainland Alaska, and on some islands such as Kodiak and the eastern Aleutians. In these places the foxes eat only a few seabirds. But fur trappers used to put foxes on many islands where they did not live naturally. These foxes killed many seabirds because the birds there were not used to predators.
17	**Arctic fox** (St. Matthew Island, Bering Sea)	Arctic foxes live in northern and western Alaska, and on some islands such as St. Lawrence Island and the Pribilof Islands. In their natural homes the foxes eat only a few seabirds. But as with red foxes, arctic foxes have killed many seabirds on islands where they have been introduced by trappers.

	Title on Slide	Long Description
18	**Raven** (Could be anywhere in Alaska)	Ravens live almost everywhere in Alaska. They sometimes eat seabird eggs and chicks.
19	**Rat** (Could be almost any city outside of Alaska, or several islands in the Aleutians)	Rats are foreign to Alaska. They get here by escaping from ships. They like to live in towns, villages, and seabird colonies if they can. Rats eat seabirds, their eggs, and their chicks. They are very dangerous to seabirds.
20	**Black-legged kittiwakes feeding on fish** (Cape Thompson, south of Point Hope, Chukchi Sea)	These black-legged kittiwakes have found a school of small fish very close to the surface of the sea. The birds are grabbing the fish while they fly close to the water or sit on it. One kittiwake is carrying a fish. Some murres in the background are also waiting to catch fish. When seabirds find many fish together near the surface, the birds can catch fish easily and their chicks do not go hungry.
21	**Subsistence hunting for auklets** (Little Diomede Island)	These Inupiat boys are hunting for auklets in the traditional subsistence way, using long-handled nets. Alaska Natives are permitted by law to hunt auklets for subsistence.
22	**Subsistence collecting murre eggs** (St. Paul Island, Pribilofs, Bering Sea)	This Aleut man is collecting murre eggs for subsistence food. He is hanging from a rope that his partners at the top of the cliff are holding. Some murres are standing to the man's left; three eggs are on the ledge below him. Alaska Natives are permitted by law to hunt murres or collect their eggs for subistence.
23	**Shipwreck (danger of oil spill or rats escaping)** (St. Matthew Island, Bering Sea)	This ship (a large freighter) is wrecked on St. Matthew Island. Oil may leak from the ship and kill seabirds. Or rats could swim from the ship to the colony and eat the eggs and chicks of seabirds. You can see a seabird colony to the left of the ship.
24	**Oil spill on beach** (Prince William Sound, Exxon Valdez oilspill)	An oil spill has coated almost all the stones on this beach with a thick layer of oil. The oil is also on the water and has made a brown stain on the boat. The oil would kill any bird that tried to swim in the water or walk on the beach.

	Title on Slide	Long Description
25	**Murre with oil on breast** (Chugach Island, Gulf of Alaska)	This murre has oil on its breast (the brown stain). Oil on a bird can also be thick and black. The oil has damaged the bird's feathers, and it is already sick. The bird will die of the cold, or it will be poisoned when it tries to clean its feathers.
26	**Fishing nets on beach** (Middleton Island, Gulf of Alaska)	These fishing nets were left at sea by their owners. They floated for a long time and finally landed on the beach. This pile of nets contains both trawl nets and drift nets. Fishing nets can catch and kill seabirds.
27	**Fishing net with dead birds** (On deck of processor vessel, North Pacific Ocean south of Aleutian Islands)	This drift net has caught many seabirds. (They are shearwaters). The birds were caught while they were chasing their own food near the nets. The birds could not get to the surface to breathe, so they drowned.
28	**Bird that died from 6-pack loops** (Could be anywhere in Alaska or elsewhere)	This seabird (a gull) died because its head got stuck in a plastic 6-pack loop that someone left on the beach. The bird may have died because it could not breath, or the plastic may have kept it from catching its food.
29	**Biologist counting seabirds** (Okhotsk Sea, east of Kamchatka Peninsula, Russia)	The biologist is sitting in a boat and counting seabirds through binoculars. Counting birds tells us how important each colony is in that area. The orange suit the biologist is wearing is a life preserver (PFD).
30	**Tourists watching seabirds** (St. Paul Island, Pribilofs, Bering Sea)	Many people enjoy watching and photographing seabirds. This colony includes least auklets, tufted puffins, and murres. Some communities have special programs to show the local seabirds to tourists. It is important for everyone who watches seabirds not to disturb the birds and to ask permission from people who own the land.

GLOSSARY

adaptation: an adjustment to environmental conditions: any modification of a plant or animal that helps it survive.

colonies: closely packed groups of nesting seabirds.

decomposers: organisms (such as bacteria or fungi) that break down dead plants and animal materials and return nutrients to the system: recycling!

diatom: single-celled algae with a hard shell.

dinoflagellate: tiny marine plant, so small you can't see it without a microscope. A kind of phytoplankton.

ecosystem: a community of living things plus the physical and chemical environment with which they interact.

food chain: who eats what in the natural world. Sequence of living organisms in a community in which one level feeds on those in the level below it, and in turn are eaten by those in the level above them.

food web: all the interacting food chains in an ecological community.

habitat: where a plant or animal lives and the things it needs there to survive.

krill: a kind of zooplankton – tiny shrimp about as big as your fingernail.

limiting factor: something (such as food, disease, or predation) that limits the number of animals or plants that survive.

middens: ancient (archaeological) garbage dumps.

mobbing: when birds gang up to fly at and dive bomb a predator.

niche: an animal's or plant's specialty in life.

pelagic: living on the ocean, far offshore.

phytoplankton: tiny plants that live in water and drift with the currents.

predator: an animal that captures and eats other animals for food.

prey: animals that are killed and eaten by other animals.

primary consumers: animals that eat plants.

primary producers: plants: they use solar energy to convert nonliving substances (water, air, soil) into food.

salt gland: an adaptation inside seabirds for safely drinking seawater.

secondary consumers: animals that eat other animals which eat plants.

tertiary consumers: animals that eat animals which eat animals.

zooplankton: tiny animals that live in water and drift with the currents.