Unit One
The Values of Rivers, Wetlands and the Sea

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Objectives:

To help students:

• Inventory and map community resources (Activity 1).
• Predict what the community will look like in 25 years (Activity 1).
• Role play a character involved in coastal zone planning (Activity 2).
• Describe coastal zone management and how it relates to values in the community (Activity 2).
• Design a symbol of rivers, wetlands and/or the sea (Activity 3).
• Begin a journal of Sea Week studies (Activity 3).
• Describe personal preferences for a variety of marine and/or freshwater environments (Activity 4).
• Draw the way each environment will look 25 years from now (Activity 4).
• List 30 river, wetland, or sea-related careers (Activity 5).
• Write a report on one sea-related career that sounds interesting (Activity 5).
• Pantomime a marine or freshwater sport, hobby or recreational activity (Activity 6).
• Diagram an aquatic food web (Activity 7).
• Cook and taste a variety of foods from rivers, wetlands, and the sea (Activity 7).
mange Alaska's River, wetlands, and ocean resources is a complex and ongoing challenge. How to depend on the water for transportation, food, minerals, and recreation is critical. Alaskan communities are

UNIT ONE: THE VALUES OF RIVERS, WETLANDS, AND THE SEA.
Seas, rivers and wetlands are some of our most valuable resources. Alaska is especially rich in these aquatic treasures, and students today will play a vital role in their future preservation, conservation and/or development. This unit gives students an opportunity to express their own values, and to identify some of the ways they can and will affect the environmental future of the state, the nation, and the world.

**Activity 1**

**Community Inventory**

**Background:**

One way to understand the value of a community in relation to its ocean, river and wetlands is to inventory what is there. And as students begin to analyze with you what is happening in the community, issues should surface for your localized Sea Week adventure. As students look at the community's history, its present, and its vision for the future, they may discover values to maintain for future generations.

**Vocabulary:**

- community inventory
- comprehensive plan

**Materials:**

- felt-tip markers
- large sheets of butcher paper
- area maps
- community planning documents, if available
- speaker familiar with community planning process
- worksheets:
  - Community Resource Inventory (1A)
  - Community Objectives Inventory (1B)
Procedure:

1. Go through the following Community Resource Inventory either as a class or individually. Assign students to find out more about each of the resources. With the help of local area maps and student research, make a wall map of community resources with butcher paper and felt-tip markers.

2. Now have students go through the Community Objectives Inventory to check those that sound like good ideas to them. If your community has a comprehensive plan, check objectives in the comprehensive plan.

3. Invite someone familiar with the community planning process (such as a city or village official or council member) to come to your class and explain what has been done so far in your community. Ask them to discuss future developments in your community and ways community objectives can be implemented, such as ordinances, zoning and other regulations. In a coastal community, you may have a coastal zone plan as well as the village or city plan (see next activity in this unit).

4. Now take all your information and make another map of how the class thinks your community will look in 25 years. Students may want to make two maps: one of how they would like the community to look, and another how they think it will look. Students may want to make individual drawings and maps first—in order to later compile them into a class prediction chart.

5. Ask students how they could influence their community to be the way they would like it to be in 25 years. Will any of them run for city council or become mayor? Will someone in their class be on the board of directors for the Native corporation? Will someone be manager of the cannery, president of the local conservation group, information officer for an oil company, or member of the school board? And of course, all of them will be able to vote. These are ways students can determine their community's future. But even right now, students can have an influence! Pick a problem or issue to study in depth. Take one of the succeeding units and apply it to your community—or pick something entirely new. Is a factory, business, mine, dam, road, or park planned for your community? Follow problem-solving guidelines included in Unit 5, Activity 5.
Activity 2
Coastal Zone Management Simulation Game

Background:

While this activity deals with a coastal community, many of the same planning problems can arise anywhere in the state or elsewhere in the nation. So, to familiarize your students with their community and its planning process, as well as to clarify the value of rivers, wetlands and the sea, give this game a try. Later, students might want to adapt it specifically for your community.

The National Coastal Zone Act of 1972 established a program for land and water resources in the nation's coastal zone. For states wishing to participate, this act plans for and manages their coastal areas. Each state develops its own plan, subject to approval of the federal office of Coastal Zone Management on behalf of the Secretary of Commerce.

In 1977, the Alaska Legislature passed the Alaska Coastal Management Act. It established the Alaska Coastal Policy Council to oversee statewide and local coastal planning efforts. The law mandated that the Coastal Policy Council draft guidelines and standards for state agencies and local communities. Currently, communities and boroughs with planning and zoning authority are developing their own coastal plans. The Coastal Policy Council, with the help of local residents, is writing the plan for unorganized boroughs. After the plans are approved by the legislature, by the Alaska Coastal Policy Council, and by the federal office of Coastal Zone Management, each area must follow these guidelines in their development plans.

The coastal zone is defined as "the coastal waters (including the lands therein and thereunder) and the adjacent shorelines (including waters therein and thereunder), strongly influenced by each other...it includes transitional and intertidal areas, salt marshes, wetlands, and beaches." (From the National Coastal Zone Management Act.)

Acknowledgments: Peggy Cowan assisted with the design and characters for this simulation game, adapted from one written by Mary Lou King, Juneau; Gordy Epler, Ellen Searby and Judith Andreeg, Alaska Coastal Management Office; and David Dall, Joe Firebaugh, Nell Hagadorn, Kristi Kantola, Elaine Loopstra, Paul McIntosh, Forest Service, Alaska Region.
Vocabulary:
- coastal zone management
- simulation game
- water-related
- water-dependent

Materials:
- pencils, paper
- felt-tip markers
- butcher paper
- construction paper
- scissors
- straight pins
- copy of local coastal zone plan
- role cards
- six copies of planning commission rating form
- worksheets:
  - Alaska Borough Map and Background Information (1C)

Procedure:
1. Introduce the idea of coastal zone management to the class. Explain that the main benefits are coordination among state and federal agencies, local governments, and local residents. In addition, local control increases as local residents develop the coastal zone plan. Planning assures that water-dependent and water-related activities are given first priority in waterfront development. Industrial and residential areas can be separated. In addition, local concerns, such as fish and wildlife habitat, estuarine productivity, subsistence hunting and fishing, and recreation can also be included in the Coastal Zone Plan.

2. Distribute copies of the Alaska Borough Map and Background Information. Have students read the background information and become familiar with the map. Explain that the class will be preparing different alternatives for a planning commission.

3. Divide the class into five or six groups of five students each, with each group responsible for creating a plan for the state-selected land. Each group then presents its plan to the planning commission. Kay Pearson, 6th grade teacher at Whitecliff Elementary in Ketchikan, finds that it works well to give students overnight to come up with their plans.

Here is a list of what each group is in favor of developing on state-selected land, as well as a list of roles within each group. Be sure students understand that these roles are only brief outlines. Students should be encouraged to expand them, based on their own experiences and sense of humor.
Airport
Pat Piper - pilot, guide
Fred Follett - local business-
man, politician
Gary Gustafson - construction
worker
Bill Black - local oil and gas
supplier
Penelope Peabody - school
teacher

Marina
Johnny Hooker - sport fisher-
man
Jane Fisher - commercial
fisherman
Dan Dockett - harbormaster
Nellie Nielson - bar owner
Dr. Winkle Van Rip -
physician

Homes
Terry Sales - real estate
agent
Mary Castle - young mother
James Green - banker
Harry Buckley - taxpayer
Polly Parrot - telephone com-
pany manager

Shopping Center
John P. Morgan - developer
Patty McDonald - high school
student
Joe Caputo - taxi driver
Rita Remmington - secretary
Jerry Price - store owner

Park
Sandy Eider - biologist
Pete Gill - commercial
fisherman
Ole Olsen - old timer
Susi Demmert - subsistence
hunter and fisherman
Will Foster - bus driver,
teacher

Logging Mill
Maria Kompkoff - Native
corporation president
Perry Peavey - logger
Ron Ionowa - Japanese busi-
nessman
Wilma Woodsey - forester
Harry Flackett - unemployed
### Pat Piper - Airport

Pilot and guide who believes the airport would be just what Yakataga City needs. Clients could easily get in and out of town, and local fishermen could more easily use the fish spotting services of local pilots.

### Fred Follett - Airport

Businessman and politician who thinks an airport would be great for quick trips to Juneau and allow him to get special order goods for his discount store.

### Gary Gustafson - Airport

Construction worker who would like to help build the airport. He also feels that airport might encourage other building projects. Furthermore, a road on the other side of the bay would mean he could drive to go hunting and fishing.

### Bill Black - Airport

Oil and gas supplier who sees business improving if planes start coming into Yakataga City. Besides, maybe he will be able to get a small plane for quick shopping trips out of town with his wife.

### Penelope Peabody - Airport

School teacher who just can't wait to get out of town more often so she can get away from her students. She does like to go clamming, though, so the park is appealing and she also thinks a marina would be fun because she'd probably use it to go boating more often.

### Johnny Hooker - Marina

Sport fisherman who wants a marina so he and his friends can keep their boats in the water. The present harbor is too crowded and if there were a marina, a lot of his friends from Anchorage could come down for weekend parties.

