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ABSTRACT

Southeast Alaska's birds and wetlands are the subject of this elementary school teacher's guide and student workbook. Included are classroom activities and field investigations which address: (1) bird identification, habitats, adaptation, and conservation: and (2) the inhabitants, ecology and value of estuaries. Workbook activities involve the development of vocabulary and reading skills wsing birds and wetlands as subject matter. A list of resource materia s and a guide for organizing field trips are included. (WB)

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ALASKÁ SEA WEEK CURRICULUM SERIES FOURTH GRADE

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BIRDS :

A Study Guide for the Fourth Grade

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ALASKA SEA WEEK CURRICULUM SEFLES

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ACKNOWLEDGEMENTS

Sea Week began in the early 1970's in Juneau, Alaska. Under the leadership of Mary Lou King, parents, teachers and agency personnel started taking elementary school students down to the sea every spring. Soon, Sea Week was an annual event with some of the junior high and high school students assisting the younger pupils on their field trips to beaches, wetlands, forests and glaciers. In 1978, a K-6 Sea Week curriculum was written with the assistance of Juneau teachers, scientists, fishermen, parents, and government employees - a true community effort. In 1979, the Southeast Regional Resource Center revised the material, adding worksheets and graphics and reworking certain activities. In 1980, endo sed as "The Year of the Coast" by President Carter, it seems very fitting that the Alaska Sea Grant Program is initiating a program to spread Sea Week statewide.

This first statewide edition is a product of Juneau - its people and environment. We would like to express our deep appreciation to the many foresighted people who contributed to Sea Week and especially to all the students who are the reason and impetus behind its success. Special thanks to Mary Lou King, Nancy Barr, Janie Cesar, Carol Koski, Dick and Betty Marriot, Virginia Eggert, Claudia Kelsey, Kathy Hanna, James G. King, Lynn Szepanski, Karen Gunstrom, Mary Beth Parsons, Dan Hopson, Pristi Kantola, Pat Thrasher, Tamara Smid, Judy Maier, Jerry Hard, Marty Early, Jan Conner, Mark Hansen, the Alaska Department of Fish and Game, the Alaska Coastal Management Program, the United States Forest Service, the Alaska Department of Environmental Conservation; the United States Fish and Wildlife Service, and the South East Regional Resquece Center.

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PREFACE

The Alaska Sea Week Curriculum Series (K-6) emphasizes one or more aspects of the marine environment at each grade level. Kindergarten materials, for instance, are intended to introduce students to the exciting and curious world of the sea and shore. At the other end of the series; materials for sixth graders stress man's interactions with the marine environment. While the subject matter at each grade level is unique, as a whole the grade level guides will yield a broad understanding of the marine environment and its importance to Alaskans.

The purpose of this curriculum series is to help the teacher in interpreting the marine environment for elementary school students. However, what is included here is just a place to, begin. As you read the following materials, you will find factual information about many aspects of the marine environment, and suggestions for presenting these concepts to students through multi-disciplinary activities both in the classroom and at field sites. Materials are organized into units, each covering a single idea or subject. From these you, the teacher, may select the units and activities which are best suited to your class, community and resources.

"Sea Week" originated in Juneau, and these curriculum materials are most applicable to southeast and southcentral Alaska. However, the Alaska Sea Grant Program has funded a three year pilot project to expand Juneau's successful program statewide. As Sea Week is piloted in 14 communities around the state, the Curriculum Series will be expanded to meet the needs of western, interior, and northern Alaska.

Send us your comments and suggestions. The strength of the final edition will depend not only on those of us staffing the project - but on you - your ideas and comments. After you've tried some of these activities - fill out and send in the evaluation sheet at the back of this book. Thanks so much:

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INTRODUCTION

Alaska has more than 33,000 miles of shoreline; the earth's circumference is only about 25,000 miles. Much of Alaska's complex and intricate shoreline is accounted for by the bays, inlets, headlands, islands of Southeast Alaska. Here, in Alaskan communities large and small we live in close contact with the marine world. Some of us make our livings by fishing or working for the Coast Guard, the State's marine pransportation system, or marine shipping companies. Most of us spend at least some of our time sport fishing, digging clams, beachcombing, or just gazing out at the incredible scenery of snowcapped mountains and everchanging inland waters.

The dynamic marine environment of which we are a partils our heritage, our trust. It is only fitting that our children know that world intimately so that they can grow up in an understanding of its complexities, it subleties, its importance. This is of particular urgency now that Alaska is facing in- creasing pressures to make decisions that will effect the use of her lands and seas for generations to come. We, and our children, must have a part in the decision making processes and the more knowledgeable we are, the more effective our participation will be.

Teaching children about the world in which they live is important and perhaps it has never been more important than it is in Alaska today. Teaching facts and concepts about the marine world is important but perhaps most important of all is the teaching of attitudes. It is hoped that through the study of marine life, students may gain the following:

- 1. An increased interest in their environment.
- A greater awareness, appreciation, respect for the natural world that is so close about them here in Alaska.
- 3. The sheer delight, pleasure, happiness that can some from observing and understanding nature close up.
- 4. A sensitivity to the relationship between themselves and their environment.

If that can be accomplished, all our lives will be better because of it....

INTRODUCTION - FOURTH GRADE

The fourth grade materials in this series provides information for the study of birds and their environment. The student booklet Birds in Alaska's South Coastal Environment has activities covering:

Kinds of birds
makeup of a bird
how.birds live
where birds live
conservation
birds in your area

The brid unit presents general information about birds and includes specifics to assist students in their identification of birds unknown to them.

A second unit: Estuaries, presents study materials on the plants and animals living in this environment. Included is the value of the wetlands as they relate to birds and to the sea. Estuary field trip activities and studies are outlined to round out this.

The hope is that students will gain an understanding of the estuary environment and an appreciation for the importance and beauty of birds. Including increased person pleasure and satisfaction from encounters with birds in every environment.

ALASKA'S BIRDS AND WETLANDS

Fourth Grade

- Learn about, identify and enjoy some of 'Southeast Alaska's birds.
 - Acquire an appreciation for and knowledge of our wetland habitats.
 - Learn about wetland conservation.

BIRDS IN THE SOUTH COASTAL ENVIRONMENT

It is recommended that each student:

- Complete Birds In Alaska's South Coastal Environment, a student booklet for bird study before going on the Sea Week Field trips. One copy is recommended for each fourth grade Student .
- 2. Complete the Estuary Worksheets--or at least participate in a class discussion on estuaries.

FOURTH GRADE FIELD TRIP TO THE BEACH DURING A MINUS TIDE

The On-Site Organization in the field trip section of this folder is recommended for beach activities.

- Divide the class in groups of 5 or 6 students with a parent or older student with each group. Explore the lowest part of the beach when the tide is out.
- In addition, before going to the beach go over again the section in Birds In Alaska's South Coastal Environment on Habitat Page 17. Make a list of bird habitat things to look for while at the beach:

FOOD COVER SAFE NEST SITES

At the mid-point of your beach trip sit down and

- What did you see that birds could eat? Did you see a bird eating? What?
- b.
- Is there any cover for birds here? Where? c.
- Where could birds/nest? What birds? đ.
- What else did you see?



- 3. For the remainder of the time you might:
 - a. Take a serious bird walk in small groups.
 Record all birds seen: (describe if they cannot be identified) in the water, on the beach and in the bushes or trees. The students could then check these birds on their own lists in the back of the bird booklet when they get back to the classroom.
 - b. Place some food (bread, herring) at widely separated spots on the beach, then sit quietly in small groups by the food and watch to see what comes -- listen to sounds and watch what goes on during the quiet time.

The best beaches for birds are those at the mouth of a river or creek, however, some birds can be seen at all the beaches.

FIELD TRIP TO AN ESTUARY

In an estuary, the fresh water from the river carries nutrients from the land that mix with the nutrients in the sea water making a very rich place for plants to grow. Some plants grow in the water, some grow in the mud flats and some grow on the uplands where they are only rarely covered with tidal water. The abundant plant life provides food for all sorts of animals from microscopic to large birds, fish, etc. The variety of plant life also provides shelter or cover as well as many nest sites. For these reasons there are more birds on the estuaries than on any other type of habitat near the sea.

Materials Needed:

- 1. Binoculars and hand lens (if available)
- 2. One plastic sandwich bag for each student and one large bag for the group leader.
- 3. Pencil and clip board (plastic bag to cover) for each group of students (four groups)
- 4. Large piece of cardboard, felt market and small roll of scotch tape for each group.

Preparation for Estuary Field Trip:

1. The student booklet <u>Birds In The South Coastal</u>
Environment has illustrations of the most common estuary plants along with the list of the most common birds in the coastal area. If the students have studies both of these they will have some idea of what to look for on the field trip.

- 3. Follow the appropriate suggestions for getting ready for the Field Trip on Page 3. Warm clothes and rubber boots are important.
- 4. Students could talk to old timers, hunters, bird-watchers and parents about the estuary. Compare what they hear with what they see.
- 5. Divide the class into four groups before leaving for the Field Trip. One parent or adult for each group is recommended. Make the student bird book available to the parents well in advance of the Field Trip.

ESTUARY TRIP

- 1. Organize the groups with Biology training students, knowledgeable parents, biologists or other valunteers, at the beginning of the field trip.
- 2. Plan the order to be followed for use of the "experts" (plant, bird, ecology) with each group.
- 3. Explain the rules
 - a. Stay with your assigned group
- 4. Distribute the plastic sandwich bags (one for each student) and the worksheets on Page 24 (one for each group) and explain the activities.
 - a. Observe and record birds on the worksheet. These birds can then be checked in the students's bird booklets when they get back to school. Record what man has done to the estuary.
 - b. Collect the items that are listed after these instructions. This could be used as a scavenger hunt with some recognition for the most complete collection and/or the nicest display or just as a learning experience.
 - 1. Group leaders work closely with your group so that only what will be used is collected. Stress Conservation.
 - Collect nothing larger than will go in a sandwich bag and only one sample of each thing in each group.



The plants on the last are those illustrated in Birds In The South Coastal Environment student booklet, therefore, if individual students would like to keep very small samples of these plants to take back to their class-room and tape in their books by each illustration, they may do so.

- 3. Do not collect live animals.
- 4. Spend the last 15 minutes of the trip having each group prepare a display of the things collected by taping and labeling the collected items on a large piece of cardboard. These displays can then be taken back to the class room for judging and following learning activities. Students could check the accuracy of the plant labeling from the illustrations in their bird books.

LIST OF THINGS TO COLLECT

Five things from the tidal area to include:

Seaweeds (Fucus and Ulva)
Goose Tongue
Sedge
Beach Rye Grass

Five different Fungi, Lichens, Moss to anclude:

Bird's Nest Fungus * Licken '/ Mosses

One Fiddle Neck Fern .

One Fruiting Body of Horse Tail

Five of the following:

Lupin Dandelion
Marsh marigold Fireweed
Yarrow Dock
Black Lily

One of each of the following:

Spruce Tree Needle and Cone Alder "cone"

Cottonwood Bud Male and Female Willow ' (Male "pussy", Female seed)

Five animal evidences such as: Feather, Shell, Bone.

c. Follow-Up Activities:

- 1. Write stories or reports that might be given orally to their own class or some other fourth grade as a method of sharing Sea Week knowledge.
 - a, What is an estuary?
 - b. The bird I like best on my field trip.
 - c. Why I would like to be a bird.
 - d. I like the Estuary because.....
 - f. I did not like the Estuary because.....
- Write a thank-you note to someone who helped the student learn something new and to enjoy seaweek.



ESTUARY WORKSHEET

Birds _

Size Kind of Reet Kind of Bill gird Name, What Does It Look Like? P.

LIST EVERYTHING YOU CAN SEE THAT SHOWS MAN IS OR HAS BEEN HERE:

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ESTUARIES AND THEIR INHABITANTS

INTRODUCTION

An estuary is a very special kind of place, it is that area where rivers or streams meet the sea. Unique conditions exist in this environment where land is continually being exposed to the air and light then covered by various mixtures of fresh and salt water.

As students begin to study and think about estuaries and to explore them, they will find that many of the ideas they have learned about the sea and its inhabitants can easily be seen. They will need to think about how the estuary is different than the sea because of the presence of freshwater.

Estuaries have a special importance to man and to the cleanliness and quality of both the land and the marine environment. By the end of the study of estuaries, students should have an understanding of the importance of estuaries and should have a knowledge of many of the plants and animals there.

UNIT 1. WHAT IS AN ESTUARY?

Objectives |

To learn that an estuary is a place where fresh water and saltwater meet, where rivers or streams enter the sea.

-To understand that the mixture of fresh and salt water constantly rising and falling make the estuary a special, unique place.

Teacher Background

The forces at work in an estuary are ever changing and they define what an estuary is.

If we think first of the fresh water that enters the estuary, we realize that the water as it enters the sea is as variable as the weather over the adjoining land. When rains have been heavy, great quantities of water may enter the estuary, but when the air is dry, the water flowing into the estuary is far less - or even none. Melting snows of winter bring one kind of water to the estuary, "gully- , washing" torrential downpours another. Sometimes the flow is gentle, sometimes powerful; sometimes the stream or river flow is clear, sometimes it is laden with silt or other debris from the land. If man lives near the estuary, it may carry with it industrial chemicals or other bi-products of man's civilization and these too enter the estuary.

where the river confronts the sea, the forces of the ocean cycle without cease. Tides rise and bring more salt water into the estuarine environment; tides ebb and carry with them fresh water from the estuary. Winds mix the masses of fresh and salt water, creating an environment too salty for many freshwater plants and animals, and too fresh for most sea-living life forms.

The tidelands are "sea floor" part of the time and exposed to air, sunlight, wind and atmospheric temperatures
at other times. Every day and every part of every day is
different.

Materials:

- -slide-tape presentation? The Heritage of our Environment: Estuaries Part I and II in Southeastern Alaska: and Ecological overview (available from SERRC)
- -student gathered pictures of 'estuaries
- -student worksheet

Procedure.



for older students, but it does define an estuary and might be a good starting place for a class discussion. You might, want to preview it and decide whether to use part or all of it, and whether it would fit best at the beginning of your study or at the end as a summary activity.

Present students with the definition of an estuary. Perhaps simply:

Estuary (es - har e e): a place where freshwater from rivers and streams meets and mingles with saltwater from the sea

Encourage students to think about the area in which they live. Are there any estuaries?

While even a small stream has its own estuary, estuaries that are larger or more extensive may involve large inlets, lagoons, or extensive shallow flats or grassy areas. If there are places in your local area that are called "tidelands' or "saltflats", these are probably estuaries. They may be the deltas of rivers where sediment is deposited at the edge of the sea. Step rock shares may also be part of an estuary. In the most expansive terms, all the inside waters of Southeast Alaska are an estuary.

As you start the study of estuaries, you might encourage students to look through natural history or geographic magazines to find pictures of a variety of estuaries. These could be used for bulletin boards or for covers of student booklets

As a guage to students of what they will learn, ask them to list on paper or name some of the following:



- **f**ishes
- -sea animals that are not fishes (invertebrates or mammals)
- ,-birds
- -plants

List as many as you can that you think might live in an estuary. Keep this list and when the unit is completed, make a second similar list and compare the two.

The first of the series of worksheets on estuaries might also be completed by each student at this point.

UNIT 2. PRIMARY PRODUCTIVITY IN AN ESTUARY

Objectives

-To understand what primary productivity means.

-To measure some primary productivity in an estuary.
-To learn to identify one of the important plants in the estuary.

Teacher Background

Primary productivity is a term that refers to the production of food material by plants. It is called "primary" because, it is the most fundamental kind of food production, one that involves gathering energy from the sun, nutrients from the environment, and, in the presence of chlorophyll, converting these into organic material. Animals cannot make this kind of elemental conversion but must depend on plants or other creatures that depend on plants for food.

All plants containing chlorophyll are capable of primary production, and, in the estuary, the two most important kinds of primary producers are phytoplankton and the tall grasses and sedges.

Phytoplankton are microscopic one celled plants. When the temperature and other conditions are right, phytoplankton may "bloom" or increase their numbers dramatically. Many of the shortlived phytoplanktens die and sink to the bottom of the estuary, there to become food for scavengers or to decompose and add their own nutrients to the waters of the estuary. Other great quantities of phytoplankton are eaten alive by tiny drifting or weakly swimming animals that are in turn eaten by larger animals, and solon.

In estuaries that include wetlands or marshlands, the grasses or sedges that thrive there are extremely important primary producers. In many alleskan wetlands, the most important of these plants is a sedge called Carex. Like / other sedges, Carex has a triangular stem, a characteristic that will distinguish it from the round-stemmed grasses.

Carex is capable of rapid growth and that growth is seasonal. New shoots appear in spring and growth ceases by mid-summer. Within its few months of growing, Carex may reach a height of three feet or more. In late summer the proteins and other nutrients from the sedge plants are drawn down into the root system and stored. In fall the tail sedge blades bend, then come to lie in a dense tangle of the wetlands. Old blades begin to deteriorate, then rot and through bacterial action, sun and weather are broken down and return to the environment which they enrich to encourage other new growth. The strong root system is ready to send up new shoots in the spring.

Carex is important because it introduces nutrient material to the estuary through the process of decomposition. But in addition it serves as shelter and food for many small organisms and much of the year but particularly in winter and spring is an important food for Canada geese, and perhaps for other geese as well. Geese feed on the massive root system of the Carex as well as on the stalks just above the roots. If you live in an area where Carex can be found, you may see groups of geese gathered in spring to feed on this plant.

Where estuarial waters are more saline than fresh, algae such as Fucus may be found growing luxuriantly in rocky areas.

ACTIVITY 1: PRIMARY PRODUCTIVITY AND THE ESTUARY

Objectives '

-To understand that plants produce "food" from the raw materials of their environment.

-To learn two kinds of plants that are important in producing food in the estuary.

Materials:

-chart or diagram showing cycle of a green plant, including food production

-worksheets on phytoplankton and Carex

Procedure.

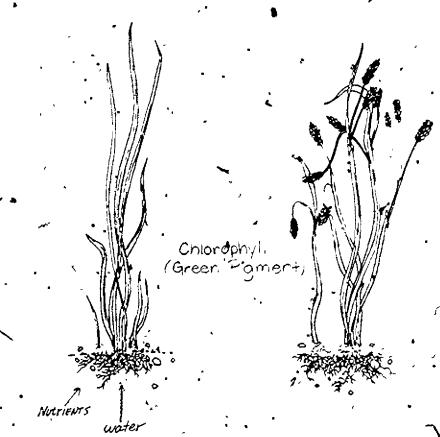
If students have not already learned about how plants produce food or if they need a review, use a diagram like the one below to discuss with them the importance of plants to all life.

Stress with students the idea that only plants can produce food; animals get all their food from plants or from other animals that eat plants - they cannot manufacture it themselves. So if it were not for plants, there could be no life as we know it on this earth.

when students understand the importance of plants as primary food producers, tell them that there are two very important kinds of food producing plants in an estuary. one is phytoplankton and the other is the grasses or sedges. By using any available, relevant science texts, the teacher background notes, and the student worksheets, teach students about phytoplankton and the sedge Carex.



CYCLE of a GREEN PLANT



Green Plants use water, sun, nutrients from soil to make new leaves and stems - that is to grow!

Green Plants produce seeds or in other ways insure that there will be new plants like themselves.

The plant dies, decay and returns as nutrie to the soil.

Before they die, many plants may be eaten by animals, large or small.



ACTIVITY 2: LOOKING CLOSELY AT CAREX LYNGBUAEL

Objectives

- -To identify Carex as it grows in an estuary.
- -To begin to understand its importance in the wetlands.

Materials:

-a small wire frame, about 1/4 meter or foot square - can be made from bent coat hangers

-a long stake or other kind of marker with a red handkerchief attached - or some other means of marking a location in a marshy area

-magnifying glasses , notebook and pencils /

Procedure.

Prepare the class for a field trip and outline with them carefully what you plan to do and what you will be studying. The activity could be carried out with the whole class or could be assigned to several students working with an older student or adult advisor.

Discuss with the students involved the fact that there are any number of plants growing on the wetlands but that you are interested, on this study trip, in finding and identifying just one of them - Carex. Discuss the idea that you are interested in learning something about its importance on the wetlands. You may want to have students suggest approaches they think they might want to try.