### Jane Fisher - Marina

Commercial fisherman who foresees an increase in whitefishing and the need for more boat slips. She would also like to see more homes built, too, as she's tired of living on her boat.
<table>
<thead>
<tr>
<th><strong>COASTAL ZONE PLAN ROLE CARDS</strong></th>
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</thead>
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<table>
<thead>
<tr>
<th><strong>Dan Dockett - Marina</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Harbormaster who wants to start a marina, now that he's experienced in running a harbor. He just inherited some money from a rich aunt and he needs to invest it.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Nellie Nielson - Marina</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar owner interested in more business. Doesn't like her present location. Things have slumped way down lately and she hasn't been able to take her usual two-month winter vacation down south. A marina would be a great place for a bar and might attract a lot of weekend parties, plus summer tourists.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Winkle Van Rip - Marina</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician who wants a place to keep his boat, and who really enjoyed life at the yacht club back in his home town in Maryland. He is a little concerned, however, about disturbing his favorite bird-hunting grounds near Clam Neck.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Terry Sales - Homes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Real estate agent who would like to have a lot more business. Besides, he says, &quot;Everybody needs a home!&quot; He'd be glad to see a shopping center, too, or at least a quick stop grocery to go along with his subdivision.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Mary Castle - Homes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Young mother who's tired of running up and down the stairs all the time. Rent is outrageous and she'd like to be in a scenic wild area where she could look out the window and have a view.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>James Green - Homes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Banker who would be glad to give out loans for the new homes. He might be interested in moving out there himself, closer to some of his favorite fishing holes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Barry Buckley - Homes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxpayer who wants to see the borough expanded so his taxes won't be so high. Nothing gets him more angry than that yearly tax bill, knowing that it only goes to support government.</td>
</tr>
<tr>
<td>Character</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Polly Parrot</td>
</tr>
<tr>
<td>Rita Remmington</td>
</tr>
<tr>
<td>Jerry Price</td>
</tr>
<tr>
<td>Sandy Eider</td>
</tr>
<tr>
<td>Pete Gill</td>
</tr>
<tr>
<td>Ole Olsen</td>
</tr>
<tr>
<td>Susi Demmert</td>
</tr>
<tr>
<td>Will Foster</td>
</tr>
<tr>
<td>Role Card</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Maria Kompkoff</td>
</tr>
<tr>
<td>Perry Peavey</td>
</tr>
<tr>
<td>Ron Ionowa</td>
</tr>
<tr>
<td>Wilma Woodsey</td>
</tr>
<tr>
<td>Harry Hackett</td>
</tr>
<tr>
<td>John P. Morgan</td>
</tr>
<tr>
<td>Patty McDonald</td>
</tr>
<tr>
<td>Joe Caputo</td>
</tr>
</tbody>
</table>

 María Kompkoff - Logging Mill

Native corporation president who sees that the biggest community need is jobs, so she favors using the land to build a logging mill. Nevertheless, she is worried about the loss of the wetlands to subsistence hunting and fishing.

Perry Peavey - Logging Mill

Logger who wants a logging mill so that his future will be assured. He's tired of always seeing the logs shipped away when they could just as easily be processed here.

Ron Ionowa - Logging Mill

Japanese businessman who would like to invest heavily in the logging industry. Lumber is needed for new houses, paper and pulp on his home island of Hokkaido.

Wilma Woodsey - Logging Mill

Forester who would like to see the logging industry expand, but in a well-managed way that protects fish and wildlife as much as possible.

Harry Hackett - Logging Mill

Unemployed worker who would like to see industry come to Yakataga City so he could get a job. His family has been on welfare for way too long.

John P. Morgan - Shopping Center

Developer who feels a shopping center is just what Yakataga City needs. New stores would be attracted and everyone could have "quick, one-stop shopping."

Patty McDonald - Shopping Center

High school student who likes the idea of more stores. Ideally, at least one would sell junk food. She'd like to see a good pizza hangout with video games and a place to buy the latest tapes and records.

Joe Caputo - Shopping Center

Taxicab driver who would enjoy a drive over to the shopping center, as well as needing the extra business. Likes the open road and a chance to get out of town.
4. Pass out role cards, butcher paper and felt-tip markers to each group. Have each student make a name tag out of construction paper, then pin on the tags with straight pins. Have the members of each group introduce themselves. Then have each group elect one person to be on the planning commission. Have the rest of the group take 15 to 20 minutes to make up a plan for the state selection land and develop a three-minute presentation, using the butcher paper and felt-tip markers to make charts or maps in support of their plan. One person should be elected to make the presentation.

5. While groups work on plans, the planning commission discusses criteria by which to pick the best plan. A sample form is enclosed.

6. Have the commission elect a president, recorder and timekeeper. The president moderates the discussion. The timekeeper insures that each presentation is limited to three minutes. The recorder takes complete notes on the proceedings. Each commissioner should ask two or three questions of the group after each presentation, so that the commissioners can vote with confidence.

7. After the presentations, the commissioners should leave the room to decide on either one plan or a combination of the plans presented. They return to explain their plan to fellow citizens of Yakataga City.

8. Afterwards, have each student write down their immediate impressions of coastal zone management. As a class, discuss the success of the simulation game. How does what's happening in Yakataga City compare with planning and values in your community? Maybe the class would like to attend a "real" local government meeting to see how it compares with their meeting. If possible, obtain a copy of your local coastal zone plan and discuss it with the class. Do they agree with all aspects or would they make changes?
Activity 3
Designing a Symbol and Beginning a Journal

Background:

The process of designing a symbol helps students to think about the value of rivers, wetlands and the sea.

Many organizations and agencies have a symbol or logo to represent, as concisely as possible, their ideas and aspirations. Even t-shirts with mottos and slogans sometimes make social and political statements. By beginning a journal, students record their values, impressions and understandings as they change and grow throughout their Sea Week studies.

Vocabulary:

- symbol
- journal

Materials:

- paper
- pencil
- scissors
- glue
- construction paper
- lined paper
- colored pencils or narrow felt-tip markers
- folders or binders for journals
- sample journals of famous explorers or scientists

Procedure:

1. Announce that as part of Sea Week studies this year, students will keep journals for one week. A week is a concise, obtainable goal. (Students may want to continue for a much longer period after they try it for a week.) Describe or read from some journals of famous explorers, scientists or sea captains. Explain that many times these journal records are the only way we know what life was like in the old days. Many times journals are used as the basis of books. Discuss the advantages of both oral and written traditions. Mention to the class that perhaps someday their children might enjoy reading their journals! As a class, decide on how to construct, bind, and keep journals. Lined paper can be used for the inside, and construction paper, file folders or three-ring binders will hold it together.

2. Make the journals and have each student design a symbol for his or her journal cover that will represent rivers, wetlands, and/or the sea. Refer back to your community inventory. Allow students to come up with their own initial ideas of what's important in both marine and freshwater
environments. They may want to change or modify their symbols as their study progresses.

3. Begin journal entries. Explain that students may want to record impressions and feelings as well as facts learned during Sea Week. Students may want to include artwork, quick sketches, poems, cartoons, news clippings and worksheets. Maybe someday they'll want to turn this material into a book.

4. During each day of Sea Week, set aside some time for students to share journals with classmates. Break the class into groups of two or three students, having them read each others' writing. To encourage each other and to feel at ease in writing and illustrating, encourage them to make mainly favorable comments on other students' journal entries.

5. At the end of Sea Week, set aside a time for students to share their favorite journal items.

Activity 4
Looking Into the Future

Background:
Change is a basic fact of life everywhere in the world, though obviously some communities change much faster than others. An important part of the education process is preparing students for this ever-changing world, especially in solving problems not yet even contemplated today. Students began thinking about change with their community inventory and the coastal zone game. Now they can take another look at change, but on a broader basis. Today's students will decide among preservation, conservation and development goals in the future. Sometimes compromises are possible, but other times the choice is either one or the other: preservation or development. Decisions are based on values, on what is important to people: their survival, their quality of life, their aesthetic and economic well-being. Students need to examine their own values--what is important to them.

Vocabulary:

* preservation
conservation
development

Materials:
- five pictures depicting marine and/or freshwater environments from magazines or calendars
- paper
- pencils
- copies of maps of Anchorage and the Cook Inlet Basin, both for now and for the year 2035 (included with the The Alaska Geographic Society's Anchorage and the Cook Inlet Basin)

1. Obtain five pictures of marine or freshwater environments from magazines or calendars showing your own community, the state, the nation, or the world—depending on what you want to emphasize. The pictures should be all black and white or all color (so the brightness of the pictures doesn't influence their decisions) and should range from a highly developed urban area along a waterfront, to a wilderness area adjacent to the coast, to a recreational beach, to a shoreside industry.

2. Number and display the pictures on the wall or bulletin board. Ask individual students to select the area in which they would most like to spend a specified number of hours or days, ranking each picture from five points (first choice) to one point (last choice). Have students write down their individual reasons for liking or disliking each picture.

3. Discuss each picture as a class. Total up the points for each picture and graph the results. Compare the values students have applied in making their choices. Are the values similar or different? What contribution does industry make to our lives? Of what value are wild areas?

4. Now have students draw the way they think each of the places pictured will look 25 years from now. How does this compare to what they think their community will look like then? You may want to divide the class into five groups, with each group taking a picture to draw and later making a presentation to the rest of the class. Have individual students write their names on the back of the picture; their age in 25 years; the date in 25 years; and where they think they'll be and what they'll be doing. Adults or parents might want to take these same pictures and draw them 25 years earlier, writing down their age then; what year it was; where they were; and what they were doing.

5. Discuss these changes as a group. How accurate will these class predictions be? What role will students have in decisions on how these pictures will really look? Explain that this year's Sea Week studies will focus on coastal, river and wetlands issues. Students will have a chance to study, debate, and perhaps even influence right now the outcome of some of these issues and how some of these places will look in the future.
6. Just for fun, students might want to compare their predictions with those of The Alaska Geographic Society's artists in the maps of Anchorage and the Cook Inlet Basin, for now and for the year 2035—which are included in the Society's book, Anchorage and the Cook Inlet Basin.