When you arrive at the study site, have the students find Carex as soon as they can. If your field trip is made in early spring, the new Carex growth will be visible as stiff, strait, pointed shoots perhaps no more than 3 - 4 inches tall. Each shoot may include about 4 blades surrounding the central, triangular stem. It will probably be pink to purple, but green will be showing at the base of the new growth. By the first of May, Carex may be 6 - 8 inches high and growing more green than pink or purple.

After students have located Carex and everyone recognizes it, select an area for your study plot. You will want to select an area where <u>Carex</u> grows thickly and where (if you are working in the spring) the fallen growth from the previous year is still evident and thick. To find such an area, you may need to look higher rather than lower in the intertidal zone.

When you have found a good spot to sample, bring your wire frame and other equipment to the spot. Place the wire frame on the ground. Some students may want to measure



the height of the previous year's growth of Carex in the plot, others may want to examine that growth, particularly at ground level in search of insects or other animals that might be living on it. Some students may want to try counting the number of Carex stems growing within the plot frame. All of these activities combined will start to give an idea of the massive growth and the importance of this plant.

ACTIVITY 3: MEASURING THE BIOMASS OF A CAREX SAMPLE

Objectives'



- -To determine how much mass of <u>Carex</u> is produced in a small plot including the roots underground.
- -To determine how much mass is added during a month of the growing season of Carex. (Optional)
- -To compare the biomass of a <u>Carex</u> plot with the biomass of another kind of area. (optional)

Teacher Background

Determining how much food material a plant produces is not hard to do. The one important notion that must be taken into account is that water does not count. Every plant stores a greater or lesser amount of water in its tissues, but because the amount of water varies from one kind of plant to another, we must remove that water if we want to be able to make a comparison between two different kinds of plants - or even between the same kinds of plants at different times or under differing conditions.

Materials:

- -wire frame as mentioned in Activity 2.
- -a means of marking the location of a plot on the wetlands
- -scissors or knives
- -shovel
- -an oven (optional)
- -a palance (scales)
- -a large plastic bag or gunny sack

Procedure:

While at the field site with students, conduct any or all of the suggestions outlined in Activity 2. With Carex identified and recognized by all the students, and with a plot selected and marked, you are then ready to harvest the plot. If you are sampling in early spring, you may want to cut off only the old growth, and measure the height of the

new shoots. Alternatively, you may cut off all growth at a manufacture above ground level - perhaps three inches.

Carefully gather up the Carex that has been cut and place it in a bag. Check to be sure that you have carefully cut everything growing within the plot boundaries but have not harvested outside it. Now, with the plot carefully marked if you want to return to it - you may move to another location where Carex roots are exposed along the stream banks to check roots and determine the probable root mass in your plot.

Find a cut-bank and separate a <u>Carex</u> plant, which is growing there, from its root. Count the number of <u>Carex</u> plants in your plot. Later students can multiply the number of plants times the weight of one to determine the probable total root mass for the plot.

When you return to the school with your bag of Carex, you are ready to dry then weigh it. To do the former, place the cut Carex in a low oven until it feels light in weight, or tie it in small bundles and hang it up to dry. Either way when it is dry, weigh what remains. To do this you may have to tie it in bundles, break it up, of devise some . method to compact it.

The answer you get when the dried <u>Carex</u> is weighed is a measure of how much food. <u>Carex</u> growing in an area the size of your plot can produce.

SUPPLEMENTARY ACTIVITIES.

- 1. Students may wish to harvest plants growing in another kind of environment perhaps the school yard, the forest edge, a lawn then follow the same drying and weighing procedure and compare the productivity of the two areas.
- 2. If you have harvested your <u>Carex</u> plot in early spring, you may want to return to it a month later, use a ruler or meter stick to measure how much taller the stems have grown, and then cut off the new growth, dry it, weigh it and determine what percentage of the annual growth appears to have taken place in the month's interval.
- 3. Review or use the activities concerning Fucus. (In-

UNIT 3. INVERTEBRATES IN THE ESTUARY

Objectives ...

-To understand that a estuary is home for a wide variety of invertebrates.

-To recognize some of the invertebrates living in an estuary and to discover where each lives.



Teacher Background

Invertebrates are animals without backbones - insects, spiders, crabs, snails, sea stars, and many, many more. Because an estuary is a complex environment with freshwater, brackish water, and salt water, it is home to a wide variety of invertebrates that live on or near some kind of water.

Every species of organism has its own unique set of requirements, a set of qualities that must be present in the environment in order for that plant or animal to be able to survive and reproduce. If students have used this curriculum series in third grade, for instance, they have learned where each species of intertidal animal is found depends on such factors as:

the kind and amount of food available.

the intensity of light
the plant's or animal's resistance to drying
the plant's or animal's tolerance to fresh water
the plant's or animal's adaptability to surf conditions
the plant's or animal's success in competing with
other organisms for the same space.

In an estuary the same kinds of factors are important in determining where any species of invertebrate will be found. The most obvious of factors is the degree of saltiness or freshness of the water. Some species, for example, may be found in the estuary only where the water is quite salty, while others survive only in the fresh stream or river water or may be able to tolerate certain degrees of salt or freshness between the two extremes.

While the factors that limit animal distributions are so complex that biologists do not fully understand them, elementary students should be able to grasp the idea that each animal species has its own built-in set of environmental requirements. By exploring an estuary and recording where several kinds of animals are found, students can begin to associate each kind of animal with a particular kind of place.

ACTIVITY 1: THE ESTUARY, HOME FOR INVESTEBRATES

Objectives

- -To recognize kinds of invertebrates that inhabit estuaries.
- -To record where each kind of invertebrate is found in the estuary.

Materials:

-worksheet on invertebrates in the estuary

-checklist or notebook and pencil_

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Procedure:

In class discuss the idea that each living species of plant or animal needs particular qualities from its environment in order for it to live and reproduce. If students studied intertidal ecology in third grade, review with them what they learned about why different intertidal species live where they do. Discuss familiar land plants and animals (what lives in forests, gardens, lawns, deserts, etc.) and then marine or freshwater plants and animals.

environmental conditions that might be found WITHIN an estuary (water saltier or fresher, grass and sedges present or absent and thick or sparse, presence of fine silt, rocky areas, sand, amount of surf or wind, amount of exposure to sun, etc.).

Allow class time for students to complete the worksheet on invertebrates in the estuary.

By using the checklist of invertebrates in the estuary, introduce or review the kinds of invertebrates often found abundantly in estuaries. Prepare students for field activities by being sure they can recognize these and identify them.

IN THE FIELD

When the class is visiting an estuary on a low tide, assign several students or the whole class to spend a portion of their time "surveying" the estuary for the animals on the checklist. Students should think about the area where they are and decide how best to look at a cross section of it. It may prove best to draw a visual line from a creek mouth or riverbank, through grass and sedges to more open salt water. Begin at one end of the imaginary line, examine each differing kind of habitat and list for it the kinds of animals that are found there. FOR SAFETY'S SAKE, THIS ACTIVITY MAY NEED TO BE DONE AS GROUP WORK WITH ADULT SUPERVISION.

In the field at the end of the above, outlined survey or later the same day (or the next) in the classroom, tabulate and analyze what students observed. Decide on key words to describe each kind of habitat you observed. For instance:

tidal edge
steep creek bank
stream
bdre mud flat
at base of thick sedges
large shallow tide pool, etc.
grass - spruce - alder line at top of tidal
influence



For each kind of habitat, list the animals that were found there. Then encourage the class to decide which animals could be found in freshest water, which in saltiest, which seemed to have the greatest tolerance for a wide range of salt concentrations, which were on or in silt, which in rocks, in tide pools, etc.

ADDITIONAL ACTIVITIES

1. Art, science. As a class or individual project make a map of the estuarine area that was visited. Mark or represent on it the animals found and their locations.

UNIT 4. FISH AND THE ESTUARY

Objecti<u>v</u>es

-To understand the importance of an estuary in the lives of many fishes.

Teacher Background

- Because of the deposition of land derived soils in wetland or estuarine areas, these places are extremely rich in nutrients which foster plant growth and create a rich environment for many animals. The estuarine web of life is extremely complex. Plants grow, decay, are fed upon by animals large and small. These animals in their turn become food for other animals or else die, decay and return thus to again enrich the natural system.
- If this complex system could be reduced (which it cannot) to a linear chain of who-eats-who-and-is-eaten-by-whom, fish would have a place near the top of the list. Feeding as they do primarily on smaller fish and on invertebrates, fish are carnivores whose very survival depends on the healthy continuance of a complex system that produces in ample supply the kinds of food they need.

Some fishes are year round or life long residents of the estuaries, while others, including salmon, may pass through the estuaries or spend part of their early lives there. In either case, the estuary is essential to their survival and they, in many cases, continue to be an important human food source. Thus although seeing all the links, causes and effects is often difficult, estuaries and their well-being are important to us because they supply us with food.

ACTIVITY 1: THE IMPORTANCE OF THE ESTUARY TO FISH

-To gather a background understanding of how fish fit into the life soheme of an estuary.

Materials:

-films, texts, visual material as available -worksheet

Procedure.

Discuss with students the idea of fish as part of the complex life in an estuary. Encourage them to think and talk about such ideas as:

What kinds of fish do you think might live in an estuary? Why?

What might fish in a estuary eat?

Why would an estuary be a good place for them to live?

If fish live in an estuary, how does this make an estuary important to us?

After developing a class discussion and supplementing it with whatever material is available, allow students time to complete the worksheet on fish in the estuary. You may want to continue the discussion to include ideas found on the worksheet

ACTIVITY 2: SALMON IN THE ESTUARY

Objective "

-To realize by first hand experience that estuaries may have an abundance of salmon fry during the spring months.

Teacher Background

Salmon are anadromous fish, that is they spend part of their lives in fresh water and part in salt water. Every late summer or fall, millions of salmon in Alaska return from a period of living in salt water, enter the streams where they themselves once hatched from eggs, spawn and die. The eggs that they deposited remain in the gravel of the



streams over winter. The following spring, young salmon move out of the streams to salt water beginning again the cycle of life of their parents.

As young fry emerge into the waters of the estuary they begin to feed in earnest. Their lives are 'tenuous and the survival of each individual as well as each species depends in large part upon the abundance of food that the estuary has to offer.

Understanding this cycle and seeing part of it as young salmon move from fresh to salt water help students appreciate one more part of their environment.

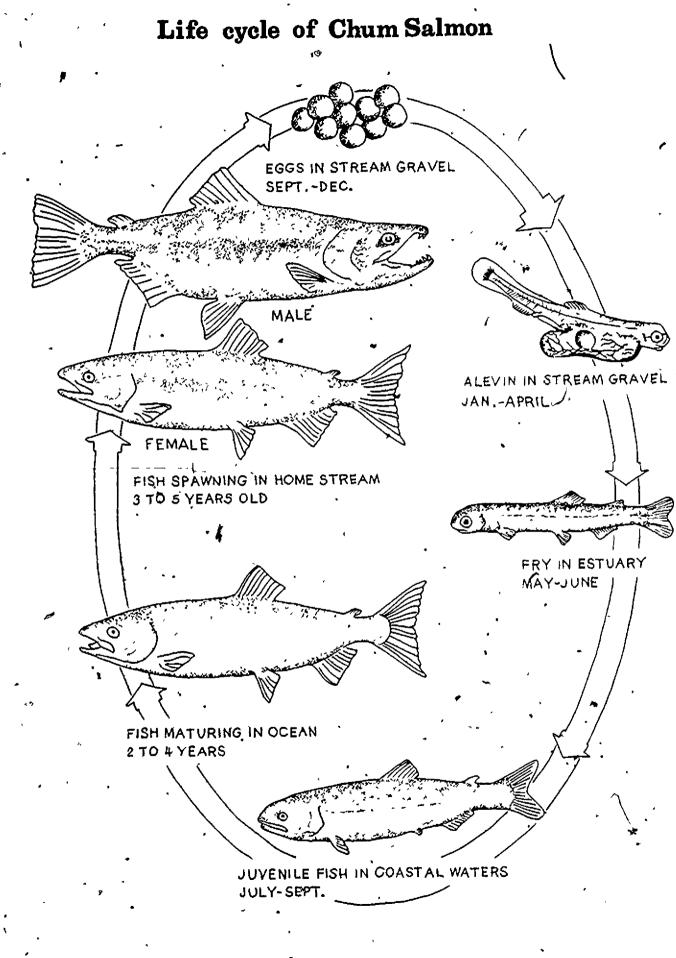
Materials: •

- simplified diagram of life cycle of salmon
- movies or filmstrips as available
- beach seine or minnow trap purchased or borrowed

Procedure

In class discuss with students the general life cycle of a salmon.

Assuming that you are teaching this unit in spring, stress the fact that it is at this time that salmon are emerging from the streams and beginning their salt water existance. (Many students may already have detailed familiarity with the salmon cycles. If they do urge them or their parents to share this knowledge with the class.)



AT THE FIELD SITE. CAPTURING SALMON FRY.

Using either a beach seine or a minnow trap (enlist help if these are unfamiliar to you!), involve the class in attempting to capture some of the outmigrating salmon fry Minnow traps should be baited and left in the stream overhight.

After students have seen the salmon fry, understood their significance and their place in the web of estuarine life, release them, stressing to students the importance of giving the fish a chance to grow and mature. Don't touch the fish or keep them long, as even mild stress can be fatal.

OTHER ACTIVITIES.

- 1. Science. Arrange to have someone from Alaska Department of Fish and Game talk to your class about salmon and their life cycle.
- 2. Creative Writing. Ask each student to make up a story about a salmon's life in the estuary, including the dangers and pleasures the fish encounters.

UNIT 5. MAN AND THE ESTUARY



Objectives

- -To understand that wetlands have great, direct and indirect, importance to our lives (
- -To understand that the care we take of them and our attitude toward them effect the quality of all our lives.

Teacher Background

Fine following exterpt from a publication of the National Wildlife Federation sums up many of the environmental values of wetlands occurring in river flood plains or estuaries.

"Wetlands play a vital role in pollution control. They trap, retard, or transform materials such as silt, pesticides, toxic metals, and organic matter. Microorganisms found in wetlands break down air pollutants such as sulfate, and water pollutants such as nitrates. Wetlands serve as living filters, removing phosphates and nitrates and storing them as nutrients for vegetation growing in the bottom mud. At the same time, wetlands generate significant amounts of oxygen by way of their abundant plant-life and their nitrogen-fixing and sulfate-reducing bacteria.

"Wetlands hold silt and sediment carried by flood waters which might otherwise end up in navigation





channels (necessitating expensive maintenance dredging) and in shellfish beds. These silt particles frequently carry pesticides and other toxic substances. By holding the silt, wetlands help these hazardous substances out of our water supplies. Keeping even silt out of the water is important because suspended silt blocks out sunlight, which reduces photosynthetic action, which in turn reduces the growth of bottom plants and phytoplankton. Increased turbidity also hinders the feeding and breathing of many fish and may even impair migratory and reproductive behavior. A thin layer of silt, for example, can suffocate fish eggs after spawning.

"There are limits, however, to the pollutionabsorbing capacities of a wetland. Excessive pollution can totally disrupt a wetland's ecological balance and transform it from a healthy, valuable resource into a putrid, polluted, mosquito-ridden liability.

"When allowed to do their job, wetlands are quite remarkable. Recent studies have demonstrated that wetlands can beduce levels of biochemical oxygen demand (BOD), phosphates and coliform (bacterial) counts, while producing significant amounts of oxygen."



Sullivan, Peter. Versatile
Wetlands - An Endangered Resource.
Conservation News. October 15, 1976.

In terms of dollars and cents, environmental economists estimate that it would cost at least \$50,000 per acre to replace all the functions that a wetlands performs. The importance of wetlands is hard to underestimate, and it is important that the students who will grow up to make decisions about them understand their value.

Materials:

-film or filmstrip on tidelands (as available)
-worksheet

Procedure.

Review with students what they have learned about tidelands. If a film is available, use it as a summary activity: Discuss with the class the ideas developed in the quota on included in Teacher Background. Allow time - and help - for students to complete the final worksheet on estuaries.

ADDITIONAL ACTIVITIES.

- 1. Encourage students to select a particular aspect of tidelands and prepare a report for the class.
- 2. Prepare a wall-size representation of the tidelands and their importance to man, wildlife include plants and animals, marine and freshwater species.

TEACHER SUGGESTIONS FOR THE USE OF THE STYDENT BIRD BOOK

If possible each student should be given a copy of this booklet (pgs. 1-49 plus the eagle front piece). If you COPY this student booklet, it is designed to be duplicated back-to-back.

The ten activities outlined could be used independently, for instance: "Habitats", which includes plants, could be used either very early in the fall or in late spring when plants are present for study.

The checklist on pages 40-49, while compiled for spring, has many illustrated birds that could be seen and identified in the fall and winter. A copy of these pages could be taped together and displayed making it possible for the students to see all the material more easily.

One objective in preparing this book was to have students discover that they each already know something about birds. Students can learn from each other, and from this book. If they still have questions, other bird books and field guides and/or community experts can be consulted.

Possible Schedule

- lst Session Cover pertinent student materials (pgs. 1-4). Additional bird books and pictures may be displayed. Students should understand they are to fill in just the first three columns of their bird list (columns 4-7 will be filled in as they go through the booklet.)
- 2nd Session What is a Bird? (pgs. 4-8) Try to obtain serveral feathers for students to hardle for this section.
- 3rd Session Making a Living (pgs. 9-11)
- 4th Session Wests (pgs. 12-13). Discuss the importance of not disturbing nesting birds.
 - 5th Session Migration (pgs. 14-16) A large map of North and South America might be helpful when locating birds' winter homes.
 - 6th Session Habitat (pgs. 17-31) Observing and identifying some of the plants near the school might be helpful. Flant samples from students homes may be displayed.
 - 7th Session Conservation (pgs. 32-33)
 - 8th Session Bird Watching (pgs. 34-35; 40-49) Students should already be observing and identifying birds after school and on weekends. Field observations with the group both within walking distance of the school and in an estuary or other good birding area might be planned.
 - 9th Session Additional Activity (pg. 36)
- 10th Session Bird Word Search, etc. (pgs. 37-39)
- Additional worksheets are included in the back of the 4th Grade Book.



BIRDS IN ALASKA'S SOUTH COASTAL ENVIRONMENT



I AM AMERICA'S NATIONAL BIRD

NOTE TO TEACHERS

This is a bird study program for Fourth Graders who attend school in the forested parts of coastal Alaska, particularly Southeast. They could work on it alone or in small groups. It will be more effective if the teacher leads discussion of the question sections. It should not require additional materials; however, use could well be made of bird books, bird pictures, the Audubon Alaskan Bird Chart, or other materials.

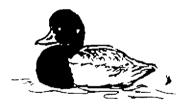
The best field guides showing pictures of all coastal area birds (plus many more) are:

Birds of North America, by Robbins, Bruun and Zim-

A Field Guide to Western Birds, by Roger Tory Peterson.

The program has been divided into ten activities, each of which could be used for one class period. Teachers with additional materials or with time for group discussion may wish to use several more periods.

At the back starting on Page 40 is a check list of the 62 most common birds that you may see in the spring. The information on this list will be helpful while doing some of the activities. Have students begin immediately to check the boxes to the left of each bird they see and can identify. Recognition might be given to the students with the longest lists by the end of the school year.

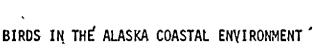




NOTE TO STUDENTS

Identify these birds. If you do not already know their name look them up in the list at the back of the book. Write their name under the picture. Do this for all bird pictures as you read this book.







1. Introduction

There are more birds in the world than there are people. Birds live everywhere that people do and almost everywhere that people go - from the center of cities to the wilderness, high in the mountains and far out to sea. There are always birds around where most of us go or live. That is why everyone knows quite a lot about birds. You will be surprised to find how much you know about birds as you go through this book. You will also be surprised at what each of your classmates knows. You will find that as you all share your knowledge about birds you will all learn something new.

Some of the things you will discuss are:

	• • • • • • • • • • • • • • • • • • • •	<u>Page</u>
		~
	Different kinds of birds	3
III.	Why you can't be a bird if you don't	
	<code>fhave'feathers</code>	5
IV.	How birds use their feet and mouths in different	_
	ways to make their living	
٧.	Where birds build their nests	12
VI.	How birds avoid harsh weather and shortages of	
	food by migration	14
VII.	You will have a chance to look at birds in their	
	habitats (where they live)	17.
VIII.	Discuss ways in which people can do the things	
	they need to do without ruining the places	
	birds need (Conservation)	32
IX.	birds need (Conservation)	34
X.	Additional activities	136
r	Checklist of Southeast Alaska's most common	٠
	birds.	40
	ACKNOWLEDGEMENTS	

Many Juneau people have helped prepare this workbook including Janie Ceaser, Frank Glass, Claudia Kelsey, Jim King, Mary Lou King, Sara King, Jamie King, Virginia Eggert, Ann Schneider and Cindy Roper. Many of the bird illustrations were done by Laurie Wojeck, Alaska Department of Fish & Game. Support was provided by the U.S. Pish and Wildlife Service.

This is the second edition - revised 1979.



II. ACTIVITY: BIRDS YOU KNOW.

Everyone should take a little time to list the most common birds they know in Column 1. of the table below. You could start with birds you see in your area. Then add wild birds you saw some other place. Finish your list with birds you saw on farms, in zoom, in movies, in picture books or anyplace.

Next fill in Column 2 - Is this a Bird you saw in your town? Write yes or no.

Now fill in Column 3 - Is this a small bird like a sparrow or a robin? Write S. A medium bird like a duck? Write M. A large bird like a goose or eagle? Write L. Or a very large bird like an ostrich? Write VL. If you aren't sure of the size discuss it with your teacher or classmates.

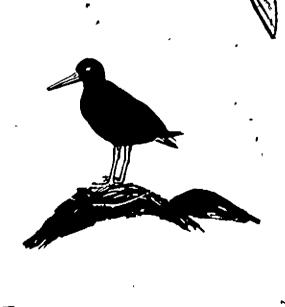
YOUR	LIST OF	FBIRDS	YOU KNO	<u> </u>	
2.	1	4. Feet	5. B111	6.	7. Ok to Hupt
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*		-			
		<u> </u>		,	_
	2. Your Town	Your Town yes-no Size	Your Town yes-no 4. Size Feet	Your Town yes-no Size Feet Bill	Your Town yes-no Size' Feet Bill Where you Have Seen It



Perhaps your teacher would wish to ask each student in turn to name one of the birds from his list and write it on the blackboard. Then ask the class members who also have this bird on their list to raise their hand and write the number after the bird. In this way you can learn now many birds are on the class list and which birds are on most of them. Then you can fill in the three questions below.

1.	How many	birds	on	vour	own	list?	
	non many	01145	O11	J	V 1111	····	

3.	Which birds were on the most lists?	- '
		• •
		•



III. ACTIVITY: WHAT IS A BIRD?
You probably know that birds are one of the main groups of animals, but how are they different from other groups?
Is it because they can fly? yes no ;
Can anything else fly? yes no What?
Is it because they can build nests? yes no
Can anything else build a nest? yes no What?
Is it because birds lay eggs yes no
Can anything else lay eggs? yes no What?
Is it because birds have feathers? yesno
Do other things have feathers? yes no What?
BIRDS ARE THE ONLY CREATURES IN THE WORLD THAT HAVE FEATHERS.
Look at the ones shown below, then answer the questions.
•
· ·
Down feathers QuillFlight or wing feather
Shaft on one side.
Body feather Tail Feather
How many kinds of feathers are there?
Write their names:
1(underwear)
2 4
(flying) (steering)

Which feather would make a pen?
How can you tell a wing feather?
How can you tell a tail feather?
Flight feathers and tail feathers have a shaft and a web. The web is held together by tiny barbs. You can pull the web apart, then by running it through your fingers hook it back together sort of like opening and closing a zipper. Try this if you have a feather in the classroom or if you find a feather on the beach. Look at the barbs through a magnifying glass. Birds keep their feathers in good order (zipped up) by preening with their bill. Most birds have an oil gland. By oiling their bill and then preening they keep their feathers waterproof. When you are out, look for a bird preening.
Have you ever wondered how many feathers a bird has?
Guess how many feathers a chicken would have.
How many feathers do you think a swan would have?
A tiny hummingbird has about 1,000 feathers. A chicken has about eight times that many. Can you figure out about how many feathers a chicken really has? Put your answer on the line beside your guess.
A swan has about 25 times as many feathers as a hummingbird. Can you figure out about how many feathers a swan has. Put your answer on the line beside your guess.
Do they have more or less feathers than you guessed?

Which of these feathers would you put in a sleeping bag?

How Birds Fly

Birds like airplanes are streamlined and are built of light materials so they have less weight to lift. Feathers point backward. Bills are lighter and more streamlined than the heavy Jaws of mapmals and reptiles. Most bird bones are hollow and filled with air from their lungs. Even the wish bone is hollow. Next time you eat chicken or turkey look at the hollow bones.

Bird wings move too fast for us to really see what they are doing. Slow motion movies show that they are actually pulling themselves forward like a man rowing a boat. They push air down and back with the broad side of the wing, then slightly turn and fold the wing to move it forward. Birds wings have an air foil like airplane wings that provide lift. Some birds with great broad wings can soar and glide for long periods without flapping.

An Air Foil

Airplane Wing

Bird Wing







Hold, a prece of paper like this and blow under it. The force of the wind will push it up.



Now blow across the top of the paper and watch it lift.

Fast moving air has less density than slow moving air and the more dense air will push toward the less dense place. In an air foil, air going over the wing has to go farther than if it goes under, therefore, it has to go a little faster reducing density and causing lift.

Name a bird with large wings that soars

Name a bird with little short wings that has to keep flapping hard most of the time ______

Before a bird lands it sets its tail and wings against the wind like brakes to slow itself down. Water birds often use their feet like skins to slide along the water as they land. Watch a duck land in the water and see if you can see it apply "brakes" and slide on its "landing gear."

Draw a bird in the space below with each part near the label.

Crown of Head

t. Eye

Throat

Bill

Back .

Breast

Wing

Tail Feathers

Feet

~ 8

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ACTIVITY: Making A Liying

People use their lower limbs (legs and feet) to travel (walk). People use their upper limbs (arms and hands) to gather food and build shelter.

Birds use their upper limbs (wings) to travel (flying or sometimes

swimming as a penguin).

Birds must gather food and build shelters (hests) too and wings are not much use except to travel. do use their Teet and mouth in lots of ways. Birds do not have teeth. Birds have a bill or beak. Different birds have different bills to help them get their food.

SHORT STRONG BILL for eating and cracking seeds (sparrows, grosbeaks, waxwings, etc.)

LONG SPEAR-LIKE BILL for catching fish (herons, kingfishers, etc.)

SHARP HOOKED BILL for tearing animal food (eagles, hawks, owls, etc.)

SLENDER BILLS and wide mouths for catching insects (swallows, warblers, etc.)

LONG POINTED BILL for digging little animals out of the mud (sandpipers, snipe)

STRONG SLENDER BILL for probing for worms or pucking up seeds (robin, blackbird, etc.)

WIDE F BILL for eating pond weeds and sifting mud (ducks wans, etc.)

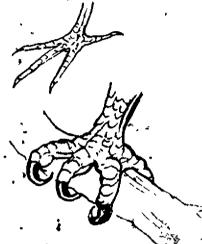
CHUNKY FLAT BILL for eating grass and roots (geese, etc.)

STOUT HOOKED BILL to catch and tear fish and scavenged food (gulls, Atc.)

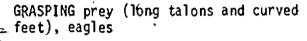
All birds can walk even though they use their wings as their primary means of getting around. They also use their feet for:



SWIMMING (webbed), ducks, geese



WADING in water and soft mud (long straight toes and usually long legs), heron, sandpiper





PERCHING or grasping on branches (long curved toes), robins, sparrows



SCRATCHING for food (three strong toes in front and a spur-like toe behind), chicken

Some birds have additionally specialized feet such as woodpeckers for holding onto the bark. The dipper has long, thin feet that clutch rocks and the ptarmigan has feathers on its feet that hold it up in the snow.



Woodpecker: 2 toes go forward and 2 backfor gripping tree bark



Ptafmigan: toes covered with feathers for snow shoes



Dipper: has long toes to clutch rocks while it is walking under water

Fill in columns 4 and 5 on page 3 with feet and bill types for the birds on your list. The checklist beginning on page 40 may help you determine the type of feet and bills if you have listed wild birds from your area.

When everyone is finished, exchange lists. See if you agree with the type of feet and bills entered on this list. If you see an entry you do not agree with raise your hand and see what the rest of the class thinks. Everyone can correct their list when they get them back.

If no one in the class knows about the feet or bill of some bird perhaps you can find out in the library or call an expert with a Government Agency.



V. ACTIVITY: NESTS.

Where a bird builds its nest depends on how large it is, whether it can use its feet or bill to make holes or carry sticks and grass and so forth. What sort of nest is needed also depends on what condition the young are when they hatch. Some young birds are helpless when they hatch and must have a place where they will not fall out and where their parents can feed them for several weeks until they can fly out. These are called ALTRICIAL birds. Most perching birds and tree nesters (humming birds, robins, eagles) have altricial young. Other baby birds can walk and pick up food soon after hatching. These are called PRECOCIAL young. Chickens, ducks, and shore birds have precocial young. Precocial chicks usually must be kept warm (brooded) by their parent at night or when it rains. The parent, usually the mother, broods the young by covering them with wings and body.

Precocial Birds

- Altricial Birds



The next page is a drawing of some habitat. There are a number of places where a bird could build a nest. Put a number at each place you think a bird might nest, then write the bird's name by the same number below.

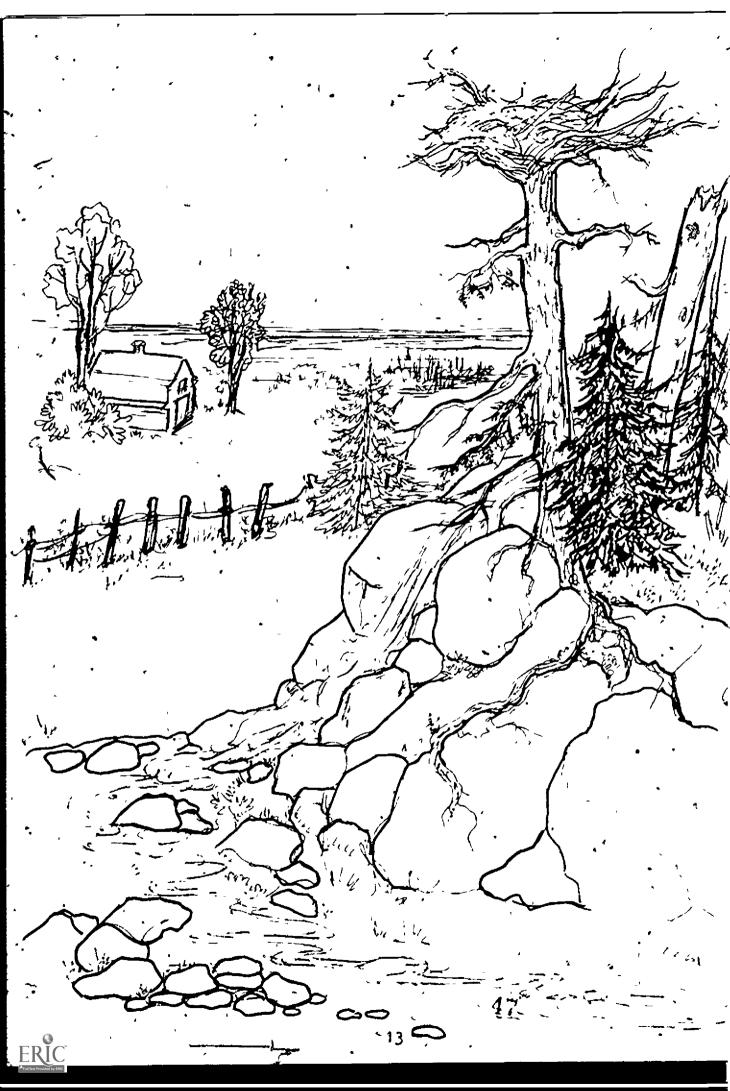
1.	5
2	6
3	7
4	8

If you have a question about some nesting places or what would use them, ask someone or look in a bird book.

Perhaps the teacher will have time to ask how many people placed five nests, six nests and so on.

How many	nests did you locate?	
What was	the highest number in	class?







VI. ACTIVITY: MIGRATION.

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

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

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

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

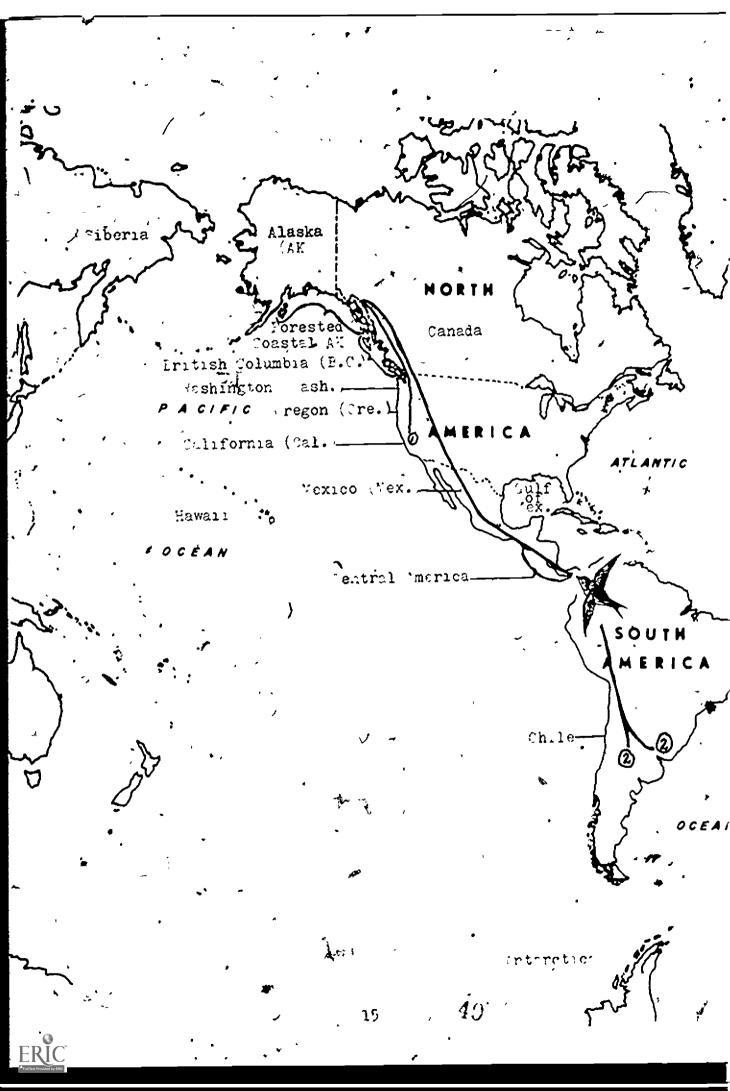
1	•	 3,	<u> </u>	<u> </u>
2		4.		•

Where do birds go in winter? The following map shows half the world. The lines on the map show where two birds we see in the summer go for the winter. The line marked (1) is for a robin that goes to California and the line marked(2) is for a barn swallow that goes to South America.

Look in a bird book of at the bird last at the back of this book and see if you can find where some of the birds you know go for the winter. Write the bird's name and where it goes on the chart. Then draw a line from where it spends the summer to where it spends the winter. Put the number you have given the bird on the chart on the line showing its migration.

Name of Bird			Where Bird Goes in Winter			
. Robin	_	·	Californ <u>ia</u>	, , , , , , , , , , , , , , , , , , ,	<u>, </u>	
. Barn Swallow			South America	·	, 	
•	•			•		
	<u></u>		•		•	
				•		
		4			•	
•				1		





List some birds that stay in your area all winter. What do they eat?

Name of Bird	What Does it Eat in Winter?
•	
	·
	,
,	
·	
•	

Find a picture in an old magazine of a bird or birds that stay in your area all winter. Paste or tape the picture here.

Look at the last column of the bird list in the back of this book.

How many birds stay all winter in coastal AK?______

How many go to Mex. and Central America?_____

How many go to South-America?_____

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VII. ACTIVITY: HABITAT.

The habitat of any animal or plant is the place where it lives. A bird's habitat must have:

- Food Seeds, plant leaves, buds, insects, mice, fish, other birds, etc.
 - Cover This might be bushes and trees for protection from the weather or from natural enemies. Cover is sometimes required for safe nesting. Cover could be a place to roost (rest or sleep).
 - Safe Nest Sites Some birds spend most, of their time in the air. Some birds roost on the water and spend most of their life out of sight of land at sea. But all birds must put their eggs on land.

In general the habitat with the most variety has the most different kinds of birds. The tide flats and nearby upland has the most variety of any habitat in our area. A place where a river meets the tide is called an ESTUARY. An estuary may have islands, marsh, trees, bushes and other features at its edge.

Following are some pictures of important plants you will see on a trip to the tide flats area. These are part of the habitat of the estuary.

Collect a piece of each of these plants and tape it next to the picture.

Color the plants as near their natural color as possible. Look at the plant or in books for colors you do not know.

Draw your own picture of a plant or plants, in the empty spaces in this section of your book, from the habitat of the estuary and tape a sample of that plant next to it.

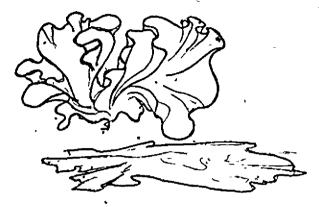
SEAWEEDS

On the lower parts of the wetlands, the only plants that grow are ones that don't mind being covered by salt water at high tide.

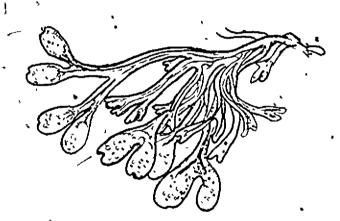
Some seaweeds are washed up on the wetlands. One is our common <u>Fucus</u>, with little "bulbs" which are fun to pop when we walk on them.

Another you often see left by the tides, in thin green sheets, is "sea lettuce" or <u>Ulva</u>. When it is growing in water, it is quite pretty and does look something like a lettuce leaf. It is good to eat but DON'T eat the old dry pieces left by the tides.

Some are "seashore plants" that like some salt water: "goose tongue" (picture on page 23) is one of these. Its real name is <u>Plantago maritima</u>. <u>Maritima</u> tells you it lives by the ocean. Goose tongue is good to eat if it is growing in a clean, unpolluted place.



"Sea Lettuce" <u>Ulva</u> "Daaw"



"Ne" Fucus



In the parts of the wetlands that are above the tides, you will find larger (and older) plants, trees and shrubs, and many flowering plants as well as grasses.

.FUNGI, LICHENS, MOSSES

You may see some early mushrooms (you would see more in the fall), and dry bracket fungi and "bird nest" fungus.

There are many interesting lichens. (Some kinds of Algae and some fungi grow together to make lichens.)

You will see some on the ground, in the moss or sand, and some growing on the trees or fallen branches or stumps, or on rocks.

You will want to look at the fruiting bodies with a handlens. Some look like little pumpkin pies.

Up among the trees mosses will be everywhere - on the ground - on stumps. There are many kinds.

Look at the little "elf caps" on the spore capsules (like seed pods). Use a hand lens. Some look like bird heads.





FERNS

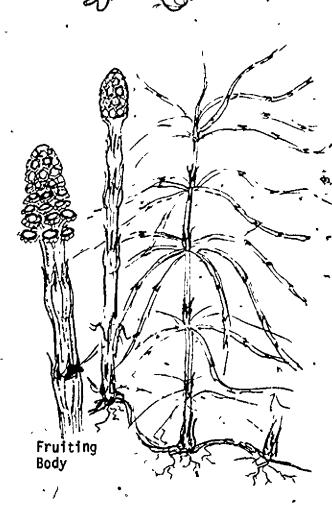
There will be ferns up by the trees. When you go in spring, the ferns will have died down over winter you will see the dead brown fronds on the large ones - but maybe some "fiddle heads" or "fiddle necks" starting up. Do you see why they call them "fiddle necks?" "Fiddle" is a name for a violin.