Activity 5
Careers

Background:

Currently nationwide, the marine recreation business ranks as the largest employer of people with ocean-related careers. In the future, as increasing use is made of the ocean's resources, sea-related jobs and skills will be more and more in demand.

In Alaska, the fishing industry supplies 25 percent of all jobs. Additionally, every community is located either on the coast or next to a river—except for Anaktuvuk Pass, which is on a wetland. The vast majority of supplies comes by boat. Marine supply stores do a booming business selling boats, motors and fishing equipment.

Career opportunities include jobs as oceanographers, marine biologists and other scientists, ocean engineers, aquaculturists, mechanics, welders, captains and crew members for boats of all sizes; ship builders, marine social scientists (including economists), lawyers, legislators, executives, public administrators and teachers; marine supply store owners,
people involved in the offshore oil and mineral development industries, as well as the Coast Guard and Navy. Language specialists will be needed to assist with the complexities of global negotiations and cooperative agreements, in addition to international trade.

Materials:
- paper
- pencils
- encyclopedias and other reference books
- people involved in marine/freshwater careers
- chalkboard and chalk

Procedure:
1. Ask students to list local marine and/or freshwater careers. Record them on the board. Do not forget support services such as grocery stores, seafood restaurants and hotels in coastal and river communities. You should be able to come up with at least 30 careers.

2. Have students select one career each that appeals to them and write reports on why they picked these careers. Ask them to describe the education and training needed to prepare for their careers, what an average day on the job would be like, and what they would hope to contribute to their fields. Students may need to either consult reference books or interview people in their chosen careers.

Additional Activities:
1. Social Studies, Language Arts. Invite people in marine careers to visit your class dressed for work. Ask the marine people to be prepared to show students what they do on the job. Have students prepare lists of questions to ask ahead of time.

2. Social Studies, Language Arts. Visit a hatchery, fishing boat, fish camp, seafood restaurant, coastal zone planning office, Coast Guard station, shoreside hotel, or dive shop in order to interview people to see what each career involves.
Activity 6
Recreation

Background:
Fishing, swimming, boating and simply walking along a beach or riverbank are all popular forms of recreation. Water--from puddles to ocean surf--has always held an attraction for people. Photography, backpacking, birdwatching and painting are more recent developments, as are mechanized boats, snowmachines and three-wheelers. Wetlands hunting, berrypicking and clam digging can also be recreational. If fun jobs or chores are included, a great part of a person's life can be classified as recreation.

Materials:
- chalkboard and chalk

Procedure:
1. Have students list on the board different types of recreation in your community. Have them mark an "X" by those that are "water-related" and an "XX" by those that are "water-dependent." Don't forget to include wetlands recreation, as well as that in rivers and the sea. Ask students:

   - What is it about water that attracts people?

   - Why is recreation important in this modern age?

   - What are the costs of various recreational activities? What resources are used to manufacture recreational equipment such as skis, snowmachines and dog harnesses?

   - What is the environmental impact of various recreational activities, such as three-wheeler travel versus human foot travel over sand dunes or wet tundra?

2. Have students pantomime some of the different types of recreation, to see if the rest of the class can guess what they're doing. Students may decide to invite to class experts in marine or freshwater recreation to demonstrate their skills.

3. Be sure to stress safety with all types of recreation. (See Unit Eight, Activities 3 and 4, Safety, First Aid and Survival.) If your students are particularly interested in recreation as an issue, see Unit Five, Activity 4.
Activity 7
Food

Background:

One of the best aspects of living on the coast is readily available seafood. Luckily, those who live inland can also enjoy this bounty of the sea through seafood markets, restaurants and grocery stores, and through the salmon that swim upriver to spawn.

Materials:

- a variety of seafoods
- recipes
- heat source
- cooking and eating utensils
- large sheet of newsprint or butcher paper
- felt-tip markers

Procedure:

1. Ask students about their favorite foods from the sea, lakes and rivers. Then plan a seafood snack, lunch or dinner. Invite parents to donate recipes, to assist with the cooking and preparation, and to taste the results!

2. Try to obtain a wide variety of seafood through parent donations and by checking your local grocery or seafood market. The Oriental section often has seaweed crackers and other delicacies. Remind students that with global food shortages, in the future they may be eating more seaweeds and a greater variety of fish and shellfish. Seaweeds have more vitamins and minerals than land fruits and vegetables. Blue mussels produce more protein per acre than any other land or shore-based food. They are especially easy to farm, using log booms with ropes hanging down, on which the mussels attach themselves. But mussels are very susceptible to paralytic shellfish poisoning (PSP), so be sure you check with the Alaska Department of Fish and Game to be sure your beach is safe before harvesting mussels or clams.

3. Have students cook at least one dish themselves, measuring quantities. Remind students that in general seafood needs only brief cooking to retain its flavors. Canned salmon or clams are easy to cook in a pot on a hot plate. Here's a salmon recipe from the Alaska Sea-
Harvest Salmon Chowder

1 can (7-3/4 oz.) salmon
1/2 cup each chopped onion and chopped celery
1 clove garlic, minced
2 tablespoons butter or margarine
1 cup each diced potatoes and carrots
2 cups chicken broth
1 teaspoon salt
1/2 teaspoon thyme
1/4 teaspoon pepper
1/2 cup chopped broccoli
1 can (13 oz.) evaporated milk
1 can (8-1/2 oz.) cream-style corn
Minced parsley

Drain salmon, reserving liquid; flake. Saute onion, celery and garlic in butter. Add potatoes, carrots, re-
served salmon liquid, chicken broth and seasonings. Sim-
mer, covered, 20 minutes or until vegetables are nearly tender; add broccoli and cook 5 minutes. Add flaked salmon, evaporated milk and corn; heat thoroughly. Sprinkle with minced parsley. Makes 4 to 6 servings.

4. Use felt-tip markers and a large piece of newsprint or butcher paper to make a large-scale diagram of the food web of your snack, lunch, or dinner menu. Use the illustration as a wall decoration to remind students of the origins of their food. (See Sea Week Volume VI, Unit 2, Activity 5, for a more in-depth discussion of marine food webs.) Students may need to check various reference books to see what the various species eat.

5. As a follow-up, have students brainstorm what it took to harvest, store and prepare the food. For example, the fishing boat is made from trees in Oregon, with metal trim mined in Montana, and with glass windows produced from sands in New York State. Oil-based nylon nets and floats are made from Louisiana oil, and the nets' lead weights come from a mine in Idaho. Then there's the boat's metal freezer, a gas stove, metal pots, clothing, survival suits, electronic communications equipment, and so on and so on!
Unit Two
Marine Mammals

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Objectives:

To help students:

- Categorize mammal and marine mammal characteristics by use of a tear-apart worksheet (Activity 1).
- Research the different groups of marine mammals (Activity 1).
- Key out the different whale characteristics (Activity 2).
- Compare whale skeletons to human ones (Activity 3).
- Explain whale adaptation to the ocean environment (Activity 3).
- Measure the length of a blue whale (Activity 3).
- Make a small classroom-sized blue whale and label its adaptations (Activity 3).
- Mark gray whale migrations on a map (Activity 4).
- Graph how fast the class can travel the distance of the gray whale migration (Activity 4).
- Write imaginary conversations about what whales say on their long migration (Activity 4).
Objectives:

- Read a story about dolphin intelligence (Activity 5).
- Demonstrate a variety of cetacean communications, including echolocation (Activity 5).
- Listen to a cetacean record and a story (Activity 5).
- Write a theme about real or imaginary talk with a whale (Activity 5).
- Make up skits to demonstrate whale first aid (Activity 6).
- Discuss the Marine Mammal Protection Act of 1972 (Activity 6).
- Read or listen to When the Whale Came to My Town (Activity 6).
- Count beans to demonstrate birth and death rates and the difficulties of estimating whale populations (Activity 7).
- Estimate killer whale populations by counting a series of "pods" (Activity 7).
- Read a humpback whale case study (Activity 7).
- Write to whale conservation groups to find out information on present-day whale populations (Activity 7).
- Read early Alaskan whaling history (Activity 8).
- Sing sea chanteys (Activity 8).
- Carve and scrimshaw art objects (Activity 8).
- Produce an imaginary TV special on the bowhead whaling issue (Activity 9).
UNIT TWO: MARINE MAMMALS. ALASKA'S WATERS AND SHORES ARE HOME TO POLAR BEARS, OTTERS, WATERFOWL, EIGHT SPECIES OF SEALS, AND 18 SPECIES OF LARGE AND SMALL WHALES—A WONDERTUL PORTION OF ALASKA'S WILDLIFE HERITAGE.
Activity 1
Five Groups of Marine Mammals

Background:

Alaska marine mammals include whales, porpoises, seals, sea lions, walrus, sea otters and polar bears. Like all mammals, these animals are:

- warm-blooded;
- breath air through lungs;
- have true hair at some stage in life;
- give birth to live young;
- suckle young with mother's milk; and
- have a four-chambered heart.

Other characteristics of marine mammals set them aside. They:

- live entirely or mostly in seawater or on sea ice;
- depend completely on food taken from the sea;
- have anatomical adaptations such as flippers, fins and webbed feet, which equip them for life in the sea or on sea ice; and
- are generally peaceful and unaggressive animals, most of them remarkably intelligent, especially the cetaceans.