You may see liverworts.

HORSETAIL Equisetum

Instead of regular seed, horsetails have "spores in a fruiting body" that looks like a little cone.

Tap the top
of a dry,
almost open
"fruiting
body." The
spores will
come out like
a soft green powder
on your hand.

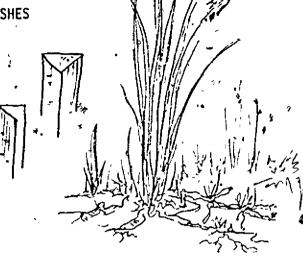




SEDGES AND RUSHES

If you cut the stems you will see that most sedges have <u>triangular</u> stems. You will see many kinds of sedges. They are very important as food for geese and other waterfowl. That is one of the reasons we have so many Canada geese on our wetlands, some of which spend both winter and summer here.

In the wetmeadows on higher ground you may flush a Wilson's snipe.





GRASSES

The large rye grass grown on the beach and sometimes up higher. Rye grass in used to make baskets (Aleut).

There are many kinds of grasses on the wetlands. Usually grass has a round stem.



FLOWERS

If you go to the higher wetlands above salt water where the trees grow, there are many flowering plants. In the early spring, you will only see the old dry stalks or leaves of most of them.

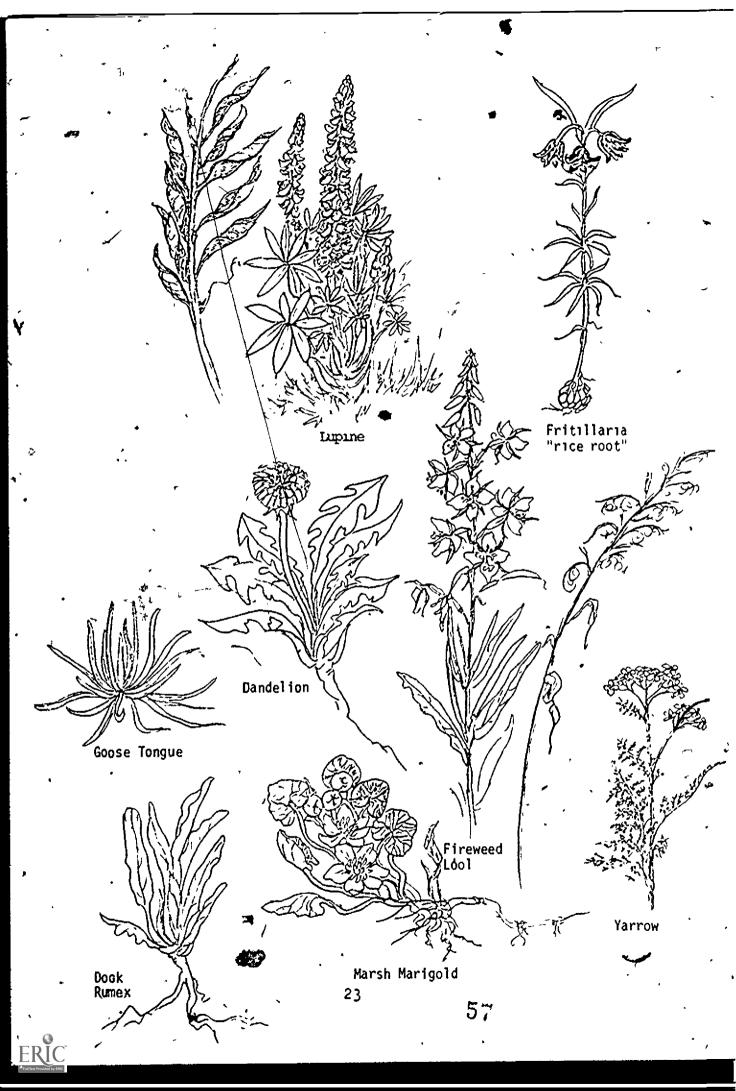
It is interesting to see how many of the wild flowers, (which you know very well when they are in bloom), you can tell when they first come up or from the old seed pods. Can you tell all of the flowers on the next page?

Some plants have many "common names" or "nickhames." The lily Fritillaria is called "rice root", "Indian rice", "chocolate lily" and "black laly." The Tlingit name is "koox." And sometimes not such nice s, because the flowers do have a rather unpleasant smell.

Goose tongue grows where it gets some salt water from the tides. Its Tlingit name is "taa wak lutee."

If you would like to color or paint the flowers on the next page, use colors as near to the right color as possible.

Find a picture of a local flower to tape here.



IMBELLIFERAE

Another plant that has many names is the "Indian rhubarb" or "cow parship." It is also called "wild celery." The Tlingit name is "yana eit."

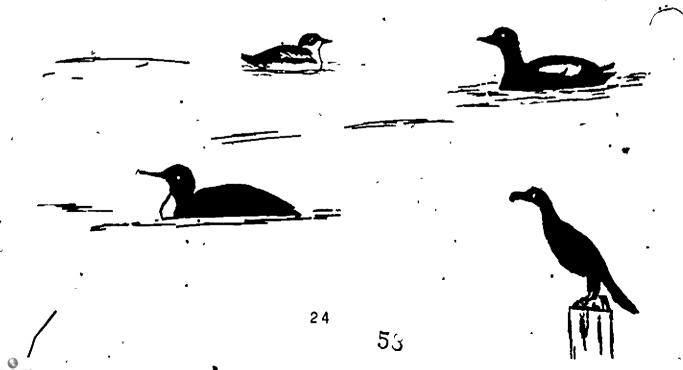
You probably know this plant. It is large and has rough, hairy stems and leaves that make blisters on some people. It has white flowers in a large <u>umbel</u>. There are other flowers on the wetlands that belong to the same family, but they are not so big as the cow parsnip.

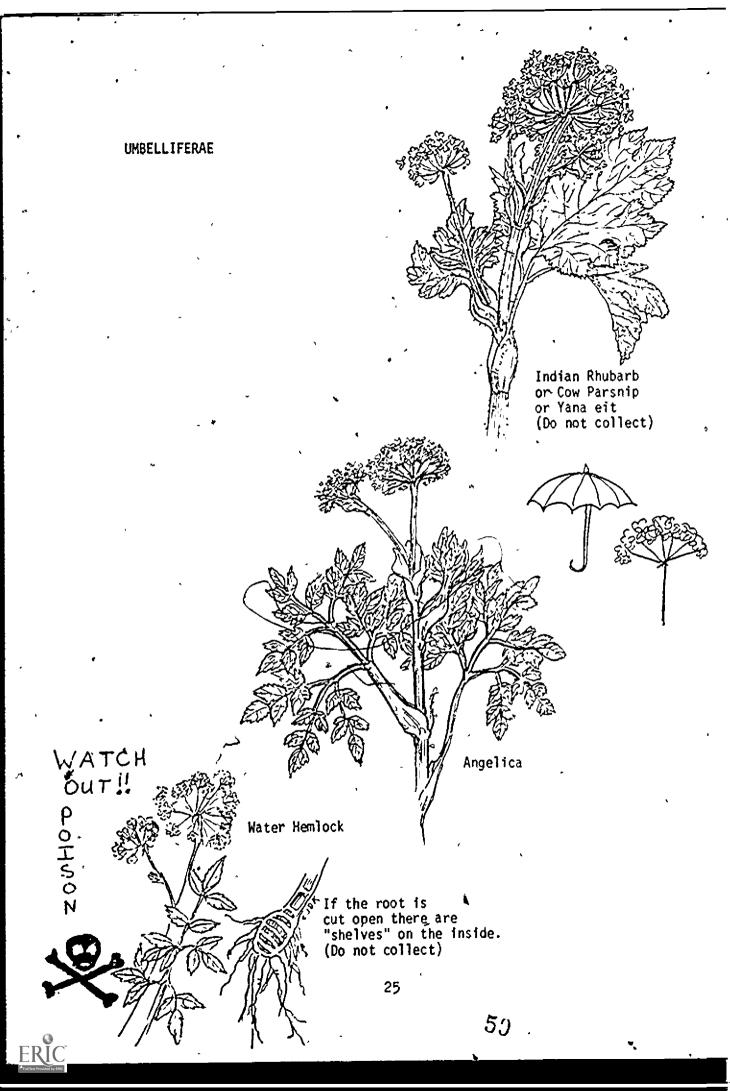
Angelica looks much like cow parsnip but has different leaves - smooth and shiny - and not so BIG. The flowers are often a little pinkish or lavender, not so white as cow parsnip.

This family is often called <u>Umbelliferae</u> because of the umbels, the flower heads like umbrellas! It is also known as the "carrot family" or "parsley family" or "celery family" because all these good FOOD plants belong to this family.

But don't let that fool you! Some of the most POISONOUS plants also belong to this family. One grows in our wetlands. It is "water hemlock" or Cicuta.

Several of our wild <u>Umbelliferae</u> are EDIBLE (good to eat) but NEVER eat any of them unless with someone who REALLY KNOWS the plants.





TREES

You will only see a few kinds of trees on the wetlands, and only on the shore, or where there are islands of land above the high tide.

The largest tree is the SITKA SPRUCE (the only native spruce in Southeast Alaska). One way you can tell it is a SITKA SPRUCE is to feel the ends of the needles; they are very prickley sharp!

Because they are narrow and often pointed, the leaves of conifers are called needles, and the leaves of Sitka spruce really feel like needles! In the spring you will see little paper-like brown "caps" covering the ends of the fresh new growth. When the covering caps first come off, the new leaves are a bright, light green and soft (if they are ready you may pull the caps off gently) but very soon they become stiff and sharp and feel like "grown up" sitka spruce leaves.

Sitka Spruce
"Yan"
Picea sitchensis

26 J

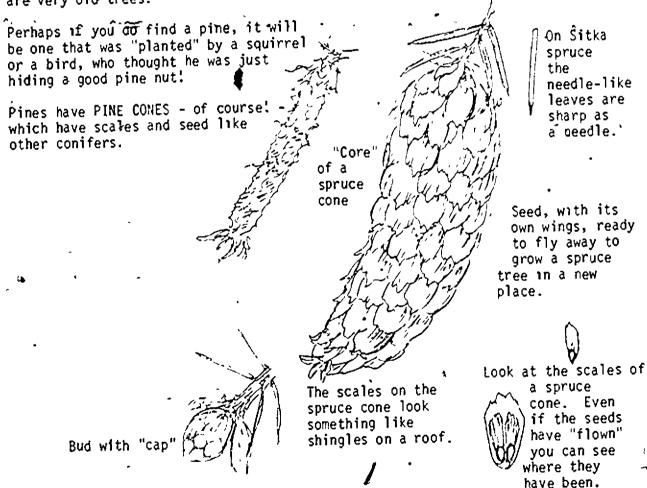


The spruce seeds are in cones. Trees with cones of this type are called CONIFERS. Each SCALE on the cone holds two little seeds; each seed has its own wing, so then the ripe cone opens, the wind will carry the seeds to new places to grow.

There would not be room for all the seeds in the cones to become trees, but the nut-like seeds are good food for birds and small animals like squirrels. You may find a place under a big spruce where squirrels have left the center (core) of the spruce cones just the way you might leave the core of an apple.

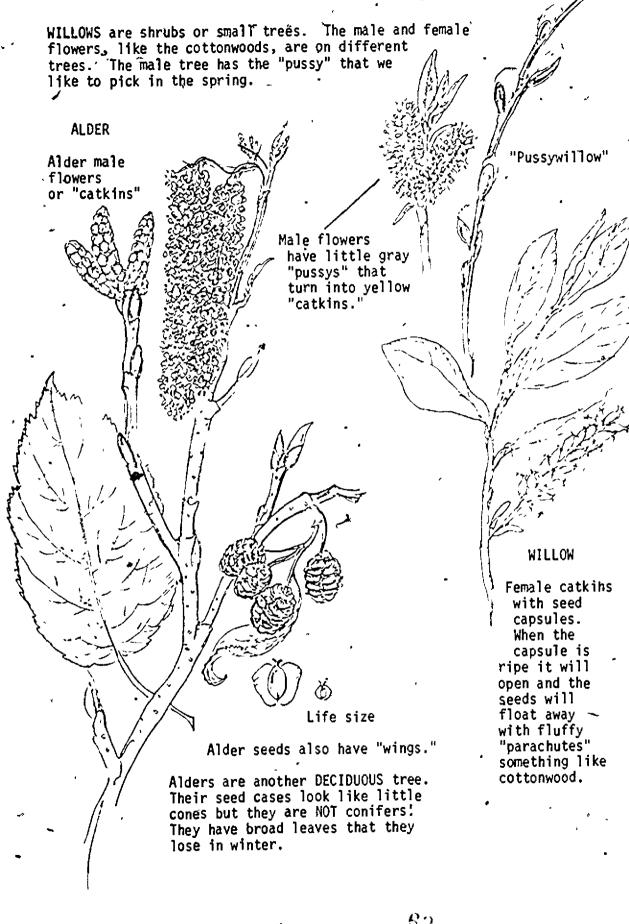
Our other conifers are NOT common on the wetlands, but if you look very hard, you may find a western hemlock or even a pine. The hemlock is easy to tell from the spruce; its needles are flat and soft and rounded at the ends. They have very small cones which also have seeds with wings.

There is only one kind of native or wild PINE tree in Alaska, but they may look very different, depending where they grow. Some get to be very tall, large trees and some are a dwarf size, even when they are very old trees.



Find a spruce cone and count the scales. There should have been two seeds in each scale. How many seeds should there have been in the cone?

COTTONWOOD The other large tree you will see is DECIDUOUS (that means its leaves come off in winter). The conifers keep their leaves on all year, so they are called "evergreens." They do get new leaves and drop old ones but never all at once! So, probably, the only big tree you will see in the spring that has bare branches or is just getting new leaves will be the "black' cottonwood." In spring the leaf buds are sticky with resin and smell very sweet. You may see the flowers or "catkins" The male and female flowers are on different trees. Only the female tree has the "cotton" that the name "cottonwood" comes from. "fluffy-cottony" hairs on the little seeds help them travel with the wind. Only the female tree (the one with seeds) has the 'cotton." Black Cottonwood Populus trichocarpa



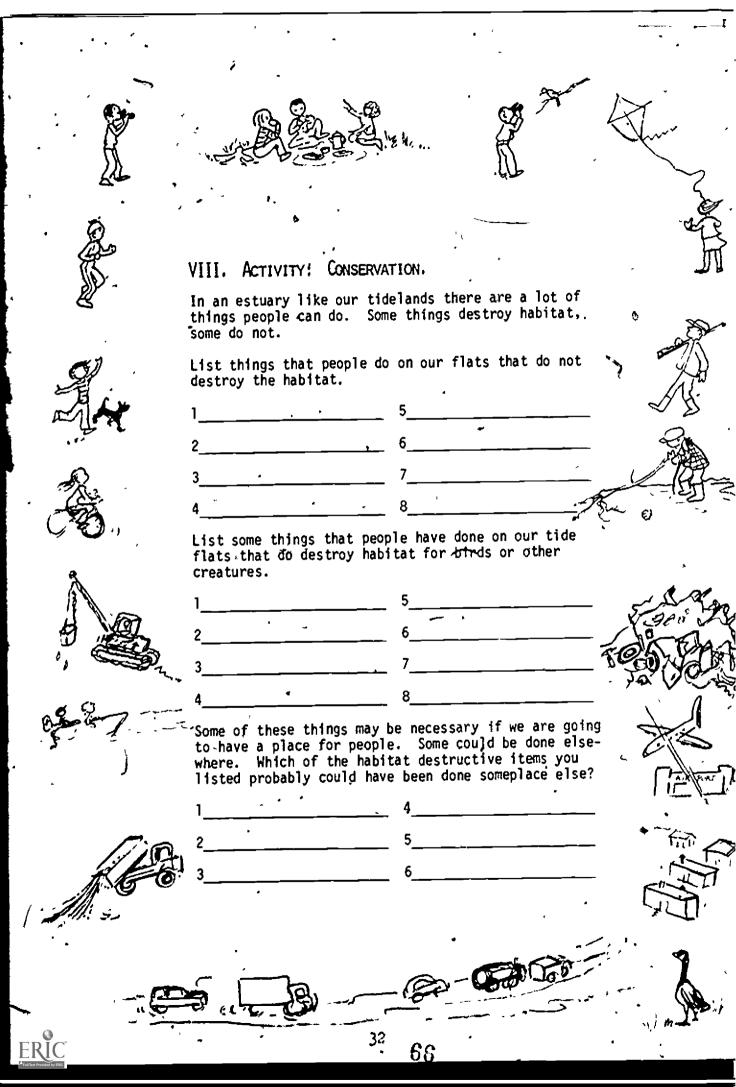


List some of the things that might attract birds that provide variety in the following types of habitat:

· 55

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Now you can see why we need laws to protect estuarine resources. We call these conservation laws. A few activities that are controlled by conservation laws are:

Hunting Fishing Digging Filling

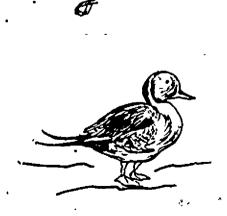
People hunt some birds for food. No hunting is allowed during nesting season. Hunting in the fall reduces the number of those that have to find food through the cold part of winter. This means more food for those that are left. Sometimes reducing the population by hunting means less chance of starvation for those that are left. The number of days of hunting season and the daily bag limit can be adjusted so not too many birds are taken by hunters.

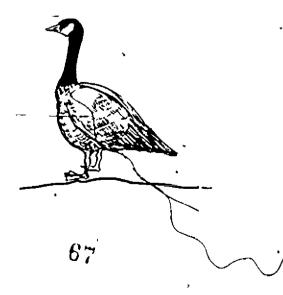
We have the laws we need to protect the estuarine resource but for the public benefit exceptions can be made like when we need an airport and there is no other place to build it.

People must always be careful to obey conservation laws and to see that exceptions are not made that are not necessary. Otherwise we lose the values provided by the estuary.

You can help conserve birds by not disturbing their nests when the birds are using them. Sometimes disturbing a bird on her nest will cause her to leave her eggs or babies. Never throw things at birds.

In Column 7 on your chart on Page 3 check the birds that people sometimes hunt for food.







IX. - ACTIVITY: BIRD WATCHING.

Many people make it a hobby to try to find and identify as many different kinds of birds as they Gan. They make a list and keep records of the birds they see.

There are several books that can help you identify the birds you see. The most commonly used books are <u>Birds of North America</u> by Robbins, Bruun and Zim; <u>A Field Guide to Western Birds</u> by Roger Tory Peterson; and the <u>Audubon Society Field Guide to North American Birds</u>. These books have a place to check off birds you have seen.

When you use a field guide be sure to check in the guide the area where the bird occurs to be sure that it is likely to be found in your area. The list of local birds in this book may help.

The U.S. Forest Service has printed a checklist of birds of Southeast Alaska and also a checklist of birds of Prince William Sound. The U.S. Fish and Wildlife Service has a checklist of birds of Kodiak. These will be helpful to have.

If you enjoy looking for and identifying birds it is a great help to use binoculars or a telescope. Most birds fly away before you can get close enough to identify them with the naked eye, but with binoculars you can usually see most of the important field marks.

There are many good places to look for birds in your area. Right in town you can see many different types of birds in the cemetery, in yards, and by the boat harbors. Other good birdwatching areas are in the wetlands along the beaches, and in any of the forested areas.

It often helps to go out with a small group of birdwatchers because someone in the group may know some of the birds you have not yet learned to identify.

On page 40 is a list of 62 bird species that are along our coasts in the spring. Read this list and make a check \checkmark by each bird you know. On your field trip see how many more you can check off.