Science has not provided a Latin name for marine mammals as a group. They are found in three orders: Cetacea, Sirenia, and Carnivora.

The cetaceans (se-TAY-shuns) include whales, dolphins and porpoises. They are the farthest removed from the land and the most fish-like in appearance. Cetaceans are extremely intelligent. Their learning and reasoning abilities have astounded investigators. This high level of intelligence, combined with their friendly dispositions, makes the cetaceans one of the most scientifically interesting and popular of all animals.
The sirensians have only two surviving members: the manatee and dugong. Steller's sea cows were formerly found in Alaska waters, but they are now believed to be extinct. Sirensians have made a complete adaptation to water, and are not able to survive at all on land. They have no hind limbs, but their forearm flippers can be manipulated to hold food and their nursing young. They are herbivorous, meaning they feed chiefly on plants, and are among the gentlest of all animals. Although the manatee and the dugong are on the U.S. government's list of endangered species, little is being done on an international level to assure their survival.

Within the order Carnivora are five families with marine mammal species, including the seals, sea lions, walrus, polar bears and sea otters. Seals, sea lions and walrus were formerly in a separate order called Pinnipedia. The eared seals (Otaridae) include the northern fur seal and the sea lion. The earless or true seals (Phocidae) are the most numerous. Ringed seals, bearded seals, harbor seals (and the closely related spotted seals), ribbon seals and the northern elephant seal are found in Alaska waters. The walrus is the only member of the family Odobenidae. Pinnipeds, translated "finfooted," are more at home in the water than on land. They still retain their four limbs from ancestral days—in the form of fins. All pinnipeds come ashore to bear their young and to mate. They have few enemies, except for polar bears, killer whales, sharks and humans. The majority prefer the colder waters at the northern and southern extremes of the planet. All feed on fish and other cold-blooded marine life. A few species will attack warm-blooded animals such as penguins and other seals. Pinnipeds are fast swimmers and expert divers. The seals seem to use a form of sonar. Blind seals have been found that are fat and in good condition. (More information on pinnipeds is in Volume IV of the Alaska Sea Week Curriculum Series.)
The ursidae family includes polar bears and the terrestrial brown and black bears. Polar bears spend their summers on the pack ice far above the Arctic Circle. In the fall, they move south with the advancing ice. In winter, they wander widely over the Arctic islands and coasts of North America. Polar bears are expert swimmers and divers, but are usually too slow to catch their prey in water, so they scavenge carcasses, sneak up on seals on the ice, or generally try to outwit the seals. For instance, they will swim under a seal’s blowhole and scratch on the ice, causing the frightened seal to plunge through the blow-hole into their waiting arms. Only expectant mother bears hibernate.

fine, soft and dense. Sea otters eat primarily urchins, mussels, crabs and clams. Because otters lack the blubber layer possessed by other marine mammals, they have a high daily food consumption. An adult male will easily consume 15 pounds of food a day, nearly one-fourth of its body weight. Otters will usually die if they go without food for three days.

(The background information for this activity was contributed primarily by Zada Friedersdorf, Redoubt Elementary, Soldotna.)

Vocabulary:

- mammal
- pinniped
- Phocidae
- Odobenidae
- Otariidae
- Cetacea
- Odontoceti
- Mysticeti
- Sirenia
- Carnivora

Materials:

- paper
- pencil
- reference books
- worksheets:
  - Sea Mammal Characteristics (2A)
  - Pinnipeds (2B)
  - Cetaceans (2C)
  - Other Marine Mammals (2D)

Procedure:

1. Pass out the worksheet Sea Mammal Characteristics. Ask students to figure out the differences between sea mammals and all other mammals. They can check their answers in reference books.
2. Assign the Pinnipeds, Cetaceans, and Other Marine Mammal worksheets to encourage further research. Have students check pronunciation of unfamiliar words in the dictionary. (The Pinniped worksheet and the additional activities were contributed by Mike Stichick, Bethel-Kilbuck Elementary, Bethel.)

(Pinnipeds answers: 1. Pinnipeds have thick hides with heavy layers of fat underneath, and their fore and hind limbs are modified to form flippers; 2. (illus.); 3. a. swim, b. open a can, do chin-ups, etc.; 4. Phocidae: ribbon seal, northern elephant seal, harbor seal (and spotted seal), bearded seal (oogruk); Otaridae: northern fur seal. Steller sea lion, California sea lion; Odobenidae: walrus; 5. Western Alaska; 6. tusks; 7. artwork, tools; 8. Bring up the idea of walrus canneries and also tanning of hides. Would this be a source of local income? What difficulties are there in getting a business like this going? How many walrus are there? Are they walrus being overharvested? What happens to the walrus bodies?; 9. useful: enjoyable to see, circus, help keep populations of some sea creatures at lower levels, this is their world, too; destructive: occasionally get caught in fisher nets, eat salmon and herring sometimes, thus competing with commercial fishers.)

(Cetaceans answers: 1. Long-beaked animals are called dolphins and short-nosed forms are called porpoises; 2. Odontoceti: killer whale, harbor porpoise, dall porpoise, sperm whale, bottlenose dolphin, white-sided dolphin, etc., Mysticeti: minke whale, Pacific right whale, sei whale, blue whale, finback whale, humpback whale, gray whale, bowhead whale, etc.; 3. toothed whale; 4. baleen whale; 5. (illus.); 6. small, shrimp-like organisms; 7. their brains are huge and heavily convoluted; they understand and imitate words, learn rapidly, make complex vocalizations of their own, and are known to train their trainers; 8. They've been overharvested commercially.)

(Other Marine Mammals: 1. 1768; 2. (illus.); 3. huge black body, 25 to 30 feet long, small head, flat lobed tail, paddle-like forelimbs with no "finger bones" and horse-like hooves with bristles on the bottom, no teeth, instead two flat plates grooved together for mashing seaweed; 4. bays and tidal rivers of southeastern United States; 5. looks very much like a manatee, except its tail is more squared off; 6. Their fur traps air and their hairs are hollow. The bottoms of their feet are covered with fur; 7. by collecting urchins, clams, crabs, mussels on the bottom and bringing them to the surface where it lies on its back and feeds, sometimes with the help of a rock to smash open tough shells; 8. Sea otters have longer fur and are much larger; river otters never turn on their backs to feed; sea otters have retractable claws and they can break open shells with a rock; 9. They were overharvested by the old-time Russians who were after thick fur.)
Additional Activities:

1. **Science, Language Arts.** Have students pretend your classroom is a large swimming pool filled with water as deep as the door knob or the table tops. Think about where the following things would have to be done by different marine mammals. If they can’t figure them out, check a reference book.
   1. getting oxygen (respiration)
   2. getting food
   3. eating
   4. having young
   5. playing
   6. sleeping
   7. getting warm
   8. escaping enemies
   9. getting a drink of water
   10. feeding their young
   11. (Add your own ideas here!)

2. **Art, Science.** Have students make a big mural showing the different groups of marine mammals and their daily activities (breathing, eating, escaping enemies, etc.).

3. **Music.** If marine mammals could sing in our language, they might sing songs about their lives and troubles. Have students write words to such a song. To make it easy, use the tune to "Old Man River" or "Blowing in the Wind." Organize a seal, sea lion, walrus, whale, sea otter and polar bear chorus to sing the song to an audience.

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**Activity 2**

**Name That Whale**

**Background:**

Alaska waters are incredibly rich. They support 9 species of great whales: the sperm, gray, minke, fin, sei, blue, humpback, bowhead and right, plus the smaller killer, beluga, goose-beaked, Bering Sea beaked, giant bottlenose, and narwhal. The best resource on Alaska whales—descriptions, pictures, and range maps—is Alaska Whales and Whaling, published by The Alaska Geographic Society. (Also, check the whale information in the Sea Week Curriculum Guides Volumes I and II.)

"As the whale is great, so to cherish it can be proof of our greatness. Meanwhile, and for a little longer, the great whale glides through the sea, feeling its vibrations and reading its meaning by senses it has gained through eons of time. Had the whale been created only to deepen our sense of wonder, that were enough, for it is imagination that makes us human."

--Dr. Victor B. Scheffer

Alaska Whales and Whaling
Vocabulary:
- baleen (review)
- toothed (review)

Materials:
- scissors
- glue
- large index cards or construction paper
- clear contact paper or lamination machine
- whale books
- worksheet
  ...Cetacean Key (2E)
  ...Beluga Bubble Puzzle (2F)

Procedure:

1. Pass out copies of the worksheet Cetacean Key, which was developed by Laurie Dumdie at the Pacific Science Center in Seattle. Ask students if they know what a scientific key is. (It's a way to identify a plant or animal by making a series of choices.) Review the terms "baleen" and "toothed."

2. Have each student cut out the whale pictures and glue them to large index cards or construction paper. Then they can use the key to figure out each species. Have them place the name match each one with its name and then check through whale books to see how well they did. Once everyone is sure of the identifications, glue the names on the back and cover the cards with clear contact paper.

3. Use the cards as flash cards, to see if students can identify the whales without the key.

Additional Activities:

1. Art, Science. Have students draw and make up cards for the other Alaska whales: minke, fin, sei, goose-beaked, Bering Sea beaked, giant bottlenose, narwhal.

2. Language Arts, Science. Have each student take a whale, research it, and make a written or oral presentation to the class.

3. Language Arts, Science. Have students make up bubble puzzles for the different species of whales, like the one enclosed that Don Gillespie in Koyuk made to go with the Beluga information sheet from the Alaska Department of Fish and Game Wildlife Notebook Series. Students can make their puzzles from marine mammal books that you have in your classroom. (Answers: 1. Color; 2. largest; 3. front; 4. Adult; 5. arctic; 6. Bering sea; 7. nulato; 8. salmon; 9. preservation—which spells CETACEANS.)
Activity 3
Whale Adaptations

Background:

Adaptations are structures or behaviors that allow an organism to be well-suited to the conditions of its environment. Whales probably descended from land animals long ago, as is evident from their skeletal similarities with land mammals. Whales are probably the largest animals that ever have lived on earth. Their huge size makes it impossible for them to live on land, but enables them to keep warm in cold waters. As an animal increases in size, there is proportionately less skin area exposed, and therefore, less heat loss to the environment. Whales also have a thick layer of blubber under the skin to insulate themselves against the cold. They have:

- glands that oil the eye to protect against salt water;
- young born tail first because of their need to be brought to the surface immediately to breathe;
- blowhole on the top of the head so they do not have to bring their whole body out of the water to breathe;
- an echolocation system that is more efficient than sight in a dark environment, especially since water is a better conductor of sound than air;
- streamlined bodies;
- forelimbs modified into flippers;
- external hindlimbs that have disappeared completely;
- a tail that has been modified into a fluke, providing propulsion by up-and-down movements;
- decreased respiration and heart rates for deep dives; and
- an ability to vary their body shapes as they move through the water, reducing resistance and drag.

(This information and the activity were adapted from the ORCA Whales curriculum developed by the Pacific Science Center and Washington Sea Grant.)

Vocabulary:

- echolocation
- forelimbs
- hindlimbs
- adaptation

Materials:

- 100-foot tape measure or measuring sticks
- pencils
- butcher paper
- old newspapers or scrap paper
- stapler
- large felt-tip markers
- worksheet: "Whale in the Water!" (3G)

Procedure:

1. Discuss the meaning of adaptation, then pass out the worksheet "Whale in the Water!" to the students. (Answers: 1. These bones would be hip bones if the whale had legs,
but through years of evolution have decreased in size; 2a. 3, 3; 2b. 5, 5; 2c. they are closely related, the same bones have come to be used for different purposes in humans and whales; 3a. 1 cubic inch; 3b. 8 cubic inches; 3c. 8; 3d. Alaska is filled with examples—think of the large mammals such as moose and caribou that roam around during winter while lemmings and voles hide under the snow; 4a. yes, to protect against salt water; 4b. no, fur would increase friction and slow down the whale in the water; 4c. no, the young need to get to the surface to breathe right away, and it might take a while for the tail to come out; 4d. no, too much heat would be lost; 4e. yes, they can move through the water faster; 4f. yes, to insulate and protect them from the cold; 4g. no, would slow down their speed; 4h. yes, retain fresh water in bodies; 4i. no, other methods can be used to keep warm; 4j. yes, the blood will be able to conserve what oxygen is there; 4k. yes, more efficient than sight when it's dark, and water is a better conductor of sound than air; 4l. no, saltwater tears don't help much when an animal is already in salt water; 4m. yes, help with swimming; 4n. yes, prevent bends, which is common in human deep sea divers, when nitrogen bubbles get into their bloodstream and cause paralysis and death if they ascend too rapidly; 4o. yes, then they can breathe effortlessly without taking their whole head or body out of the water.)

2. Take a hundred-foot tape measure or use measuring sticks to mark the size of a blue whale in the school hallway, side of the building, or on the playground. Mark the measurements with a sign so other classes can see, too!

3. Then make a smaller blue whale for the classroom out of butcher paper. Stuff the insides with old newspaper and staple it together. Label the adaptations on your whale. Make sure it's ready for the water!
Activity 4
Following the Gray Whale

Background:

One of the biggest adaptations is migration. The gray whale makes the longest migration of any mammal—10,000 miles round trip from the warm-water lagoons of Baja California to the Bering and Chukchi seas and the Arctic Ocean. The grays spend the summer (May to September) feeding on one-inch-long amphipods and other small bottom-dwelling invertebrates that thrive on lush plankton growth fueled by the long hours of sunlight. During the rest of the year, the whales eat very little, concentrating on migration and breeding activities.

The gray whale is different from all the other baleen whales. Scientists believe that grays are the most ancient of baleen whales, as well as the sole survivors of a family of whales that was once represented by many species. Grays continue to dominate the choicest of the ocean habitats—nearshore waters. At one time, gray whales were found along the eastern Atlantic and western Pacific coasts and possibly the western Atlantic, but due to heavy onshore whaling operations, only the eastern Pacific population remains. The eastern Pacific populations were almost exterminated in the mid-1800s, when whaling captain Charles Scammon discovered their shallow-water breeding areas in Baja California's coastal lagoons. The whalers took mainly pregnant and nursing females because they were in the shallowest water. And though the grays are extraordinarily fierce when it comes to protection of their young, and will regularly charge boats, the whales were no match for the whalers. Consequently, scientists and whalers at one time thought this great species was extinct, but somehow the whales found each other and began to increase after they were almost wiped out.

Currently, whaling occurs only in the Arctic, where the Soviets take around 180 per year, which they say are for Siberian Natives. A greater danger may be potential development pressures. The Mexican government has declared Scammon's Lagoon a whale sanctuary, but oil is being drilled nearby. If oil is discovered, the natural place to ship it would be from the protected entrances of the lagoons. Heavy tourist traffic along the migration route may represent another threat to the grays. But in some cases whales have begun to interact with boats. Visitors in small boats are sometimes able to approach within 10 to 20 feet of the whales in the breeding lagoons. And recently, certain whales have come right up to the boats, rubbed against them, and even permitted themselves to be petted!

After spending more than two months (November-December) on
the breeding grounds, the whales swim northward until they reach the waters of the Bering and Chukchi seas in May or June. They stay fairly close to shore on their way north, but not as close as on the southward migration. Vancouver Island seems to be the staging area for the crossing of the open waters of the Gulf of Alaska. From here on, though, their migration is a mystery—they are not sighted again until they reach the Bering Sea. They may go through or around the Aleutian Islands.

On the journey back south, they go through Unimak Pass between the Aleutian Islands, commencing their journey in October as the Arctic seas begin to freeze.

How the whales navigate is still largely unknown. They occasionally emit pulses that some people think are echolocation clicks. Navigation is also accomplished by memory and vision. Whales are often observed lifting their heads vertically out of the water in a manner known as "spyhopping," which may enable them to get their bearings on various land marks.

To make the 5,000-mile, one-way trip, the whales must keep moving almost 24 hours a day, which leaves them little time for sleep! When migrating or feeding, the whales breathe every 10 or 15 seconds before making a long dive. When they get to the Baja California lagoons, they do sleep, lying quietly at the surface, barely awash, head and flukes hanging limply, raising slightly every eight to ten minutes for a slow breath.

Vocabulary:
- migration
- navigation
- echolocation
- endangered
- extinct

Materials:
- butcher paper
- felt-tip marker
- paper
- pens
- Pacific coast map
- worksheet:
  ...Gray Whale Migration (2H)

Procedure:
1. Ask students to tell you about the longest trips they have ever made. Then pass out the worksheet Gray Whale Migration. Have them use a Pacific coast map to label their worksheets.

2. Get out the butcher paper and felt-tip pens. Ask the class if they would like to duplicate the gray whale's journey. See if they can equal a whale's trip one way by jogging, biking, swimming, hiking or skiing (for example, 25 students running 1 mile each equals 25 miles). Make a graph or map of the journey with the butcher paper (ask for student help in the design), so that each day they can record how far they moved the day before. (A class of 25 students each running 1 mile per day would take 200 days for the 5,000-mile migration!)

Your class may want to join with another class. It's not so important that the end goal be reached as that the process of working toward
that goal will give them an idea of how far 5,000 miles is!

3. Have students write paragraphs on what they think the whales talk about on this long journey. Ask students to quickly jot down what comes to mind. Then have them rewrite, adding actual conversation. Let them critique each other's work in small groups and then polish up their whale fantasy.

(These three procedures were adapted from Gentle Giants of the Sea by The Whale Museum. Write for their curriculum guide for more activity ideas: The Whale Museum, P.O. Box 945, Friday Harbor, Washington 98250. You may also be interested in ordering the Gray Whale Teaching Kit, available with slides or filmstrip from: American Cetacean Society, P.O. Box 4416, San Pedro, California 90731.)

Activity 5
Cetacean Intelligence and Communication

Background:

"We are beginning to discern the outline of another mind on the planet—a mind anatomically like ours, but profoundly different."

—Joan McIntyre
Mind in the Waters

Whales and dolphins have very large and complex brains that make high intelligence or awareness possible. Cetaceans usually live in social groups. They help each other, talk to each other, hunt, feed, and work together. Most knowledge of cetacean behavior and cetacean brains has been drawn from captive dolphins and killer whales. Today there are many more questions than answers about whale intelligence and brain structure. In testing what intelligence is, scientists are limited by their own knowledge and the questions and tasks they can think to ask. Results are biased because of the attempt to apply human standards to very nonhuman species. Whales have a human-like sense of humor, a long memory span, an ability to mimic sounds, an ability to learn quickly, and a social organization. The future
offers some most exciting possibilities for us to learn from whales, if we can keep them around long enough.

Cetaceans communicate by echolocation, songs, touching, and body movements. Sound is their primary sense, and they seem to be able to talk with other cetaceans and navigate at the same time. Cetacean sounds have been grouped into pure tones (clear whistles) and pulsed tones (echolocation sounds, faster clicks used for social communication, and mysterious, more repetitive, less well-modulated sounds). The species vary in the amount and variety of vocalizations. Each whistle is individualized, like a signature or name, and species can also communicate with other species.