BIRD WATCHING PLACES

Right in town in the residential areas you will find birds that like the open spaces of lawns surrounded by trees and shrubs to provide cover. Some birds feed on insects and worms, some on flower nectar, and some eat seeds and other vegatation. Birds you can find in town are:

Rufous Hummingbird
Barn Swallow
Tree Swallow
Steller's Jay
Chestnut-backed Chickadee
Winter Wren
American Robin

Varied Thrush
Ruby-crowned Kinglet
Myrtle Warbler
Wilson's Warbler
Oregon Junco
Golden-crowned Sparrow

Down by the boat harbor and along the waterfronty you can find birds that eat fish, shellfish, marine invertebrates and other foods found in the marine and coast environment. Birds you can find at the waterfront are:

Pelagic Cormorant Greater Scaup Barrow's Goldeneye Bufflehead White-winged Scoter Surf Scoter

Bald Eagle

Glaucous-winged Gull Herring Gull Bonaparte's Gull Pigeon Guillemot Marbled Murrelet Northwestern Crow Song Sparrow

The wetlands that have wide areas of grasses, mudflats and shallow inlets and ponds. This is one of the best areas to see birds. In the wetlands you can find:

Canada Goose
Mallard
Pintail
Green-winged Teal
Common Merganser
Marsh Hawk
Semipalmated Plover
Common Snipe

Greater Yellowlegs Dunlin Western Sandpiper Short-eared Owl Belted Kingfisher Water Pipit Savannah Sparrow

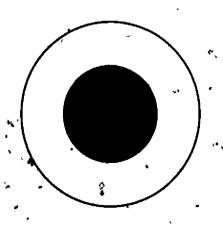
In the uplands near rivers or flaciers you can find birds that like shrubby vegatation and birds that like freshwater streams and ponds.

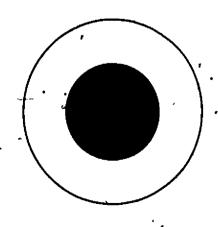
Red-throated Loon Harlequin Duck Bald Eagle Spotted Sandpiper Arctic Tern Dipper Barn Swallow Myrtle Warbler Wilson's Warbler Pine Siskin

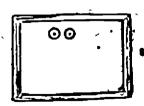
63

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X. ADDITION	AL ACTIVITY,	•		/
Write a repo	rt about your favorite	bird.	,)
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Mat does it	look like?			
Where does i	t live?			
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What other t	hings thave you learned	about your b	oird?	
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Birds often smash into large house windows. Many birds are unneccessarily killed this way. Owl eyes in the window sometimes warn birds. Color the large circles yellow then cut out your owl eyes and put them up near the center top of your window with scotch tape.







Bird Word Search

The birds on this word search can be found up, down, across and diagonally Circle each hird that you find.

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Cormorant Loon Murrelet Goose Sanapiper Robin

Harlequin Swan Mallard Pintail . Scaup Raven Thrusn

Gull Tern Dippen Crow Junco

Dunlin Heron Jay Grouse Ptarmigan

Bird Habitat Word Search

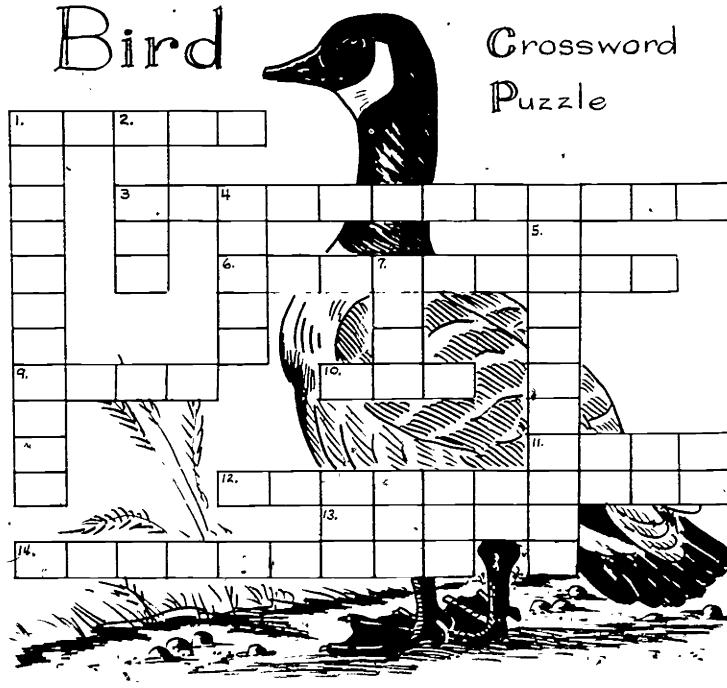
There are twenty (20) things in this puzzle that can be found on the wetlands. Words can be found up, down, across, and diagonally.

Circle each word that you find.

R	I	V	E	R	S	E	С	L	
E	S	m	O	Q	Ш	S	W	D	
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L	R		7	R	Ε	E	٦	N	ய
A	Ц		С	N		D	L	D	E
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A		0	N	R	E	F	9	I_	R
E	M	N	I	G	N	u	F	0.	I
	Н	Ε	M	L	0	С	K	N	F

River Tide Fish Sedge Alder Spruce Insect Tree Moss
Plant
Fern
Fungi
Sea
Willow
Fireweed
Algae

Hemlock Cone. Dandelion Seed



Bald Eagle Blackbird Bufflehead Barn Crow Canada Hummingbird Heron Yinifisher

Across

- 1. Largest bird on the list that wades.
- 3 Looks like a robin with black band on chest
- 6. Black medium sized perching bird
- 9. Swallow with rusty breast
- 10.Bird of prev with large eyes
- 11.Largest waterfowl.
- 12.Smallest duck
- 13.Our National Bird.
- 14.Has feathers on feet that act like snowshoes.

Do⊷r

- l -muxlest or hims birt.
- 2 Targest black bird
- 4 Lormon for sint birt with relireast
- 5 Medium azid ter harutar whose rums
- * tells what he eats
- 7 Black surface if a set, maller than a river
- 8, soose with white heek.



CHECKLIST OF SOUTHEAST ALASKA'S MOST COMMON BIRDS IN SPRING (Seaweek)

Make a check mark by each bird you see during your bird study or through the summer.

Note - some of these birds have different plumage in winter and occur in different habitats then (see your bird book or SE list).

The habitats listed are best places to see these birds, But they can occur in other places.

The "winter home" column shows general range in the eastern Pacific area. Some of these occur elsewhere in winter. Those listed for "Coastal Alaska" stay all winter.

See your bird book for several hundred more species that are sometimes seen in Southeast Alaska.

	Your Check List	Bird	Size	Feet	Bill	Habitat	Most Distinguishing Characteristics	Winter Home	t
BIRDS THAT SWIM SEA BIRDS	•	orant, Pelagic	L	Swim	Long hooked	₹ Salt water	Black, upright	Coastal to B.C.	
1	_ Gu11	lem ő t, Pigeon	м	Swim	Pointed	Salt water	Black, white side patch	Coastal to Cal.	
2"	□ Loor	n, Red-throated	L	Swim	Pointed	Freshwater usually	Grey, red throat	Coastal to Cal.	

ERIC

74

40

	□ Murrelet, Marbled	М	Swim	Small, Pointed	Salt water	Small, mottled brown	Southeast AK to Cal.
WATERFOWL	•		_				
	□ Bufflehead	ML	Swim	Wedge shape	Salt water	Smallest duck, black and white	Coastal Al to Mexico
	□ Goldeneye, Barrow's	L	Swim	Wedge shape	Salt water	Black and white	Coastal Al
- 2	□ Goose, Canada	VL	Sw1m	Wedge shape	Water, wetlands	White cheek patch	Coastal A to Cal.
	☐ Green-winged Teal	*	Swim	Wedge shape	Fresh water, salt water	Small duck, green wing patch	Cal. to Mexico
	□ Harlequin /	Ł	Swim	Wedg e shape	Salt water, streams	Blue body with white streaks (male)	Coastal A to Cal.
	□ Mallard	Ł	Swim	Wide, flat	Wetlands	Green head, grey back	Coastal A to Mex.

ERIC "Full Text Provided by ERIC

	r . ,	•			*		
	☐ Glaucous-winged	Ĺ	Swim	Hooked	Beaches,dump, fish streams,	Large gull, grey wings	Coastal AK to Mex.
	Herring	L	miwS	Hooked	Beaches, dump, fish streams	Large gull,black	Coastal AK
	Tern, Arctic	ML	Swim	Hooked	Tide flats, glacier	Orange bill and feet, forked tail	Chile to
BIRDS THAT WADE	□ Dipper	M	Grip	Sharp,	Streams	Grey bobs body	Coastal AK
43	,	et	,	pointed		up and down	· .
	□ Dunlin̂	\$	Long legs	Long, pointed,	Beach, mudflats	Rusty back, black belly	Coastal AK to Mex.
	☐ Heron, Great Blue	VL`	Long legs, toes	Ļonġ; pointed	Beach, fish streams	Bluish color, tall	Coastal AK
	°□ Killdeer	s	Long toes, legs	Pointed	Beach, fish streams	Two black stripes on breast	Wash. to Central America
ERIC		•				. نگر ا	

2	· 🛕 .							
		Oystercatcher, Black	* M	Long toes, legs	Long, flat	Islands, reefs	Black with orange bill	Coastal AK
•		□ Plover, Semipalmated	S	Long toes, legs	Medium pointed	Mudflats, beach	One black stripe on breast	Cal. to S.America
·		□ Sandpiper, Spotted	s	Long toes, legs	Medium pointed	Mudflats, sandy places	Spots on Breast	Cal. to S.America
.44		□ Såndpiper, Western	\$	Long toes, Plegs	Medium pointed	Mudflats, beagh	Very small	Cal. to S.America
		□ Snipe, Common	\$	Long toes, legs	Long, pointed:	Swampy places	Long bill, short legs	Coastal AK to S.Amer
: ر اگر :		□ ¥ellowlegs, Greater	S	Long toes,	Long, pointed	Mudflats, beach	Yellow legs	Cal. to S.America
Ē	BIRDS OF PREY	□ Eagle, Bald 🚣.	· Vt.	Grasp	Sharp, hooked	Coast, salmon	Adults have white head and tail	Coastal AK
ERIC	32	, 4 ^p	<u> </u>	· ·			- 5 _V	\

*			I			•	• .
•	□ Hawk, Marsh	L	Grasp	Sharp, hooked	Tide flats	White above tail →	Central America
	□ Owl, Short-eared	L	Grasp	Sharp, hooked	Tide flats	Black patch near bend of wing, no visible ear tufts	to Mexico
PERCHING BIRDS: VE	ERY LARGE			(•	• •	
	□ Raven, Common	VL ,	Perch	Strong, pointed	Town	All black	Coastal AK
PERCHING BIRDS: L	ARGE .	•					
ኧ	✓ □ Crow. Northwestern _	L	Perch	Strong, pointed	Beach ~	All black, smaller than raven	Coastal AK
	□ Grouse, Blue	L	Scratch	Seed	Forest	"Hooter"	Coastal AK
	□ Ptarmigan, Rock	L	Scratch	Seed	Alpine	Black tail, white in winter	Coastal AK
		4	<u></u>			· · · · · · · · · · · · · · · · · · · ·	<u> </u>
<i>K</i>		\$	" y'		•		

PERCHING BIRDS: MET	□ Blackbird, Rusty	M ,	Perch' Seed	Pointed,	Tide flats	Rusty black, Light eyes	Cal. to Gulf of Mex
T	Grosbeak, Pine	М	Perch	Seed	Forest, ash trees in town	White wingbars	Coastal AK to Oregon
	^ □ Jay, Steller!s	М	Perch	Seed	Forest, estuary	♣lue, crest, noisy	Coastal AK
	☐ Kingfisher, Belted	# /	Perch	Pointed	Beach, lakes	Crest, grey, white neck ring	Coastal AK
	□ Robin, American	м.	Perch	Pointed, seed	Yards, wetlands	Red Breast ~	California
.)	□ Starling	M	Perch	Pointed	Town, parks	Short-tailed, dark	Coastal AK around tow
	□ Thrush, Varied .	* M	Perch	Pointed, seed	Yards, wetlands	Black band on redbreast	B.C. to G
-86	· · · · · · · · · · · · · · · · · · ·		•	•		27	

ERIC Full text Provided by ERIC

PERCHING BIF	RDS: SMALL	□ Waxwing, Bohemian Chickadee, Chestnut-	M	Perch •	Pointed, Seed	Yards, forest	Yellow chest, red on wingtip and tail	Coastal AK to Cal.
Perching Bil				•				₹
- /		backed	S	Perch	Pointed	Forest, yards.	White eye mask	Coastal AK to Oregon
		□ Hummingbird, Rufous	, VS	Perch	Pointed	Yard, on flowers	Male is orange, brown, bright orange throat	Mexico
	HALL	□ Junco, Oregon	\$ S	Perch	Seed	Yard, forest	Black head, white outside tail feathers	Coastal AK to Mex.
		Crowned	٧s	Perch	Insect	Forest	White gye ring, red crown	To California
-		_		-		· · ·	·	
	4.	□ Pipit, Water/ /	s 	Perch'	Insect	Wetland	Bobs, grey feathers, white sided tail feathers	Oregon to Mexico
. ,85		Redpoll, Common	S	Perch	Insect	Forest	Red on Head and chin, nervous	Coastal AK to Cal.
							<u> </u>	

	□ Siskin, Pinė	S	Perch Seed	Yard, forest	Yellow on side '	Coastal Al
	•				wings	
	☐ Sparrow, Golden- crowned	\$	Perch Seed .	Yard, wetland	Gold stripe on top of head	B.C. to California
	□ Sparrow, Lincoln's	s [·]	Perch Seed	Wetland -	Pale yellow- brown under eye	To Cal.
, •	☐ Sparrow, Savannah	\$	Perch Seed	Wetland	Faint yellow above eye	Wash. to Cal.
	□ Sparrow, Song	S	∲_ Perch Seed	Wetland	Black spot on breast	Wash. and Oregon
	□ Sparrow, White- crowned .	, , S	Perch Seed	Wetland	Two white stripes on head	B.C. to Mexico
,	·□ Šwallow, Tree	s	Perch Însect	Yard, Wetland	White breast, soars	Cal. to Central America
-90		*		• • • • • • • • • • • • • • • • • • • •	91	

. 48

	□ Barn Swallow	S	Perch	Insect '	Yard, barn, wetland	 Rusty breast, forked tail	South America	^
	□ Warbler, Myrtle	\$	Perch	Insect	Forest, wetland	Yellow on side of wing and above tail	Oregon to Panama	
	□ Warbler, Wilson's	S	Perch	Insect	Forest, wetland	Yellow with black hat	Mexico to Panama	°
	□ Wren, Winter	vs \$	Perch	Insect	Forest	Tail stands up, brown	Coastal A	K
)	•				•	,		

ERIC.

ESTUARY: WORKSHEET 1

ESTUARY (es choo er e): a place where freshwater meets the sea, often an inlet or the wide mouth of a river.

'In an estuary, freshwater from the land and salt water from the sea mix. The mixture of the two kinds of water changes as the rivers, the sea, and the weather change. Sometimes heavy rains or the melting ice of spring bring great amounts of freshwater to the estuary. Sometimes the rivers carry silt or debris or man's wastes into the estuary. Everytime the tide changes the mixture of salt and fresh water in the estuary changes; when the tide is high, there is more salt water in the estuary and when the tide is low, there is less. Sometimes the freshwater flows over the top of the heavier salt water, but storms, winds, currents or changes in temperature may cause the salt water and freshwater to mix.

Because the degree of salt in the water of the estuary is always changing, plants and animals that live there must be able to stand these changes. To the plants and animals that can tolerate the constant change, the estuary is a rich place to live because it offers abundant food. As the plants grow tall and thick, they make the estuary a sheltering place for birds to feed or nest. The plants of the estuary also make this an important "nursery" for many young marine animals.

TEŠTING YOURSELF
Draw a line under the right answer or fill in the blank.
1. In an estuary, saltwater mixes with
2. From the story you can tell
a. the estuary is a bad place for young marine animals.
b. the estuary is a sheltering place for birds to feed or nest.
c. the estuáry never changes.
3. The story as a whole is about
a. the ocean. c. where freshwater meets the sea.
b. freshwater rivers. d. freshwater and saltwater don't mix.
4. Plants and animals living in estuarys
must be able to stand change. YES NO DOES NOT SAY ,
5. The estuary offers abundant food
for plants and animals. YES NO DOES NOT SAY,
6. What word in the first paragraph means a place where freshwater
meets the sea?
SAY & KNOW GETTING READY TO READ
Draw a line under the right answer or fill in the blan
MICROSCOPE 1. Another word for multiply DOUBT INCREASE HIDE
2. To rot is the same as PIGHT BEND
DECAY 3. To have many different things is to have a LEAF VARIETY. TINY
HIDE 4. is something that helps you see tiny
GENERATION 5. A word for food material
HOPE NUTRIENT SEA LEAF 6. Your parents and grand parents are a different
NUTRIENT than you.
VARIETY EDGE LEAF
INCREASE

ANSWERS Lesson I

- 1. Freshwater
- 2. B the estuary is a feeding place for young marine animals.
- 3. C where fresh water meets the sea
- .4, Yes
 - 5. Yes
- 6. Estuary

· ANSWERS

SAY & KNOW

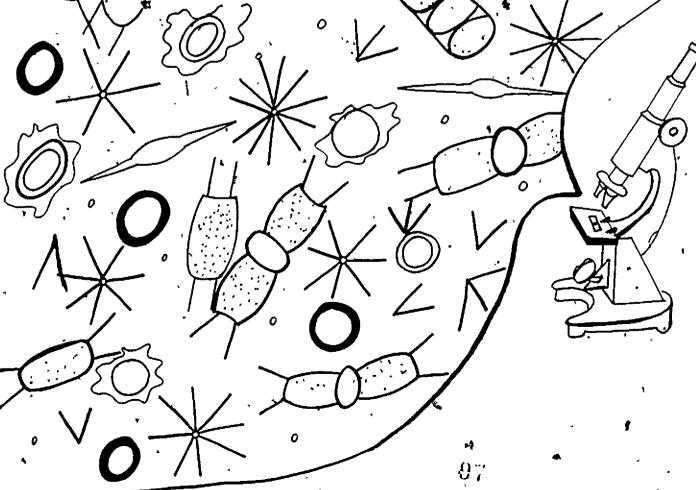
- 1. increase
- ,2. decay
 - variety
 - 4. microscope
 - 5. nutrient
 - 6. generation

ESTUARIES: WORKSHEET 2

PHYTOPLANKTON in the estuary.

Phytoplankton are tiny one-celled plants drifting in large bodies of water - like the oceans. They are so small they can be seen only by using a microscope, but they come in an amazing variety of shapes and colors. Like the larger green plants, phytoplankton can use the energy from the sum and nutrients from water to make food. In spring when the days grow longer and warmer, these tiny one-celled plants begin to grow and divide and to greatly increase in number. Many phytoplankters, as they are called, are eaten by tiny swimming or drifting animals that are eaten by larger animals that are in their turn eaten too. Thus phytoplankton is the food that all animals in the sea depend on in one way or another.

The estuary collects many nutrients washed from the land to the sea, which makes it a very rich place and a good place for phytoplankton to live and multiply. Estuaries often have large numbers of phytoplankters living in their waters. While they are alive, the tiny plants are food for tiny animals. When the phytoplankton dies it sinks to the bottom of the estuary. Once on the bottom the tiny phytoplankton may either be eaten by bottom living animals or decay and become nutrient material that will be part of the food supply for new generations of plants.



TESTING YOURSELF .
Braw a line under the right answer or fill in the blanks.
1. Phytoplankton are tiny plants.
2. From the story you can tell
a. phytoplankton all look the same.
b. phytoplankton cannot be seen by, a microscope.
c. phytoplankton are eaten by tiny swimming or drifting animal
3. The story as a whole is about
a. one-celled animals c. plants and animals in the ocean
b. one-celled plants d. plants and animals in the estuaries
4. The estuary is a good place for phytoplankton to live.
YES NO DOES NOT SAY
5. Phytoplankton can use the energy from the sun and nutrients from water to make food.
YES NO DOES NOT SAY
6. What word in the first paragraph means one-celled plants?
*
SAY AND KNOW GETTING READY TO READ
SAY AND KNOW GETTING READY TO READ Draw a line under the right answer or fill in the blank.
SOLID 1. Food will you. STORM NOURISH , SOLID
MICROSCOPIC 2 To come into view is to PRODUCE SOLID FIGHT APPEAR
NOURISH 3. Not useless means the same as VALUABLE RELAX
FIGHT 4. If you make something youit. PRODUCE FIGHT STORM
SIMILAR 5. If something looks almost the same it looks
APPEAR FIGHT NEWAY 2
6. You need a microscope to see animals.

RELAX

ANSWER

Lesson II

- .1. one-celled
 - 2. C,- phytoplankton are eaten by tiny swimming or drifting animals.
 - > B one-celled plants .
 - 4. Yes
 - 5. Yes
 - 6. Phytoplankton

ANSWERS

SAY AND KNOW

- l. nourish
- 2. appear
- 3. valuable
 - 4. produce
 - 5. similar
 - 6. microscopic

ESTUARIES: * WORKSHEET 3

Carex, an important plant in the estuary.

Carex is called a sedge. That means that its stem is triangular and solid, instead of hollow. Many kinds of Carex can be found in Alaska. They grow along roads and in yards as well as in estuaries.



One kind of <u>Carex</u> living in estuaries, grow very rapidly and may reach a height of three feet or more during a growing time of four or five months! This <u>Carex</u> begins to grow in the spring and stops by mid-summer. Then in the fall and winter, it starts to bend over, to fall, and to decay. Finally the <u>Carex</u> disappears as it changes from plant to nutrients and return to the rich mud of the wetlands. The following spring new green shoots will appear.

While Carex shoots are alive, many small animals may live on them and some probably feed on the tall plant. When the new growth begins to decay, microscopic animals feast on it. The nutrients from the decaying Carex nourish new sedges and grasses, or they will find their way into the waters of the estuary to become food for phytoplankton.

Carex and the other plants of the wetlands produce more plant material than any other kinds of plants of similar size growing in the areas. If they are measured in energy or food value, wetlands may produce four times as much plant material as a rice field and twice as much as a corn field. This means if we want to talk about how valuable different kinds of land arein producing food for the animals of the world, wetlands must rank among the most important.



ERIC

	· · · · · · · · · · · · · · · · · · ·
	TESTING YOURSELF
	Draw a line under the right answer or fill in the blank.
,	1. Carex changes from plant to
	2. From the story you can tell
	a. Carex grows very rapidly.
•	b. Carex keeps growing all year long.
	c. Carex grows a hollow stem.
	3. This story is about *
	a. plants living in wetlands.
	b. animals living in estuaries.
,	
	c. how animals reproduce.
	4. Bacteria feast on Carex.
`	YES · NO DOES NOT SAY
	5. Wet lands cannot produce four times as much plant material as
•	a rice field. YES NO DOES NOT SAY
	6. What word means a stem is triangular and solid?
	SAY AND KNOW GETTING READY TO READ.
	Draw a line under the right answer or fill in the
	AMAZE 1. If something has no meaning it is
	FRESH FRESH MEANINGLESS OCEAN
	2. To surprise someone is to MEANINGDESS AMAZE, ROCK BLOOM
	OCEAN 3. To have many parts is to be
	MIXTURE 4. When something is not the same it is
	BLOOM FRESH ROOT DIFFERENT 5. When you put different things together you get a
	INDIRECTLY MIXTURE · OCEAN · ROCK
	COMPLEX 6 is the same as roundabout. INDIRECTLY BLOOM FRESH
	and the same of th

ANSWERS

Lesson III

- ~ 1. nutrient
 - 2. a. Carek grows very rapidly
 - 3. a. plants living in wetlands.
 - 4. yes
 - 5. no
 - 6. sedge

ANSWERS

SAY AND KNOW

- 1, meaningless
- 2. amaze
- 3. complex
- 4. different
- 5. mixture
- 6. indirectly

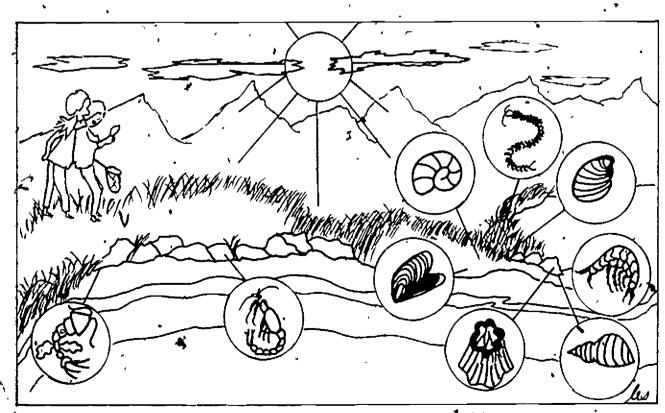
ESTUARY WORKSHEET 4

INVERTEBRATES in the Estuary.

Invertebrates are animals without backbones. Insects,
sea stars, clams, crabs, worms -these and many more are
among the common invertebrates.

In an estuary live many different kinds of invertebrates and each of them has its own set of needs for the kind of place it has to have to be able to live. Some invertebrates in the estuary can live only where there is fresh water; others can live only where there is salt water; still others must have water that is a mixture of fresh and salt. Some invertebrates live in mud, some only under rocks, other prefer the roots or stems of the marsh grasses and sedges. Discovering where many different kinds of small invertebrates are found in the estuary will help us understand how complex and amazing the natural world can be.

Crustaceans, bivalves and worms are types of invertebrates living in estuarys. Each of these small lives may seem meaningless but they are part of a important food chain. Small invertebrates eat tiny plants and animals. Larger animals like fish and ducks eat the small invertebrates. Together they are steps of a food chain and are very important) - even indirectly in feeding us.



TES?	ring yourself
Dra	w a line under the right answer or fill in the blank.
1 3	Crustaceans, bivalves and worms are types of
2.	From the story you can tell .
•	a. invertebrates live in many different places.
_	b. invertebrates all live in the mud.
	c. invertebrates don't like the water.
3.	This story as a whole is about
	a. invertebrates eat ducks
	b. invertebrates are an important part of a food chain.
b	c. invertebrates don't fit in the food chain.
4.	Crustaceans are worms living in the ocean.
	YES NO DOES NOT SAY
5.	Many different kinds of invertebrates live in the estuary.
	YES NO , DOES NOT SAY
6.	What word in the first paragraph names an animal without
•	a backbone?
	AND WHOM COMMING DEADY MO PEAD
SAY	AND KNOW GETTING READY TO READ
	Draw a line under the right answer or fill in the blanks.
INC	REASE 1. To have great value is to be very
	IMPORTANT STREAM FOUND
	z. 10 det bigger in size is to
	3 Someone who studies plants and animals is called a
EXA	MINATION MONTH BIOLOGIST EGG

FOUND

5. When fish lay their eggs it is called SPAWN FOUND STREAM

6. Everything you eat goes into your .
STOMACH . MONTH FOUND

4. It means to look closely EXAMINATION STREAM

STREAM

IMPORTANT

SPAWN

MONTH

'ANSWERS

Lesson IV

- 1. invertebrates -
- 2. A invertebrates live in many different places
- 3. invertebrates are an important part of a food chain
- 4. no
- 5. yes
- 6. invertebrate

ANSWERS

SAY AND KNOW

- 1. important
- 2. increase
- 3. biologist
- 4. examination
- 5. spawm
- 6. stomach

TESTING YOURSELF

Draw a line under the right answer or fill in the blank.

- 1. Many fish live in the ______
- 2. From the story you can tell
 - a. salmon live in freshwater and saltwater.
 - b. salmon eat other fish in the estuary.
 - fc. salmon die in the ocean.
- 3. This story, as a whole, is about
 - a. what crustaceans feed on.
 - b. fish living in estuarres.
 - c. fish in the ocean.

SUFFOCATE

4. Sálmon lay their eggs then die.

YES NO DOES NOT SAY

5. Salmon spend all their life In fresh. water.

YES NO DOES NOT SAY

6. What word in the third paragraph is a name for young salmon?

SAY AND KNOW		GETTING READY TO READ			
		Draw a line under the right answer	r or fill in th	he	
•		4	,		
RESIDENT 1.		Natural materials are called			
			R ·		
TÓXIC 🛌	2,	ANCHOR ORGANIC WATER When a bird does not travel it is	•		
ORGANIC		RESIDENT BLOOM, WRAP	, ,		

BLOOM

3. To kill by preventing oxygen is called SULT

4. At the mouth of a river you may find SILT HUNT WRAP

5. To remove by passing through is to

ANCHOR ANCHOR FILTER HUNT means the same as harmful BLOOM ANCHOR

ill in the

TESTING YOURSELF

Draw a line, under the right answer or fill in the blank.

- 1. Many fish live in the ____
- 2. From the story you can tell
 - a. salmon live in freshwater and saltwater.
 - b. salmon eat other fish in the estuary.
 - fc. salmon die in the ocean.
- 3. This story, as a whole, is about
 - a. what crustaceans feed on.
 - b. fish living in estuarres.
 - c. fish in the ocean.

SAY AND KNOW

- 4. Sálmon lay their eggs then die.
 - YES' NO DOES NOT SAY
- 5. Salmon spend all their life in fresh water.

YES NO DOES NOT SAY

6. What word in the third paragraph is a name for young salmon?

GETTING READY TO RPAD

,		Draw a line under the right answer or fi
RESIDENT TOXIC CORGANIC		Natural materials are called ANCHOR ORGANIC WATER When a bird does not travel it is RESIDENT BLOOM WRAP
BLOOM SILT SUFFOCATE ANCHOR WRAP	4. 5. 6.	To kill by preventing oxygen is called SUFFOCATE ANCHOR SHELL At the mouth of a river you may find SILT HUNT WRAP To remove by passing through is to ANCHOR FILTER HUNT means the same as harmful BLOOM ANCHOR

ANSWER SHEET

Lesson V

- 1. estuaries
- 2. A salmon live in fresh water and salt water.
- 3. B fish living in estuaries
- 4. yes
- 5. no `
- 6. fry

ANSWERS

SAY AND KNOW

- 1. organic
- 2. resident
- 3. suffocate
- 4. silt
- 5. filter
- 6. toxic

ESTUARY: WORKSHEET 6

MAN AND THE WETLANDS

Water washing from the land often carries with it silt, toxic materials, and organic materials, but wetlands have microscopic organisms that can break these materials down and stop them from doing harm to the environment. Wetlands also serve as filters, trapping valuable nutrients from the soil or water and making them available for new plant growth. Finally, wetlands trap silt and stop it from traveling further into the estuary where it would cause problems with life forms by blocking the light plants need for growth or covering fish and invertebrate eggs which would then suffocate for lack of oxygen.

Wetlands may look like wastelands of tall, grass-like plants, but they really are a very important part of our environment. They serve as a buffer zone between land and sea, are a nursery or home for many marine animals as well as plants. They also provide food and cover for both mesident and magazing birds.



TESTING YOURSELF

Fraw a line under the right answer or fill in the blank.

- 1. Name something of great importance to man's environment.
- 2. From the story you can tell
 - a. wetlands stop water from traveling into the estuary.
 - b. wetlands trap valuable nutrients from the soil.
 - , c. wetlands are wastelands.
- 3. The story, as a whole is about
 - a. grass-like plants. > . . .
 - b. birds that live in the estuary.
 - c. wetlands effect environment,
 - 4. Fish and invertabrates need oxygen to live.

YES . NO. DOES NOT SAY

5. Wetlands contain microscopic organisms that break down toxic materials.

YES NO DOES NOT SAY

6. What word in the second paragraph means to travel each season?

6B

answers

1.

Lesson 6

wetlands }

- . 2. B wetlands trap maluable nutrients from the soil
 - 3. C wetlands effect environment
 - 4. yes
 - 5. yes
 - 6. 'migrating

ESTURARY WORKSHEET 7

INVERTEBRATES in the Estuary.

Here is a list of eight kinds of invertebrates you can expect to find on a field trip to an estuary. Try to find these and record where you found them. Add to the list any additional kinds of invertebrates you discover!

Who

What .

Where

foraminifera microscopic animals with ' tiny shells composed of chambers, the last of which is open

mysids

shrimp-like crustaceans with long slender abdomens, or "tails"

pepods

crustaceans, often with a broad, flattened body and large antennae

amphipods

crustaceans # often flat- ' tened side to side, with a curved body covered sometimes by a shiny, hard outer skeleton

barnacles

crustaceans that live within a hard covering attached permanently to rock, etc. t

mussels

bivalves; the most common are the blue mussels with large purple-blue, sometime brown, shells

clams

bivalves; small white clams called Macoma live in estuaries-most common out here are the plnk ones

polychaetes

segmented worms, usually with many "feet"

littorinas

small snails, often solid dull color, sometimes with color bands. .

collect some sand or sand/shell debris from the intertidal zone and examine it under a microscope

watch for them in shallow pools or near a creek mouth under rocks along the edge

look at the cut bank of a stream-especially where roots are exposed

at creek mouths, under rocks, there are many different species-can you separate them from each other by how they look and where they live?

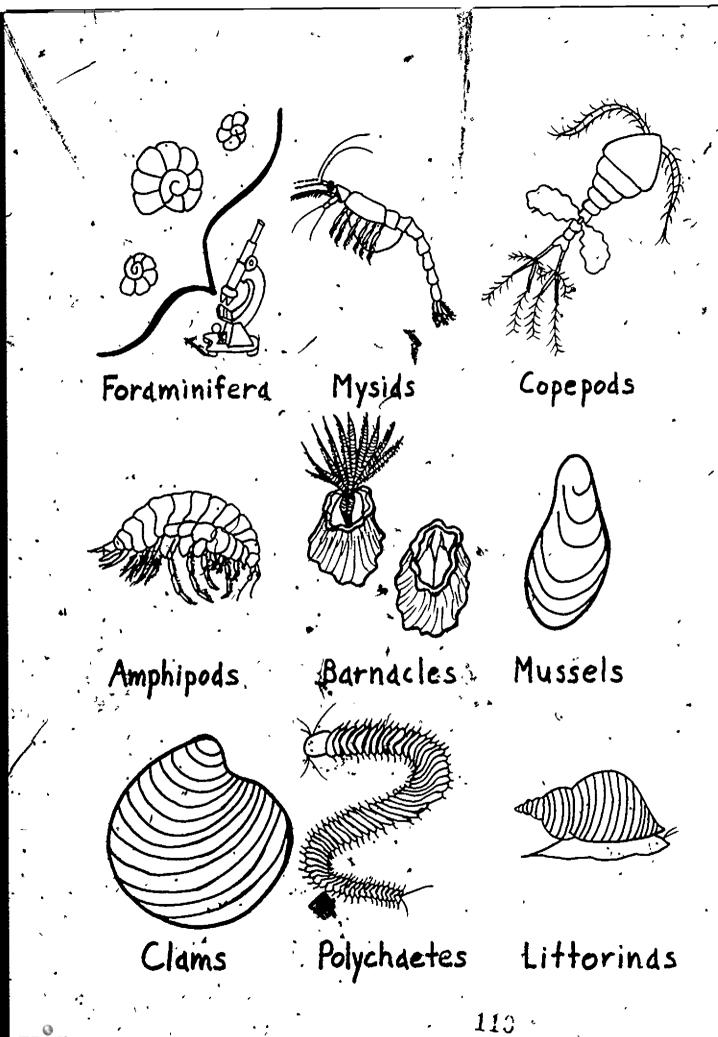
marine animals. (See how close to the freshwater source they can live,

(Are they marine animals. more or less tolerant of fresh water than barnacles3/)

although *live animals usually burned in sand or mud, empty shells may be found

dig for them in mud where the water is saltier than fresh.

high intertidal zone on



"COMMON BIRDS OF SOUTHEAST ALASKA"

Slide - Tape Show**
and
Supplementary Materials

I. Slide Tape Show

Part 1. 20 minutes (need a 140 slide carousel) (* 1-111)

Part 2: 18 minutes (need standard (80) \$11de (# 112-163) 5

II. Worksheets

1. 4th Grade Bird Study Worksheet.

To be used while the students are

viewing the Bird-Slide Tape Show, "Common Birds of Southeast Alaska"

2. Precocial Birds (Canada Geese) and Vocabulary.

To be used before showing the Bird Slide
Tape Show to familiarize students with
the word, precocial.

3. Altricial Birds (Bald Fagle)

To be used before showing the Bird Slide + Tape Show to familiarize students with the word, altricial.

Vocabulary Sheets

To be used before and/or after the Bird Slide - Tape Show

To be used with the 4th grade Bard book, "Birds in the Alaska Coastal Environment"

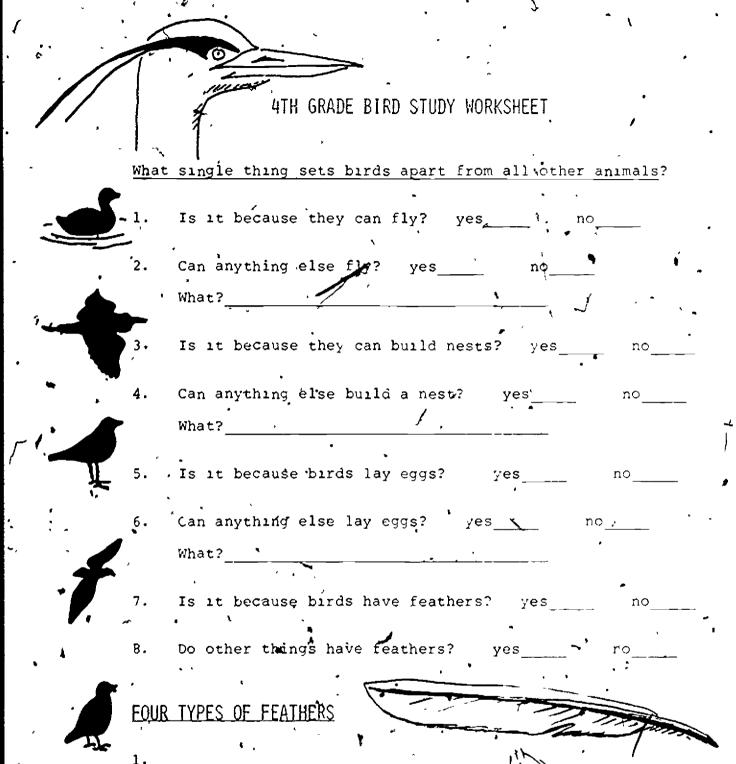
- a. Birds and Their Bills or Beaks
- b. Brrds Can Walk
- c. Do You Know
- d. How Birds Get Food
- e. Bird Beaks or Bills:

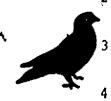
< Activities

- f. Activities Bird Bills or Beaks
- g., Activities Bird Bills or Beaks

**Ed. note: This slide-tape show is available from the South East Regional Resource Center, 538 Willoughby Avenue, Juneau, Alaska 99801. (586-6086) You might also ask your local librarian for "Estuaries, Part I and Part II" by Elizabeth A. Daugherty:









How many feathers do these brids have?	
•	
1. Hummingbirā	
2. Chicken	29/00
3. Swan	
SIX MAIN GROUPS OF BIRDS	
1.	/
2	
3.	
4.	
5.	
6.	
SIX MAIN TYPES OF FEET	
1.	
.2	
3.	,
4.	6.0
,	
5.	7
·6.	Marine Marine

•	
, √	
- 1	
	SIX MAIN TYPES OF BEAKS OR BILLS
	The same of the sa
	1
•	
	2
	3
▼	4
•	
4	5
я.	6
·. •	
192	TWO TYPES OF BABY BIRDS
	1 What does altricial mean?
-40	Tite mas soes are read, mean
* •	/
· · · · · · · · · · · · · · · · · · ·	· Ţwo altricial bàby birds are?
	A
	•
	B
•	1 11hat does an
	2, What does precocial mean?
	· · · · · · · · · · · · · · · · · · ·
	Two precocial baby birds are?
,	
	A.
	B", 1
41	(30)
•	· · · · · · · · · · · · · · · · · · ·
- W	117
ERĬC	

BIRD STUDY UNIT QUIZ



(Circle the correct answer)

Bird A

- 1. What group is this bird in?
- a. Perching bird
- b. Preying bird.
- c. Wading bird