To echolocate, dolphins and whales send out a series of clicks, which bounce back. By analyzing the strength and character of the echo, dolphins and whales can tell size, texture, speed, location and other characteristics of any object they focus on. Scientists developed sonar by watching cetaceans. Like whales, the ships of today can "see" with sound.

Mind in the Waters, edited by Joan McIntyre, is a good source of information on cetacean intelligence and communication. You also might want to order Whales from Ginn Custom Publishing, as a reader for students.

Materials:

- two wooden dowels, the size of a broomstick
- stopwatch
- tape measure
- scarves or blindfolds for all students
- paper
- crayons or felt-tip markers
- record of whale voices
- books about whales
- worksheet:
  ... Say "Roo-bee!" (21)

Procedure:

1. Ask students to relate stories they have heard about cetacean intelligence. Distribute the worksheet Say "Roo-bee!". Encourage students to do additional research about whale intelligence on their own.

2. Discuss cetacean communication. Cetaceans "see" with their ears more than with their eyes. Although they have very good eyesight above and near the water's surface, it is impossible to see deep in the ocean where there is no light. Explain that cetaceans send out thousands of clicking sounds that bounce off the things around them. Then they listen to the echoes from the clicks to tell where they are and what is in their way. This is called echolocation. They have memories of the "sights" they have heard; they can tell the difference between their clicks and those of their friends; and they can send out sounds and listen at the same time.

3. Have students demonstrate cetacean communication. First break the class into pairs. Have each student think of a story to tell. Then have them both start telling their stories, trying to listen and talk at the same time!
Divide the class into groups of six or eight. Have each group close their eyes and walk around very softly calling "hello" over and over. See if the students can tell which hello belongs to which person, and where each person is. See if students can use their sense of sound to keep their "pod of whales" together. (Ideas from Project Jonah)

4. Demonstrate echolocation. Take the class outside. Give one student two wooden dowels and station him or her 50 feet away from the building. Place all remaining students 50 feet from the building and blindfold them. As the first student hits the dowels together, have the blindfolded students listen. Describe the echo. Then give one blindfolded student a stopwatch to start when the dowels are hit together and to stop when the echo is heard. Write down the time it took. Then move 100 feet from building and try this again. Move at 50-foot intervals and keep recording data. How far is the echo traveling each time? (Twice as far as the distance from the building.) Remind students that because water is denser than air, sound travels five times as fast in water as in air.

5. Demonstrate the importance of two ears in sound communication. Because the external ears of most cetaceans are small and inconspicuous, scientists used to think that their ears were nonfunctional. Nevertheless, the middle and internal ears are highly developed, and many of the toothed whales appear to receive sound through the lower jaws. By receiving sound on both sides of the head, direction can be determined. Divide the class into "porpoises" and "fish." Have the porpoises close their eyes and keep their heads stationary. Have the fish make prearranged sounds and see if the "porpoises" can point to the "fish." Now have the porpoises cover one ear and try the same thing. Is this as easy? (Probably not, because the brain needs to compute the differences between what the two ears hear to determine sound direction. Using only one ear, the only clue to direction is loudness.)

Have the "porpoises" move their heads, repeating the one-ear exercise. Does it help them to orient (find the direction)? Now instruct the "porpoises" to use both ears and move their heads around slowly (they may turn their whole bodies), attempting to be conscious of how the sound changes as they turn towards it or away from it. When they reach the point where the sound seems to come into the two ears equally, they may open their eyes. What are they looking at? (If they have listened carefully, they are facing the "fish.") Have they ever seen animals do this? (Many animals, as well as people, will orient in this way by hearing, and then find the target by eyesight. Dolphins and porpoises probably don't use their sight until after they have zeroed in with their hearing.)
6. Have students listen to a cetacean record and read a book about cetaceans (check the bibliography at the end of this unit). Conclude this activity by having students select one or two emotions displayed or communicated orally by whales, and attempt to illustrate them with paper and crayons or felt-tip markers. (Suggested by R. Brumbaugh, Metlakatla)

Additional Activities:

1. Language Arts, Art, Science. Write and illustrate a pamphlet or book about cetaceans. (Suggested by Rocky Goodwin, Sherrod Elementary, Palmer)

2. Language Arts, Science. Obtain a whale movie. Show the movie without the sound. Have students pretend they are on a whale-watching expedition. Have them take notes about observed whale behavior. Then run the movie with the sound and see how well the students did at observation. Did they see things that were not mentioned in the sound track?
Activity 6
Whale First Aid

Background:
Scientists do not know the reasons why cetaceans often strand themselves on beaches. Perhaps they are sick, or parasites have interfered with their sonar navigation. Though finding a whale on the beach is not too likely, ideally this activity will appeal to student imagination and inspire some creativity. (Information for this activity was taken from the International Fund for Animal Welfare pamphlet "First Aid for Stranded Marine Mammals."

Materials:
- towels, sheets or cloths
- blankets or tarps
- plastic bags
- lanolin, vaseline or zinc oxides
- When the Whale Came to My Town by Jim Young
- worksheet:
  "...There's a Whale On My Beach! (2J)"

Procedure:
1. Ask students what they would do if a whale becomes stranded on a beach near your community. Pass out the worksheet There's a Whale on My Beach for first aid directions. (Answers: 1: gray whale, arrows should point to flippers, tail, flukes, blowhole, eye; 2: 40 feet; 3: roughly 60,000 pounds.)

2. Divide the class into small groups to practice whale first aid on "whale" victims. Some groups may want to work on single strandings, while others work on mass strandings. Have each group prepare a skit for the rest of the class.

3. Discuss the Marine Mammal Protection Act of 1972. It prohibits the "taking" of any marine mammals by anyone except Alaska Natives involved in subsistence activities, people with a permit to take them for research purposes, or fishermen who accidentally entangle them in their nets. The law states that no other killing, harassing, hunting, or capturing of marine mammals is allowed. Collecting any marine mammal, alive or dead, is also illegal. So leave those bones on the beach until you have a permit for them from the National Marine Fisheries Service. Schools can get permits by writing to NMFS, P.O. Box 1688, Juneau, Alaska 99801. Ask students if they can figure out why the collecting of bones, skulls, and other
parts of dead animals is not allowed. (Someone might kill a live animal for its skull and then say it was found dead.)

4. Tell students that if they find a dying or dead whale, they should contact the phone numbers mentioned on the worksheet. If the animal has not decomposed too badly, it is a storehouse of information for biologists interested in marine mammals. A dead whale may serve as a clue to why cetaceans sometimes beach themselves. If scientists cannot come to investigate, they may want your class to take special measurements, and to sketch and photograph the whale.

Marine mammal research is still in its infancy. It is difficult to study animals that are out of sight so much of the time. Maybe your class can help make some exciting discoveries. Fill out this card and mail it to: Scientific Event Alert Network, 10th Street and Constitution Avenue, N.W., Washington, DC 20560.