- 2. What type of foot does it have? a. Preying
 - b. Scratching
 - c. Climbing
- What is the name of this bird? a. Owl:

 - b. Eagle
 - c. Hawk



- 1. What group is this bird in?
- a. Wading bird
- b. Sea Bird 🤼
- c. Waterfowl
- 2: What type of foot does it have? a. Wading
 - b. Swimming or webbed
 - c. Preying



Bird C

- 1. What type of bill does it have? a. Straining
 - b. Fish eating
 - c. Preying
- 2. What does this bird eat?
- a. Fish
- b. Seeds
- c. Insects



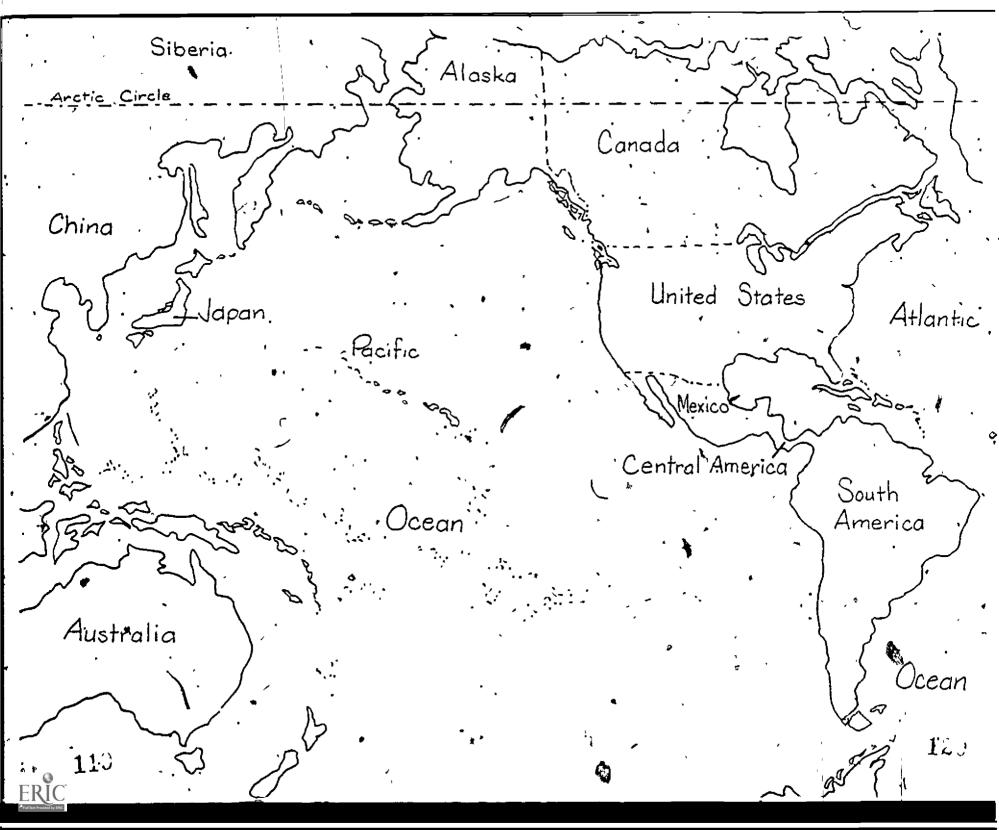
- 1. What is this pird's name?
- a. Sparrow
- b. Robin
- c. Warbler

- Do you think this bird migrates in winter? a. yes.



- 1. What type of bill dges this bird have? a. Straining
 - - b. Probing
 - c. Insect eating
- Does this bird have altricial or precocial young?
 - a. altricial
- b. precocial





Story - 4th Grade

Precocial Birds

Directions: Read the story. Check the meaning of the words in the Vocabulary List Canada Geese

> CRACK!!! CRACK! The Ganada Goose gosling, a precocial bird, cracks its way out of its shell with its egg tooth.

Soon, a small, wet head with large dark eyes is cracking out of the egg shell. In what seems like minutes, a once very wet gosling is walking slowly. then running and swimming. It is finding food and eating--ALL BY ITSELF. there are five little, light-colored, downy-covered Canada Geese trailing along after the mother goose and the gander.

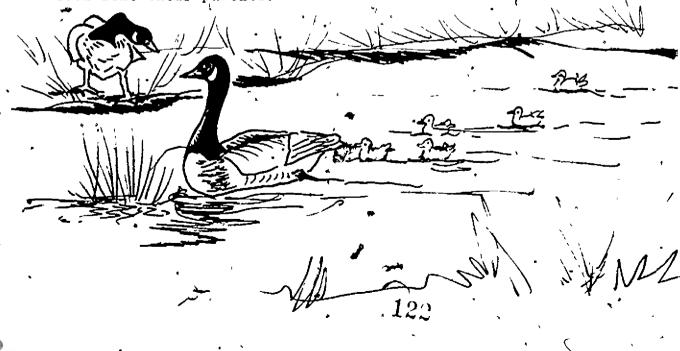
In mere hours, the goose pair and their brood are finding seeds, weeds, and grasses to eat. They are swimming in the ponds and lakes. The female is guiding her brood around and the male is hissing and flapping his wings and successfully keeping most everything away from his family.

Canada Geese story continued,

The male goose has been protecting his <u>mate</u> and their young since the female began setting on the eggs almost five weeks ago.

This Canada Goose pair made their nest in an opening in the roots of a large spruce tree. The tree helped protect the nest from predators and harsh weather. First, the female goose dug a little hollow in the tree roots. Then she pulled some down from her feathers and lined the hole with it. She also gathered moss and grasses. Finally, she settled down in the nest and laid her five eggs. She left/the nest, only briefly, to eat and drink. During this time, the male was darting back and forth and hissing and flapping his wings in an effort to keep away bredators.

In about four weeks, the goslings have all their feathers. In about six weeks, they are fully grown and look like their parents.



VOCABULARY LIST FOR PRECOCIAL BIRDS

Gosling - a young goose

Precocial - young that can swim, run, and feed themselves
within hours after hatching. Some precocial
baby birds are geese, ducks, chickens, seagulls,
and shorebirds such as sandpipers, snipes,
plovers and killdeer.

Egg tooth - a special hard spot on the upper part of the gosling's beak. The young goose or other precocial bird bangs the shell with its egg tooth until he cracks a hole big enough to get out of.

Downy-covered - a down-like covering on the baby bird. This keeps the young warm until the feathers grow in.

Gander - a male goose

Pair - two things. Like a pair of shoes or a pair of people.

Brood - young birds from a single nest. &

Female - opposite of male. (grrl, womah)

Male - opposite of female. (boy, man)

Mate - a friend, companion or one of a pdi23



Vocabulary list for Precocial Birds, continued,

Predators - animals that kill and eat another animal. The preditors of the Canada Geese in this story include gulls, foxes, coyotes, wolves, bears, wolverines, eagles, ravens, and man.

<u>Down</u> - feathers that are the soft underfeathers, of a bird.

They help to insulate and keep the bird warm in even severely cold weather.

The Bald Eagle: An Altricial Bird

Out of dull-colored, rough textured, oval egg comes a very small young eaglet.

When first hatched this young bird is completely covered with long and thick down. It has long down on its head

pushed out. A short, woolly, thich down of a dark gray color grows in. At about five or six weeks, the feathers, begin to grow on the body and wings. At seven or eight weeks, the eaglet is fairly well feathered. The flight feathers are about half grown.

The eagle nest is located on cliffs or in large trees. The nest is a large mass of sticks that is added to each year. It is deep so the young birds will not fall out.

The young eaglet is an <u>altricial</u> bird.

They are helpless and need their mother's eagle's care. They need to be fed and protected by the parent eagles for months.

It is not until the third or fourth year that the young eaglet gets the characteristic colors of the adult Bald Eagle.

Some other <u>altricial</u> birds are humming birds, robins, ravens, and hawks



BIRDS AND THEIR BILLS OR BEAKS

(Worksheet to accompany "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment. Grade 4.)

Directions: Match the description of the bird's beak or bill with the name of the bird. You may use your bird book or a reference book to help you.

Short Strong Bill

Gulls

Long Spear-Like Bill

Ducks, Swans

Sharp Hooked Bill

Sandpipers, Snipes

Slender Bills

Eagles, Hawks, Owls

Long Pointed Bill or Probing Bill

Sparrows, Grosbeaks, Waxwings

Strong Slender Bill

Geese

Wide Flat Bill

Robins, Blackbards

Chunky Flat Bill

Swallows, Warblers

Stout Hooked Bill

Herons, Kingfishers

BIRDS CAN WALK

(A worksheet to accompany "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment.)

DIRECTIONS: Draw a line from the type of bird foot to the name of the bird that has that foot. More than one bird will have the same kind of foot.

TYPE OF BIRD FOOT

1. SWIMMING OR WEBBED FOOT

NAME OF BIRD

Chickens

Robins

2. WADING FOOT _ Eagles

Ducks

3. GRASPING OR PREYING FOOT

Herons

Grouse

Sparrows

4. PERCHING FOOT

Hawks

Sandpiper

5. SCRATCHING FOOT

Geese -

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Owls

ERIC

DO YOU KNOW???

(Worksheet t Birds in the							ıvıng"	from
	•	- 1						
Directions:								<u>-y:</u>
'Making a Liv	ing in	your bird	book,	comple/	e the	follo	owing	
sentences.		•						

	•	•	•
1.	Sparrows, Grosbeaks and Waxy	wings have	 .
bil;	ls for eating and cracking se	eeds.	•
2.	Seagulls have	bills	to help them
cate	ch and tear apart fish.		
3.	Geese have	bills for	eating grass.
and	roots.		,
4.	Herons and Kingfishers have	<u> </u>	bills
for	catching rish.	. ,	, ,
5.	Ducks and Swans have		bills for
eat.	ing pond weeds.		
6.	Eagles, Hawks and Owls have		bills
for	tearing animal food such as	mice, rabbits and	other rodents.
7.	Robins and Blackbirds have		
bil	ls for probing for worms and	picking up seeds.	•
8.	Swallows and Warblers have		bills and wide
mou	ths for catching insects.	7	
9.	Sandpipers and Snipes have	·	bills or
prol	bing bills for digging little	animals out of th	e mud.
	WORDS YOU	MIGHT FIND HELPFUL	

stout hooked

short strong long pointed strong slender long spear-like wide flat sharp hooked slender chunky flat

4 Ja Grade

		HOW BIRDS			
	(Worksheet to accor Birds in the Alask	mpany "IV. Act a Coastal Envir	tivity: Mak: conment. Cra	ing a Living"	, , ,
,	Directions Write words may be used			spaces. Some	of the
,	mud	roots	• beak	pill	
	food	pond weeds	grass	teeth	
	anımal food	little animal	ls worrs		.y 3 %
	fish-v	insects	seeas	CE	
	Birds do not h	ave	,	. to chew for	od.
	2. Birds use thei	r	or	to get for	od.
	3. A short, stron				
	4. A long spear-l	ike bill is for	r catching		•
,	5: A sharp, hooke	d bill is for	tearing	• •	
	63 Slender bills				
	7. A long, pointe		•		
	out of the mud.			~	
	83 A strong, slen	dor bill is fo	ر r probing fo	٣	or
			r probing to		
	picking up	•	_'		
,	9. A wide, flat b		ing <u>/</u> .		
1 -	and sifting	 · .	•	(
` •	10. A chunky, flat	bill is for e	ating		and
•	•	• .			
	113 A stout, hooke	d bill is used	to catch an	d tear	
-	and scavenge		•	•	
ERIO	•	-',	120	,	· . · ·
Full Text Provided by	ERIC			1	



Bird Beaks or Bills

ound in "IV. Activity:

(A'worksheet to accompany the information found in "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment.)

Directions: Using your bird book as a guide, make pictures of the bills or beaks described in each bot below.

SHORT STRONG BILL for eating and cracking seeds

LONG SPEAR LIKE BILL for catching fish

SHARP HOOKED BILL for tearing animal food

SLENDER BILLS and wide mouths for catching insects



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ACTIVITIES: BIRD BILLS OR BEAKS

(A worksheet to accompany the information found in "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment.)

Directions: Using your bird book as a guide, make pictures of the bills or beaks described in each box below.

LONG POINTED BILL or PROBING .BILL for digging little animals out of the mud

STRONG SLENDER BILL for probing for worms or picking up seeds

Draw.your favorite bird.

ACTIVITIES: BIRD BILLS OR BEAFS



(A worksheet to accompany the information found in "IV. Activity: Making a Living" from <u>Rirds in the Alaska Coastal Environment</u>)

Directions: Using your bird book as a guide, make pictures of the bills or beaks described in each box below.

STOUT HOOKED, BILL to catch and tear fish and scavenge food

WIDE FLAT BILL for eating pond weeds and sifting mud

CHUNKY FLAT BILL for eating grass and roots

STERS TO ORGANIZING A SEA WEEK IN YOUR COMMUNITY

- I. Familiarize yourself with the Sea Week curriculum and introduce it to other interested teachers and parents.
- II. Catalog the resources in your area. Where are the good beaches? When are the good low tides? Are there any agency, hatchery, or museum personnel that would be available as speakers and/or for field trips?
- III. Draw up a well-thought out plan for Sea Week and present at to your administrators for approval.
- IV. Talk to teachers in the upper grades about having some of their students accompany you on your field brips. Brief them ahead of time as to the activities you'll be doing.
- V. Make up a calendar of when speakers will talk, which movies will be shown, and when each class will take their field trips. By arranging two field trips near one another in location, or by having the second class come to the beach when the first field trip of the day is leaving, gas (and energy) can be saved by having fewer bus trips.
- VI. Invite the whole community to participate parents, chamber of commerce, governmental agencies, native corporations, fishermen, etc. Parents can assist with field trips; businesses might display student artwork. If community organizations are interested, the week can become a Festival of the Sea, with boat tours, movies, speakers, games, and dances. Contact your local paper about featuring Sea Week with a photo and story beforehand, during, and afterwards! Radio stations might want to interview field trip leaders or read stories that students have written.
- VII. Spend an entire week studying the amazing ocean! Math problems, writing assignments, spelling words can all relate to our marine environment. Show your students the wonder of sea life!

SUGGESTED FIELD TRIPS

In planning field trips for your class two things should be considered: 1. The emphasis in Sea Week studies at your grade level. 2. The available community resources.

Consider visiting a place - beaches, docks, vessels (fishing, pleasure; ferry, barge, tour ship, Coast Guard), cold storage plant, canneries, supermarket, government research facilities, hatcheries. Museums, private collections and stores might be considered for indoor trips. Arrangements might be made to watch someone at work - fisherman, biologist, or Coast Guard personnel. If your students have an opportunity to visit another community you might include Sea Week activities in your itinerary or might include the entire trip around them.

In planning any trip, if possible arrange for knowledgeable persons to accompany your group. The involvement of interested parents is also valuable.

FOURTH GRADE

- I. Beach A trip oriented to bird observations as well as to other sea life.
- II. Estuary -
 - A. Field trip oriented to birds in the estuary is outlined in the Student booklet <u>Birds</u> in <u>Alaska's Coastal Environment</u>.
 - B. Field trips oriented to a study of the estuary are suggested in the unit.
- III. School grounds or adjacent ares observe birds in your
 immediate surroundings.
- IV. Museum Study mounted birds and historic uses of birds for food, clothing, decoration.



WHAT TO DO ON THE BUS

Put together a checklist of objects (or use the one that follows) that the students may see at the beach. During the bus ride, students can circle the name (or picture) of each object that they think they will be seeing during the field trip. At the beach, they can check off the objects they actually saw, and estimate or count how many they saw. A Juneau teacher makes her checklists into a small book, with a pencil attached by yarn, and gives each pupil a sandwich bag in which to store his/her checklist.

bus		COM		
can		ravē	in .	
fish		shee	∍p	
tree .		· drif	Etwood	
gull		boat	: '	·
buoy	·	moos	se .	
anemone		dock	· ·	
whale		star	rfish	·
seaweed.	·	hous	s e	
crab		air	plane	
bottle		fish	herman	
jellyfish ,		, límì	pet shell	
sand flea	· · · · ·	sea	urchin	
mussel .		·por	paise	

Conservation may be defined as the "wise use" of our natural resources. It is not the non-use of them, but rather a use that comes after careful thought has been given to the reasons and consequences of that use

It is perhaps trite to say that with increasing population pressures, the ever-increasing need for raw materials, for recreational facilities for homesites, etc., pressures increase on a natural environment that may previously have been untrammeled and in no need of someone to protit from total alteration. Here in Alaska, particularily, the residents of the State are faced with making many immediate far-reaching decisions about the natural environment of our State. What man's impact on it will be and if any how that impact should be limited or controlled are some of these decisions.

Conservation, practically, comes down to a few important principles:

Every living thing, as well as non-living thing, has a place and function in the balance of existence on the surface of this planet, whether or not we happen to know what its precise niche is. "Everything is connected with everything else." "Everything affects everything else." Destruction of one species, useless and unimportant though that species may seem to our ignorance, can have wide-reaching repercussions.

- 2. Natural resources are exhaustible. Populations which drop below a critical threshold cease to reproduce and the species plummets into extinction. Energy resources on earth are not renewable. Extinction of living species and exhaustion of non-living resources are natural processes. Trillobites went extinct before men appeared on the scene. Volcanoes spew noxious gases into the air. Nevertheless, the speed with which man, especially 20th century man, is destroying or using usextant life and resources is astronomical compared to natural process.
 - 3. Since man is an intelligent being, he can, if he will, desist from extinguishing life and exhausting the resources of the earth. Mai can practite conservation without denying himself a full and enjoyablife. His reason for using resources wisely may be an idealistic appreciation of all that nature has and is, or it may be a realization that our tomorrows will be poorer unless wisdom regulates usage of our goods.

For school children studying Alaska's marine life, conservation invola few simple, yet extremely important principals:

- DO VISIT THE BEACH AND ENJOY YOUR TIME THERE BUT WHEN YOU LEAVE, LET THE AREA BE THE SAME, OR BETTER, THAN YOU FOUND IT.
- IF YOU TURN OVER A ROCK TO SEE WHAT IS HIDING UNDER IT, TURN IT BACK OVER WHEN YOU HAVE FINISHED. (What lives there may depend for survival on the exact kind of micro-habitat that exists under that rock.)

Reef and Shore. Hawaii Nature Study Program for Elementary School Children, p. 4.

A-4

- 3. IF YOU PICK UP ANIMALS FOR CLOSER VIEWING, DISTURB ONLY THE ONES YOU WANT TO LOOK AT, HANDLE THEM CAREFULLY, THEN REPLACE THEM WHERE YOU FOUND THEM. SEA CREATURES CAN LIVE OUTSIDE OF THE WATER ONLY BRIEFLY. A PAN OR BUCKET OF SEAWATER WILL ALLOW CLOSER EXAMINATION AND REDUCE STRESS ON THE ANIMAL. KEEP THE CONTAINER OUT CF DIRECT SUNLIGHT AND REPLACE THE WATER IF IT BEGINS TO WARM. HANDLE FISH WITH WET HANDS TO PRESERVE THEIR PROTECTIVE SLIME AND IN HANDLING CRABS AND JELLYFISH WATCH OUT FOR STINGERS AND PINCHERS. PICK CRABS UP FROM THE BACK AND SUPPORT THEIR UNDERSIDE WITH THE PALM OF YOUR HAND. DON'T TOUCH JELLYFISH.
- 4. IF YOU WANT TO USE LIVE MATERIALS IN THE CLASSROOM AFTER THE FIELD TRIP TO THE BEACH, TAKE ONLY WHAT YOU WILL NEED, TAKE CARETO KEEP IT ALIVE, AND RETURN IT TO THE BEACH WHEN YOU ARE FINISHED WITH IT.
- 5. NON-LIVING BEACH MATERIALS MAY BE COLLECTED BUT USE MODERATION HERE, TOO. IF MATERIALS ARE FOR CLASS USE, HAVE A PROJECT IN MIND BEFORE YOU BEGIN COLLECTING AND THEN GATHER ONLY WHAT YOU WILL NEED. YOU MAY WANT TO GATHER DRIFTWOOD, STONES, BITS OF POLISHED GLASS, UNLESS YOU ARE A SECOND GRADE TEACHER, HOWEVER, PLEASE COLLECT ONLY A FEW, IF ANY, EMPLY SHELLS LEAVING THESE MATERIALS FOR THE SECOND GRADERS WHOSE ONLY SEA WEEK BEACH AND CLASSROOM ACTIVITY IS STUDYING THEM.