5. Read the story of a stranded whale, When the Whale Came to My Town, by Jim Young.

```
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DISPOSITION OF SPECIMEN | 200 |

REPORTED BY | 050 |
| TEL |

EXAMINED BY | 125 |
| TEL |

REMARKS | 008 |
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40
Activity 7
Whale Populations

Background:

The International Whaling Commission (IWC) is the only worldwide organization with any responsibility for controlling the whaling industry. Membership is voluntary and numbers 17 countries, including Japan and the Soviet Union, both of which still hunt the great whales even though as of 1981, the Soviets publicly stated they would comply with the 1976 plan to stop their commercial whaling endeavors. Partly because the presence of these two nations forces compromises, critics argue that the IWC represents more of the vested interest in the whaling industry than it does conservation of the whales. Many countries which allow whaling who are not members of the IWC, and pirate whalers indiscriminately take any type of whale in any region at any time. Moreover, the IWC has no power of enforcement, and members can choose not to comply with decisions made at meetings.

The Scientific Committee of the IWC makes estimates of whale populations, setting harvest quotas based on these estimates. The theory is that a population can replenish itself if not too many of its numbers are taken. The Maximum Sustainable Yield (MSY) is the highest number of animals that can be taken from a population and still allow the remaining population to make up the deficiency. Calculating the MSY, however, requires a knowledge of the original population size. Present whale populations are difficult enough to estimate, and estimates of the original populations of the great whales are not much more than educated guesses. These guesses are made on the basis of sightings of whales, a statistic suspect in itself, and by comparing the number of whales caught to the effort involved. Thus, MSY-based quotas can be quite inaccurate.

Conservationists have many other criticisms on the statistical assessments of the IWC. (For more information, see The Whale Manual by Friends of the Earth.) One is that the MSY estimate is a technique used to regulate the fishing industry, but may not be useful to control whaling. Fish have a much higher reproductive rate and can more easily replace their numbers than whales can. There is also evidence that social disruption, such as killing members of a group, may reduce the reproductive ability of whales, and that below a certain population density, whales may never be able to reproduce enough to recover their losses.

The IWC currently bans the hunting of sperm whales, blue whales, right whales, gray whales, bowheads (with exception of limited subsistence hunting by Eskimos) and humpbacks. The IWC places quotas on minke whales, fin whales, sei and Bryde's whales. A 10 year moratorium on all whal-
ing has been suggested to allow populations to recover, but it remains to be seen if the Soviet Union and Japan will agree to such a ban before the remaining great whales become so scarce as to be commercially unexploitable.

(This activity was adapted from the ORCA WHALES curriculum developed by the Pacific Science Center and Washington Sea Grant.)

Vocabulary:

- maximum sustainable yield
- law of diminishing returns
- harvest quotas
- International Whaling Commission

Materials:

- Two one-quart jars of dry kidney or pinto beans
- cardboard box about 12"x14"x2"
- acetate about 3"x5"
- tape
- overhead projector
- blindfold
- worksheet:
  ...Humpback Whale Case Study (2K)

Procedure:

1. Before class, make a counting box out of a two-inch-deep cardboard box (or two lids). Cut out a "window" in the top and tape a three-by-five inch piece of acetate on it. Now put a number of beans in the box.

2. Ask students how they would count a whale population. Show them the counting box (ocean), with beans representing the whales. Place the box on the overhead projector. Shake the box around vigorously so the beans move before students have time to count those appearing in the window. On the basis of the beans they can see, can the students estimate the total number? Take their guesses and ask what they are based on. Now try a different number of beans, either a great deal more or less, and repeat the estimations.

Ask students to describe the difficulties in counting beans.

Based on this exercise, what does the class think are some of the problems in trying to count whale populations? (The whales move around, you can't tell if you've counted them before or not, they live in areas that we can't always watch, etc.)

3. Talk about the International Whaling Commission (IWC), its make-up and power (or lack thereof), and what statistics whaling quotas are based on. To demonstrate how a population estimate can be based on the energy expended to capture individuals, bring out the counting box again. This time have a blindfolded student "hunting" for beans; that is, picking beans out of the box one by one. They can be put into a jar once they are caught. What happens to the number of attempts to catch a bean as more beans have been caught? Now "improve" the hunting technique: remove the blindfold. (Whaler's hunting techniques were greatly improved by the invention of the explosive harpoon and motorized catcher boats.) Compare the energy needed to hunt now.
Explain the law of diminishing returns, which states that as a resource is used up, it takes increasing time and energy per unit to exploit what remains. There is a point when, because of the scarcity of the resource, it becomes no longer profitable (in terms of capital or energy) to exploit it. This has happened with many of the great whales, which means they have become extinct for commercial purposes. And scientists are worried that once whales fall below a certain population density, they may never be able to reproduce enough to recover their losses.

4. Use beans, once again, to get across the effect of birth and death rates on population growth. Place two one-quart jars at the front of the classroom and divide the students into two groups. Students in one group will each add two beans to their jar, and students in the other group will add three beans at a time to their jar, to represent two different birth rates. Compare how fast the jars fill up. Now demonstrate birth and death rates. Start with both jars full. Have each group add two beans at a time to their jars, but have one group take away one and the other group take away three to represent two different death rates. What eventually happens to the three-bean group? (None will be left.) This is obviously an extremely simplistic model of the great whale situation, but it appears that whales are not increasing their birth rate to balance the death rate.

Whalers are spending more time and energy to catch each whale than ever before. Point out that decreasing population density can have a serious effect on the birth rate.

5. Demonstrate the difficulty of gauging whole numbers by having half the class be killer whales and the other half be whale watchers. Have the half that are killer whales go outside the class. The whales should decide how many will re-enter the classroom on the first visit of the pod. Have them enter for 30 seconds, leave again, and then re-enter with a different number. Switch groups after a few visits.

Ask students:

· What problems did the whale watchers have? (It's hard to know if you've counted the same animal before; sometimes they move so fast you can't identify and count them all; you need to write down what you see in order to know how the population has changed; killer whales with their dorsal fins and humpback whales with their humps have distinguishing marks (each is different) but other whales are harder to tell apart, and sometimes you see only a little bit of their fin, so it's hard to even tell the whale species!)

· What kind of information can be gained from this type of study? (Birth and death rates; maternal behavior; social
behavior (who hangs out with who); of feeding habits and movements.]

6. Distribute the worksheet Humpback Whale Case Study for the students to read and answer the questions to. (Answers: 1. One problem is whales getting entangled and causing damage to fishing gear. Solutions might be to reimburse fishermen for damage, or to figure out some way to keep the whales from getting caught. For example, whales seem to be able to "see" certain net mesh sizes and not others. Another problem is the increasing pressure of whale watchers. A solution might be to regulate such activity where whales are congregating or breeding, perhaps by setting up wildlife refuge areas; 2. That there is a need for information on birth and death rates, changes in the population from year to year and during migrations, life history, social behavior, maternal and breeding behavior, knowledge of communication, and identification through photos of flukes that vary with the individual. All this would help in humpback whale management; 3. You will need estimates of the original population size from old whaling records and sightings. Then, comparing the number of whales caught to the effort involved (data obtainable from whalers) gives you a gauge of how the population has decreased. You can now estimate present population size, and from this estimate the maximum sustainable yield (MSY), which is the number of humpbacks that can be taken without further reducing the population. You will also need knowledge of their birth and death rates to determine how fast they reproduce and increase their population. This information may or may not be available from other biologists.) Arguments such as these are still being presented today to the International Whaling Commission for other whale species.

7. Have students write to the following whale conservation groups for literature and information on current whale populations and suggestions for what they can do if they want to help whale populations:

Marine Mammal Commission
1625 "I" Street
Washington, D.C. 20006

Project Jonah
240 Fort Mason
San Francisco, California 94123

Greenpeace
2623 West 4th Avenue
Vancouver, British Columbia Canada BCV 6P8

General Whale
9616 McArthur Boulevard
Oakland, California 94605

Rare Animal Relief Effort
c/o National Audubon Society
950 Third Avenue
New York, New York 10022

The Whale Museum
P.O. Box 1154
Friday Harbor, Washington 98250
8. Sing songs about whales. Most sea chanties are about killing whales, but here's one about saving them.
The Song

Of the World's Last Whale

1. I heard the song
   Of the world's last whale,
   As I rocked in the moonlight
   And reefed the sail.
   It'll happen to you
   Also without fail,
   If it happens to me
   Sang the world's last whale.

2. It was down off Bermuda
   Early last spring,
   Near an underwater mountain
   Where the humpbacks sing.
   I lowered the microphone
   A quarter mile down,
   Switched on the recorder
   And let the tape spin round.

3. I didn't just hear grunting,
   I didn't just hear squeaks,
   I didn't just hear bellows,
   I didn't just hear shrieks.
   It was the musical singing
   And the passionate wail
   That came from the heart
   Of the world's last whale.

4. Down in the Antarctic
   The harpoons wait,
   But it's up on the land
   They decide my fate.
   In London Town
   They'll be telling the tale,
   If it's life or death
   For the world's last whale.

5. So here's a little test
   To see how you feel,
   Here's a little test
   For this Age Of The Automo-
   bile.
   If we can save
   Our singers in the sea,
   Perhaps there's a chance
   To save you and me.

6. I heard the song
   Of the world's last whale,
   As I rocked in the moonlight
   And reefed the sail.
   It'll happen to you
   Also without fail,
   If it happens to me
   Sang the world's last whale.
Activity 8
Whaling Then and Now

Background:

Whaling is an old tradition in human history. Documented drawings, estimated at more than 12,000 years old, depict men with harpoons hunting whales. The Basques began whaling in the Stone Age, and by the 8th century A.D., they had developed organized hunts in the Bay of Biscay.

They were efficient enough to have driven their prey increasingly farther into the Atlantic. They may even have gone as far west as the New World, reaching the North American shores long before Columbus.

During the 16th and 17th century, the German, English and Dutch joined in the hunting of the great whales. The slow-swimming right whale was the easiest to catch and therefore the favorite whale of these early whalers (hence the name "right"). They were killed by the thousands.