A CHECK LIST

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A FIELD TRIP TO THE BEACH

FOR .

You the teacher:

- 1. Be sure you are personally familiar with the beach to which you and your class are going. If you have not been there before, take a bit of time after school or on the weekend to go to that beach and walk it carefully. By being familiar with it yourself, you can anticipate what your students will be able to see and do there.
- Check carefully on all bus arrangements for your class. Be sure that a bus is scheduled for you and be aware of the delivery and pick-up times.
- 3. Arrange for adequate adult supervision. Usually there is no problem in finding parents willing to go along. Often junior or senior high school students may also be available and, if they are taking biology or other related science courses, they can be very helpful. One older student or adult for every five or six children would be a good ratio in terms of safety, control, and learning.
- 4. Give careful thought to what you will do with your time at the beach. The beach is an exciting place just to explore, but some thought and directions given to the activities to take place will make the experience richer and more profitable for students and you, too.
- 5. Meet or at least talk by phone with your volunteers before the field trip to acquaint them with your plans for the outing. Be sure that each of them knows specifically what you would like each to do. Recommend that they attend appropriate training workshops and provide them with information from this guide or elsewhere.
- 6. Well in advance of the beach trip itself, begin preparing your students for their experiences there. The better prepared they are, the more successful the field trip will be.
- 7. Letters should be written to all parents, including permission slips, so that parents know about the activities in which their children will be implied.
- 8. Collect and ready all materials you will need for the field trip buckets, pans, binoculars, camera, whatever it is you need. You might consider bringing or arranging for some kind of snack at the beach a big bag of gorp (M & M's, raisins, salted peanuts, etc.) always makes a hit and a snack can serve

to reorganize matters at the beach and create a natural (though slightly contrived) change of pace and focus. (see the suggested time plan that follows.) Be sure to take along a supply of bandaids - or better yet, a small first-aid kit - just in case there is a need for it.

9. Plan the trip ahead, but allow for flexibility. If a whale is breaching just off shore while you are trying to teach the life and ways of a barnacle, your stadents will not be absorbing much of your lecture. Be prepared to take advantage of those special events that occur so often along our shores.

The students:

- 1. Involve them in preparing for the field trip as much as possible.
- 2. Explain to them any rules for field trip conduct. Stress especially the fact that the beach is a special environment and a fragile one whose beauty comes from the LIVING plants and animals to be found there. Impress upon them the need to respect the life forms they will see, to leave the beach as nearly like they find it as possible and not to collect or molest leve beach animals unless you, the teacher, have very specific and well thought out needs for limited quantities of live animals and materials for use in further teaching processes and have requested the students help you gather materials.
- 3. A quick talk about safety at the beach would not be out of place the need for proper clothing, care to be taken on rocks that are
 slippery when wet, what to do in case of injury, always keep an
 eye on the tide to be sure you are not stranded or lose gear to
 the rising waters, etc..
- 4. If a class project is planned for the beach time, help students to prepare or gather materials they will need to take with them.

BOTH teacher and students:

BE PROPERLY DRESSED. It is always difficult to predict what the weather will be in coastal Alaska but there is often a good chance that there may be rain. Be sure everyone knows that he or she should come dressed warmly and prepared for rain if that prospect seems at all likely. Wearing layers of clothes always makes sense - a short sleeved shirt, then something with long sleeves, topped by a sweater or warm jacket and something water and wind-proof. Foot gear is important. Layer socks for maximum warmth and wear RUBBER boots if possible. Carrying a back pack is a good idea for students and teachers alike. It leaves your hands free, lets you store away layers of clothes you want to shed or don't need at the moment and is a good place to keep the snack you and/or the students have decided to bring along.

Appendix VI

SUGGESTED ON-SITE ORGANIZATION

The beach is an exciting place on your first visit there or your five hundredth and the most normal and natural thing to do on the beach is to walk - or run - along the shoreline to see what is there for the finding. If your class has been working hard on sea related studies and has carefully outlined what they want to do with their time at the beach, then perhaps all students will set right to work with whatever tasks have been outlined beforehand. But, if a less structured approach seems to be in order, you might try the following idea...

Part I

If, before the beach experience, you have been working in the classroom with the students on the particular area of marine knowledge
outlined for your grade level, then the students should have a good
idea of particular concepts or kinds of life or situations they
might look for at the beach. Students could have the first half of
the time at the beach to apply their knowledge in a free kind of
framework. That is, for example, if you are a second grade teacher
and have been studying shells with your students, give them the
first part of their time at the beach to see how many different kinds
of shells they can count, or give them some other similar kind of
task that they can carry out and at the same time still be free to
explore other aspects of the beach.

Part II

At the mid-point of your allotted time at the beach, gather the children together. Taking a bit of time out to open that big bag of gorp, or gathering for some other kind of snacking, works to draw everyone together, change the pace and focus.

After the quick energy break is a good time to have the students sit down quietly and talk about what they have seen or to have adult helpers work in small groups with children to share further discoveries or knowledge about materials found on the beach. As an example, if you are a first grade teacher who has been studying marine animals with your class, each adult helper might have been assigned to gather in a bucket - with the children's help - examples of a particular group of animals during the first part of the time on the beach. Then, during the second half of the beach time, each adult and his or her bucket of materials might circulate from one small group of children to the next, encouraging them to touch, feel, observe certain characteristics or qualities of these particular animals.

Children need both to enjoy the beach just for the pleasure there is in being there and to grow in understanding the complex web of life and environmental factors that are at work there. If careful thought and planning have gone on well before the actual trip to the beach, there is every reason to believe that both these goals can be accomplished.



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A LOOK AT THE BEACH

Any beach is as individual in its own way as are we who, as individuals can be distinguished from all other people. Just as each of us represents only one combination out of the many possible, so it is with beaches. A beach is a place where the sea confronts the land, and every aspect of that sea and that land edge is important in determining what the general appearance of that beach will be and what kinds of plants and animals will grow and thrive in that particular environment. Many factors combine to determine the personality of that unique and special place.

The Sea

If we think first about the water at the beach, we realize that there are several ways in which it can vary. To begin with, for example, those of us living in the Juneau area look out to waters that are relatively protected. That is, our beaches are not subjected to the open, powerful swells that are common on coast lines that abut the open ocean. Unlike conditions that might be found at Sitka, for example, the wave conditions along our beaches are always relatively mild and non-violent. Even in the Juneau area, however, local differences in topography influence the personality of the beach. Whether a particular beach area is a straight, uninterrupted stretch, a deep or shallow cover, or a jutting point will influence the force and effect of the waves upon the shore. Consequently, we might expect to find different kinds of life on a point, i) a cove, or cha straight, uncomplicated shoreline because each species has a particular ability to withstand greater or lesser wave force.

We all know that the sea is salty but we may not all realize that the concentration of salt in sea water can be highly variable. In the open ocean, salt concentrations measure about 32 to 33 parts per thousand. In our inside waters around Juneau, the average salt concentration in main channels may be slightly less than that because of the greater influence of fresh water entering from streams and rivers. At the mouths of the streams and rivers themselves, where salt and freshwater mix, salt concentrations are very low. Because each kind of marine plant or animal has its own built-in tolerances to varying saltiness or freshness, these living populations vary with the salinity prevalent at a particular place.

THE SIZE OF PEBBLES

If you stand on a beach and look thoughtfully at it, one of the first things you will notice is its texture - whether it it sandy, gravelly, composed of cobbles, bedrock, mud or a combination of two or more of these. The nature of the beach is critical in determining what can live there. Let's examine each kind of substrate in turn to see what kind of life we might expect to find.



Mud ,

Mud can be anything from relatively porous sand-soil mix to the clay muck that sucks rubber boots right off your feet. If you look at the surface of this kind of substrate, you will be aware of little, if any, life. Here and there you may see the flexible tubes of mud dwelling worms sticking up an inch or so above the surface. Or you may see "cake decorations" left by other burrowing worms. Finally, you may be aware of the presence of clams by the squirts of water and the siphone holes in the mud. Digging with a shovel will reveal the various inhabitants of the mud. in all their glory - fat, bulbous peanut worms: slender, earthworm-like nemerteans of various descriptions; many-legged annelld worms; and hardy bivalves.

Sand

Because sand is more porous than mud, it is a better surface for many burrowers, a better surface for a wider number of animals to live on and in. On a sand flat at low tide one may find starfish, sea urchins, and numerous kinds of crabs and snails. Some of these animals wander over the sand flats when they are submerged, scouring them for bits of food. Some crabs, like the Dungeness, tend to stay in sandy areas because of the methods of self-protection involves burrowing into the sand to hade. (Even when the sand is exposed, watch for depressions in the surface that mimic the shape of the crab's shell. By digging there, you may uncover a crab that stayed buried even, as the water receded.) By looking for clam or cockle siphon holes, you will discover these common residents of sandy areas and by digging carefully you may unearth them.

Cobbles and Boulders

Obviously, the size of loose rocks on the beach may range from something just a bit coarser than sand up to boulders too large to be lifted. general, the larger the general size of the rock pieces, the greater variety of life one might expect to find there. The more stable the Hard surface is, the greater protection and anchors it can afford a resident plant or animal. Intertidal areas of cobbles or rocks are often most obviously serving as anchorages for marine plants (most common in the Juneau area, Fucus, the rockweed, the tough, ubiquitous, brown plant with the bulbous reproductive bodies that kids like to pop) and for barnacles and blue mussels that may cover certain rocks of sections of beach in great density. If you begin to lock down among the beds of rockweed, barnacles, and mussels and UNDER cobbles and boulders, you will discover an amazing diversity of life forms. six-rayed starfish cling beneath medium sized rocks, often brooding clutches of eggs. Blennies up to six inches or so in lenth (one of the two most common intertidally discovered fish) hide under rocks. So do amphipods or sand fleas and tiny crustacean beach scavengers that quickly seek new cover when discovered under their protective rock. Clinging to the surfact of the rocks may be limpets, chitons, sponges. Look for the latter particularly under overhangs of larger rocks.

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Because of their ability to serve as anchors and because they offer so many protective niches, rocks on beaches afford some to the best looking places. Don't neglect to have along a magnifying glass so you can really see some of the tiny critters! Guaranteed that the more your look, the more you will see there! Just be very sure that, after you turn over a rock to reveal its underside residents, that you replace it so the animals don't dry out and perish!

Bedrock

This is just as exciting a place to poke as cobbles/boulder areas and many of the same inhabitants can be found here - with 'two general'. kinds of exceptions. First, obviously this rock surface can't be turned over so the "rock and sand or mud residents" are not here. Second, it is in bedrock areas that you are most apt to find remnant puddles of water - tidepools - that may harbor lots of life, including small anemones with tentacles extended to trap food (they come in a wide variety of gorgeous color combinations), rock hard coralline algae that looks like hard, pink plaster but are actually living plants, tiny immature sculpins, and perhaps little shrimp. Be sure to lock carefully in crevasses for sponges, staffish, and other creatures.

THE DISTANCE FROM THE WATER

Each species of marine plant and animal has a particular tolerance to being out of salt water. Some of them, for example, are rever found intertidally because they have absolutely no tolerance for exposure to the effects of an air environment. Others can stand being out of salt water or extended periods of time, needing only to be wet by the sea on occasional very high tides. By locking at the beach in a section from its highest high water mark down to the water level on a low, low tide, you can quickly begin to see major differences in plant and animal populations.

The Highest Fringe

At the upper limits of the intertical zone, least life forms are evident. You may notice that the rocks appear black here. This is because they are covered by a black encrusting lichen or by a bluegreen algae that makes these rocks treacherous and slippery when wet. In these upper reaches, too, may be found the common tiny, periwinkle a fat, ridged snail that sometimes seems to pepper the rocks.

The Middle Zone

As you move down toward the water's edge on a low tide, you will be aware of obvious color bands or patches on the beach. There may be banding of Fucus, the common brown rockweed, and of blue-black mussels (the intertidal - and subtidal - bivalve that attaches itself by tiny threads to rocks and pilings and other surfaces), and barnacles. Here too you will begin to see limpets (the species of which are sometimes most quickly identified by how low or high they are found on the beach), amphipods, various starfish, tiny black sea cucumbers, and other forms of life there were not in evidence at higher levels.



The Lowest Zone

As you approach the water's edge, you will not find some of the plants and animals that were evident at higher levels. In general, however, the lower you go in the intertidal zone the greater the diversity of life forms you will find. Here you will find see urchins, a wide variety of often large starfish, perhaps juvenile king crabs, large white or varicolored sea anemones (if they are out of water, these will look like squishy, uninviting blobs, but look out into the shallow waters to see the same animals in all their expanded glory), and the larger snails.

So...as you look at any particulat beath for the first time, there is a great deal to think about. Remember that each part of the beach, each kind of surface type, each height from the water, each kind of topographical variation indicates what life may be found there. In general, it is advisable to spend the lowest part of the tidal cycle closest to the water's edge for in that way you will have the maximum amount of time to spend along the beach area that is revealed to us least often and which tands to harbor the greatest diversity of plants and animals.

If you can, acquaint your students with these obvious or subtle variations in the beach habitat for it will enrich their beach experience, too!!!



TIDES

Students can understand some basics about tides and should definitely learn that the height of the water on the beach varies with the stage of the tide and that maximum and minimum tidal, levels vary each day.

Tides, in a very simplified kind of explanation, occur because of the gravitational pull of the sun and the moon on the earth. Just as the earth exerts gravitational force (why does an apple fall? why can't we step off into space?), so do these other two bodies. The force of the pull of the sun and moon on a particular place on earth depends on how directly they are in line with that place. The force they exert tends to pull the water away from the earth's surface on the side of the earth facing, thus causing a high tide. Because the relative position of the sun, earth, and moon are constantly changing in a cyclic rhythm, so are the tides.

Activities

Here in Southeast Alaska we experience a tidal cycle that consists of two unequal high tides and two unequal low tides each day. With some students in primary grades and all those in upper grades, you might sit down with a tide-table and look at the numbers and explain what they mean. You might even make a simple chart of tide levels and of activities to coincide with various stages of the tide. For instance, it might be much easier to launch a boat when the tide is high but digging clams can best, be done on the very lowest tide. Students might be shown the same beach at high and at low tide and through words or art work compare the differences.

Preparation for Field Trip

In preparing for the field trip, discuss tides with the students. Mention the need to be as close to the water as possible when the tide is at its lowest in order to see that strip of beach and the life that is there, for the water quickly comes in and covers it. Talk, too, about the need to be aware of the tide level and thus not to set a pack or bucket next to the water's edge and expect to find it there later if the tide is flooding.

As a teacher you need to be aware of the time of low tide when scheduling your field trip to the beach and in planning the activities that will take place there. The time of very lowest tide should be kept open for observation of what is to be found in the zone nearest the water. Activities such as taking a break for a snack or gathering around buckets to discuss and examine particular animals should occur when the tide is ebbing or flooding.

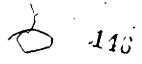




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Plus +++ check with agencies in your area, aquaculture associations, the U. S. Coast Guard, focal corporations to see what publications they may have available.

OTHER LEARNING AIDS

The Alaska State Museum has multi-media learning kits available for use by Alaskan schools, including a Salmon kit. Priority use is given to bush schools. Write: Alaska State Museum, Pouch FM, Juneau, Alaska, 99811.

Your school can order films through the Alaska State Film Library. Their marine science/oceanography listings are too numerous to mention, but some topics that are dealt with include: marine , invertebrates, ocean currents, the beach, whales, life cycle of the salmon, mollusks, tide pool life, marine science careers, sea birds, octopus, the ocean as a food source, hishing techniques, the ecology of the ocean, and seacoast cultures.

The Smithsonian Institution is currently field testing a binder of estuary study activities (\$9.68). Activities include: Beachcombing, Mapping, Barnacles, Build A Trap, Fish Adaptations, Fish, Marsh Muck, Crabs, Water in Motion, Menance Oil Slick, Oil Spill Cleanup, and Estuary 3-D Board. For more information write:

SEA (Smithsonian Estuarine Activities)
Chesapeake Bay Center For Environmental Studies
Smithsonian Institution
P. O. Box 28
Edgewater, Maryland 21037

Posters on beach safety and pamphlets on tides, whales, crabs, and other marine topics are available from the Oregon State University Sea Grant Marine Advisory Program. For a catalog and price list (many are free) write:

Extension Communication-Marine Advisory Program Oregon State University AdS 422 Corvallis, OR 97331

	ALASKA SEA WEEK EVALUATI	ON FORM		, ca	mouter	∞de nu	mbers
د.				, ,			(1-4)
1.	Town or village		ı				(5)
2.	Grade level				_		(6–7)
	Number of students involved			-	•		(8-10)
Yo	u may need to review your Alaska Sea Week mater	rials to	answer	these q	uestion	ìS.	
4.	How many classroom (indoor) activities and wor	rksheets	did you	use fr	om each	p book?	
-	Book (Grade level) Number of ac	<u>ctivities</u>	_		• •	•	
7 ·	Discovery (K) Sea Animals (1) Shells (2) Glacial & Intertidal Ecology(3) Birds (4) Fish (5) Man's Influence on the Sea (6)	- - - - -				ši.	(11-12) (13-14) (15-16) (17-18) (19-20) (21-22) (23-24)
5.	What is the total number of field (outdoor) ac	ctivities	used t	from the	7 boot	vs?	(25/26)
6.	How many periods (1 hr. each) did your class	spend on	the Sea	a Week P	rogram	?	(27-29)
P	ease check the appropriate box to the right of	each que	stion.			¥	
•	·	decidedly	yes	no opinion	no	decided	У
7.	Were the Alaska Sea Week materials relevant to your curriculum?	yes (1)	(2)		(4	(5)	(30)
8	Did the Sea Week materials motivate students improve their math, reading, & writing skills		(2)	(3)	(4)	(5)	(31)
9	Did the Sea Week materials upgrade your science program?	(1)	(2)	(3)			(32)
10	Did students enjoy the Sea Week activities?	(1)	(2)	(3)	(4)	(5)	(33)
11	Did students develop a greater awareness, appreciation, and respect for the sea?	(1)	(2	(3)	-\-(4	(5)	(34)
12	Did students develop decision-making skills necessary for resolution of marine issues?	(1)	(2	(3)	(4	(5)	(35)
13	Was the material appropriate for your students' grade level?	(1)	(2	(3)	(4	1	(36)
14	. Was the teacher background section adequate?	(1)	(2	(3)	(4	(5)	(37)
15	Were the teacher instructions helpful & complete?	(1)	(2	(3)	(4	(5)	(38)
16 •	Were parents and other community members involved in your Sea Week?	(1)	(2	(3)	(4	(5)	(39)
17 -	. Were parents favorably impressed with the Sea Week Program?	(1)	(2	(3)	(4	(5)((40)
18	Did Sea Week help improve the relationship of the school to the community?	. (1)	(2	(3)	(4	(5)	(41)
19	. Rate your overall feelings about the Sea Week	MATERIAL	Sona	scale o	of 1 to	5.	(42)
20	. Rate your overall feelings about the Sea Week	PROGRAM	on als	bigh; of	=łov) 5		(43)
ER	(OVER, PLEAS		(1 =	high; 5	=low)		*
Full Text Pro	ded by ERIC				_		

21. How many teachers are in your school? How many are using Sea Week materials?	(44-
22. To you plan to introduce the Sea Week materials to other teachers? yes (1) no (2)	(46)
23. Do you plan to use the Sea Week materials again? yes(1) no(2)	(47)
24. Would you be interested in aftending a marine education/Sea Week workshop? yes(1) no(2) .	(48)
If so, list your name and school address:	
Name	
Address	
25 What Other comments do you have? Are there are energific improvements you would	a .

25. What other comments do you have? Are there any specific improvements you would suggest?

Please return this completed form to Jill Thayer, Belle Mickelson, Alaska Sea Grant Program University of Alaska, Fairbanks, Alaska 99701.