About this same time, the Pacific whales were also hunted by Eskimos, coastal Indians and the Japanese. Methods varied, but they usually used poisoned harpoon heads. Floats were sometimes attached to tire the whale. Eskimos used umiaks or kayaks for the hunt. A large whale provided much-needed food, and could feed an entire village for weeks, as well as providing oil for lamps, leather for clothing, and numerous other products. Not many whales were killed and many men died in their attempts to feed their village.

The two inventions that made this period so productive were the harpoon gun and the exploding tip. In 1840, a Scot named William Greener invented the first harpoon gun. Until this time, the harpoon had been hand thrown, like a spear, by a man standing in a small wooden boat. Even with this new weapon, many whales escaped when the harpoon pulled out or the rope broke. About 15 years later, however, Svend Foyn, a Norwegian, made the harpoon gun even more deadly by devising a delayed explosive tip. A few seconds after the harpoon entered the whale, the explosive charge released, usually killing the whale instantly if it entered anywhere near a vital organ.

Although the Atlantic whaling fleet was the largest, the whalers in the Pacific also killed huge numbers of whales. For countless centuries, the annual migration of as many as 15,000 California gray whales had proceeded along the North American coast. In 1857, Captain Charles Scammon discovered a large lagoon on the west coast of Mexico that was filled with gray whales. The breeding and calving whales in this and other bays along the coast proved to be easy prey.

By 1890 the gray whale was close to extinction, and the American whaling industry, particularly in New England, was disintegrating. Many whaling ships had been lost during the Civil War in the 1860s. In 1871, more than 30 ships were crushed by Arctic ice during a single whaling expedition near the Alaska coast.

The crushing blow to the whaling industry in the United States, however, had nothing to do with the loss of ships. Petroleum,
discovered in the 1860s, began to replace whale oil as a lubricant and fuel. Baleen was replaced by the invention of the flexible steel spring in 1906. Whaling, of course, did not end. Instead, it became more mechanized and moved into a different era.

The era of modern whaling actually began in 1925. In that year, the first factory ship was launched. Each factory ship was accompanied by several catcher boats, which did the actual killing. The introduction of these new ships meant that the flenses (the men who cut the whale) no longer needed to stand on the edge of the ship or on the whale carcass. This was a very risky job and many flenses fell to their death. The use of the factory ship also meant that, since the dead whale was brought into the ship and cut up inside, there was less loss of the dead whales from storms or shark and orca scavenging.

Though there were fewer whaling fleets, their efficiency was greatly increased. By the 1930s, the whaling nations began to realize that if the industry were to survive, they must put some curbs on the number of whales killed every year. Many agreements were made at this time, but the number of whales killed was still high. Between 1925 and 1930, almost 50,000 whales were taken. In 1938 alone, more than 54,000 of the great whales were killed, and this figure does not include the smaller whales and dolphins.

In 1946, the International Whaling Commission (IWC) was formed by the whaling countries of the world in an effort to regulate the killing. Over the years some whales were protected, but this only happened when their numbers became seriously low. Because there were fewer whales to be hunted each year and because of the cost of building and maintaining the huge ships, the number of whaling fleets and the number of countries involved in whaling dwindled. In the Antarctic alone, 41 factory ships were operating in 1931. By 1964, there were only 23 in all the oceans of the world. Nonetheless, 63,000 whales were killed in 1964. But this was a drop from the peak year, 1962, when 86,090 were taken. As of 1980 there are only nine factory ships left, run by the Japanese and the Soviets, though a number of countries still operate from land-based stations. In addition, pirate whalers from non-IWC nations claim to be independent and ignore all IWC rulings. They will kill any whale they can find, protected or not, including females with calves.

Whales are used for pet foods, leathers, cosmetics, fertilizers, lubricating and cutting oils in the textile and leather industries, candles, glue, and oil for human consumption. Whales are used for a variety of other products, too. But we can currently synthesize all of the products made from whales, as well as substituting other foods for the meat they provide. Many biologists are
pushing for a 10 year moratorium on whale hunting, so that whale populations can be more accurately gauged and given a chance to recover.

(Material for this background was adapted by permission, from Gentle Giants of the Sea by the Whale Museum. Detailed information on whale history, products and populations can be found in The Whale Manual by Friends of the Earth. Alaska history of both commercial and subsistence whaling is recorded in Alaska Whales and Whaling, published by The Alaska Geographic Society.)

Materials:

- paper
- pencils
- sea chanties
- Clorox bottles or wood pieces or soft-fired clay whale teeth
- sandpaper
- wood-carving knives (if you are using wood)
- heavy-duty scissors (if you are using plastic Clorox bottles)
- a large needle for each student
- paper towels or rags
- map of Alaska
- map of the world
- copy of Typical Cost of a Whaling Voyage
- sample ivory etchings and carvings
- local scrimshaw and ivory carvers
- worksheets:
  - ...After the Whale! (2L)
  - ...Blow Ye Winds in the Morning (2M)
  - ...Old-time Whaling Puzzle (2N)

Procedure:

1. Ask students to relate what they know about whaling history. Point out to students, on a world map, the route of the Yankee whalers from New England: around the tip of South America, up to Hawaii where they rested and resupplied, then north to Alaska waters. Then pass out the worksheet After the Whale! (Answers: 1. these dates should be incorporated in the timeline 1835, 1848, 1849, 1852, 1853, 1854, 1855, 1865, 1870, 1871, 1876, 1868-1880, 1884, 1887, 1889, 1897, 1807. Scan the text for what happened on each of the dates; 2. these geographic place names should be marked: Kodiak, Aleutian Islands, Bering Sea, Bering Straits, Arctic Ocean, Okhotsk Sea, Pt. Belcher, Icy Cape, Pt. Barrow, Cape Thompson, MacKenzie Bay and your community; 3. 18; 4. 315; 5. 3,150 gallons; 6a. 12; 6b. 2,000,000 gallons; 7a. trade items, warm clothes, knife, boots, binoculars, journal, pencils, quill pens, ink, oil cloth rain gear, sea bag, books, etc.; 7b. good food, something to keep you from getting scurvy, extra rain gear, knives, extra materials for boat repair including sailcloth, line (rope), tools, nails, whaling gear, etc. Students may be interested in these figures on the Typical Cost of Whaling Voyage.)
TYPICAL COST OF WHALING VOYAGE
(including outfitting and original cost of ship)

List of the principal articles required to outfit a vessel for a voyage in sperm whaling, together with the amount of each article and cost according to the prices which prevailed on January 1, 1844.

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TOTAL COST OF OUTFIT $19,774.75
COST OF A TYPICAL VESSEL 31,224.72

COMBINED COST OF VESSEL AND OUTFIT $50,999.47

From: The American Whaleman
by Elmo Paul Hohman
2. Have students try their hands at scrimshaw. Explain that old-time whalers carved beautiful objects in their spare time at sea. The sperm whale tooth ivory was a favorite for carving. The same techniques can be demonstrated on heavy plastic, wood, or soft-fired clay. Bring out the Clorox bottles or pieces of wood. Use heavy-duty scissors to cut the Clorox bottles into manageable pieces. Use knives to carve the wood into interesting shapes. Sand the wood. Have students draw designs on paper first, then etch the outline on the wood, clay, or plastic. Apply a tiny drop of ink. (Ivory India ink.) Rub the ink thoroughly into the cut and wipe it off immediately with a tiny piece of paper towel or a rag moistened with saliva. Then continue to make more cuts, ink, rub, and wipe until the etching is complete. Invite people in your community who scrimshaw or carve ivory to demonstrate their techniques. Also show students ivory from personal collections or from a local gift shop.

3. Sing some sea chanties to get that feeling of what it was like to be on an old whaling ship. The worksheet Blow Ye Winds should get you started. Sea chanties were used for entertainment (no TV on the old ships!) and to make the work go more easily. Pulling sails on those old-time ships was rough work that required lots of muscle power. The chanteyman and fiddle or banjo player was an important part of the crew.

Additional Activities:

1. Language Arts. Read whaling stories or excerpts (Moby Dick) and have the students try writing creative stories with these beginnings:

   We lowered the boats and took out after the largest sperm whale I'd ever seen...

   In the midst of the South China Sea, we came upon a ship under full sail with not a soul aboard....

   The Mate's booming command, "All hands on deck!" sent us tumbling from our bunks, scrambling into our foul weather gear and up the ladder to face the icy breath of Cape Horn....

   The band of burly, raucous sailors burst into the smoke-filled atmosphere of the tavern.

   "You're not going to ship on that ship, are you, mate?" whispered the bearded sailor between his teeth, his weathered hand gripping my arm like a band of iron....

   The ship had been gone three years, and every day now the Captain's wife could be seen on the "widow's walk," her eyes eagerly searching the horizon for an approaching sail....

   (Suggestions from the Mystic Seaport Museum, Mystic, Connecticut, where the old whaling ship Charles W. Morgan can still be seen and visited.)

2. Language Arts. Order a copy of the booklet Life on
Activity 9
Battle Over the Bowhead

Background:

Every spring, the great bowhead whales begin to make their way up through the Bering Strait to their summer feeding and calving waters in the Arctic Ocean and the Beaufort (BOW-fort) Sea. And the Inupiat Eskimos will be waiting, as they have for thousands of years.

Long ago, other Native people hunted many kinds of whales that sounded and blew in Alaska waters. With poisoned spearsheads and magic charms, the Aleuts matched their fragile one-man skin boats against the awesome size of the gray, fin, sperm and bowhead whales. There were also scattered coastal whaling cultures from Yakutat to Cook Inlet, from Kodiak to the Bering Sea.

In the late 1800s and early 1900s, commercial whalers killed most of the great whales in the world's oceans. As a result, an international treaty was drawn up to try to save the whales that remained.

Among the endangered species is the great bowhead, *Balaena mysticetus* (ba-LEEN-uh miss-ti-SEE-tus). Once, thousands ranged through all the northern seas.
But today, except for isolated
groups in northern Canada and
eastern Siberia, the only bowheads
left are believed to be those who
follow the retreating Bering Sea
pack ice on their spring migration
into the Arctic Ocean. And only
the northern Inupiat Eskimos, the
last of Alaska's great whaling
cultures, continue the traditional
hunt.

In 1977, for the first time in
history, the International Whaling
Commission extended its control to
cover subsistence hunting in an
effort to save endangered whales.

Can both the Eskimo's lifestyle and
the whales survive? How? What
other values are involved? See
what your students think after
they take part in the following
Tidelines TV news special, "Battle
Over the Bowhead."

Materials:

- worksheets:
  - Battle Over the Bowhead
    (20)
  - The Whale's Tail (2P)

Procedure:

1. Ask students to tell what
   they know about the bowhead
   whale controversy. Pass out
   the worksheet Battle Over the
   Bowhead and explain that this
   is their chance to do a TV
   special on the bowhead.
   Select members of the class
   for each part and let each
   one choose a team of ad-
   visors. If you can get the
   equipment, have the class
   videotape the TV special with
   some members of the class
   acting as the camera crew.

2. After the production, explain
   that it came from the March
   1979 Tidelines. How is the
   situation different now? Your
   class might want to look for
   newspaper clippings or con-
   tact the National Marine
   Fisheries Service, Alaska
   Department of Fish and Game,
   or Eskimo Whaling Com-
   mission. How would your
   students solve this issue?
   What are some of the problems
   of marine mammal management?

3. As a review, pass out the
   worksheet The Whale's Tail.
   Here are the answers: