Student Activity Sheets
Community Resource Inventory

I. History

a. When was your community founded? ________________

b. Who founded it? ___________________________

c. Why was it settled? __________________________

______________________________

d. How did original settlers make a living? __________

______________________________

e. What are some things that have happened as your community has grown larger or smaller?

______________________________

______________________________

______________________________

g. What are some reasons for its growth or shrinkage?

______________________________

______________________________

______________________________

II. Population

a. What was your population 100 years ago? __________

75 years ago? __________

50 years ago? __________

40 years ago? __________

30 years ago? __________

20 years ago? __________

10 years ago? __________
b. What is your population predicted to be in the future
   10 years from now? ________________
   20 years from now? ________________
   30 years from now? ________________
   40 years from now? ________________
   50 years from now? ________________
   100 years from now? ________________

c. What developments do these future population estimates depend on?


III. Natural Resources

   Does your community have...
   a. agricultural land? ______________________
   b. timber? ______________________________
   c. minerals? _____________________________
   d. sand and gravel? ______________________
   e. intertidal life? ________________________
   f. wetlands? ____________________________
g. natural transportation opportunities (such as ocean, rivers, harbors, mountain passes, lakes, etc.)?

h. water resources for ___ households?
   ___ electric power?
   ___ aquaculture?
   ___ industry?
   ___ public safety?

i. energy resources
   ___ wind?
   ___ sun?
   ___ water?
   ___ coal?
   ___ oil?
   ___ gas?
   ___ tidal power?
   ___ geothermal?
   ___ wood?

j. game animals?

k. non-game animals?

l. birds?
m. fish?

n. shellfish?

IV. Community Resources

Does your community have...

a. historic and archeology sites?

b. cultural events (festivals, dances, concerts, art shows, museums)?

c. public buildings (schools, meeting halls, government offices, hospitals, libraries, aquarium)?

d. transportation (roads, trails, floats, docks, airports, railroads)?

e. private business (hotels, stores, repair shops, contractors)?

f. recreational areas (gyms, a swimming pool, trail systems, parks, playgrounds)?

g. residences?
V. Economic Resources

Does your community have...

a. manufacturing plants?

b. tourism?

c. transportation facilities?

d. food processing?

e. government agencies?

f. other industries?

VI. Human Resources

Does your community have...

a. artists?

b. musicians?
c. journalists, writers, storytellers and photographers?


d. government officials?


e. scientists?


f. mechanics?


g. carpenters?


h. public health officials (physicians, nurses, dentists)?


i. businessmen and women?


j. recreation workers?


k. police and fire fighters?


l. transportation workers (pilots, ticket sellers, bus drivers)?


m. teachers?


n. fishers, hunters?


o. other?
Community Objectives Inventory

Does your community want to...

<table>
<thead>
<tr>
<th>CLASS</th>
<th>COMPREHENSIVE PLAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. improve sport fishing?</td>
<td></td>
</tr>
<tr>
<td>commercial fishing?</td>
<td></td>
</tr>
<tr>
<td>subsistence fishing?</td>
<td></td>
</tr>
<tr>
<td>b. harvest timber?</td>
<td></td>
</tr>
<tr>
<td>firewood?</td>
<td></td>
</tr>
<tr>
<td>c. mine minerals?</td>
<td></td>
</tr>
<tr>
<td>d. develop wind power?</td>
<td></td>
</tr>
<tr>
<td>solar power?</td>
<td></td>
</tr>
<tr>
<td>hydro power?</td>
<td></td>
</tr>
<tr>
<td>coal?</td>
<td></td>
</tr>
<tr>
<td>oil?</td>
<td></td>
</tr>
<tr>
<td>gas?</td>
<td></td>
</tr>
<tr>
<td>wood?</td>
<td></td>
</tr>
<tr>
<td>tidal power?</td>
<td></td>
</tr>
<tr>
<td>geothermal?</td>
<td></td>
</tr>
<tr>
<td>e. increase number of housing units?</td>
<td></td>
</tr>
<tr>
<td>number of businesses?</td>
<td></td>
</tr>
<tr>
<td>amount of industry?</td>
<td></td>
</tr>
<tr>
<td>f. promote tourism?</td>
<td></td>
</tr>
<tr>
<td>g. improve roads?</td>
<td></td>
</tr>
<tr>
<td>h. improve schools?</td>
<td></td>
</tr>
<tr>
<td>i. improve playgrounds?</td>
<td></td>
</tr>
<tr>
<td>j. add more parks?</td>
<td></td>
</tr>
<tr>
<td>k. improve local trails?</td>
<td></td>
</tr>
<tr>
<td>l. add additional recreation facilities?</td>
<td></td>
</tr>
<tr>
<td>m. build a swimming pool?</td>
<td></td>
</tr>
<tr>
<td>n. improve the harbor?</td>
<td></td>
</tr>
<tr>
<td>o. preserve beach and recreational uses?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CLASS</td>
</tr>
<tr>
<td>---</td>
<td>-------</td>
</tr>
<tr>
<td>p. enhance fish, game, and bird populations?</td>
<td></td>
</tr>
<tr>
<td>q. protect wildlife habitat?</td>
<td></td>
</tr>
<tr>
<td>r. build sewers?</td>
<td></td>
</tr>
<tr>
<td>s. improve the water supply?</td>
<td></td>
</tr>
<tr>
<td>t. expand the dump?</td>
<td></td>
</tr>
<tr>
<td>u. build sidewalks?</td>
<td></td>
</tr>
<tr>
<td>bike trails?</td>
<td></td>
</tr>
<tr>
<td>hiking trails?</td>
<td></td>
</tr>
<tr>
<td>ski trails?</td>
<td></td>
</tr>
<tr>
<td>v. create a museum?</td>
<td></td>
</tr>
<tr>
<td>aquarium?</td>
<td></td>
</tr>
<tr>
<td>w. have a concert?</td>
<td></td>
</tr>
<tr>
<td>art show?</td>
<td></td>
</tr>
<tr>
<td>community sing along?</td>
<td></td>
</tr>
</tbody>
</table>
BACKGROUND INFORMATION

1. The selected land and Yakataga City are in the coastal zone and surrounded by national forest land.

2. There is a shortage of available land due to federal land ownership, terrain, and natural hazards.

3. Yakataga City's population is 2,500 and increasing, creating a demand for housing, jobs, additional services and recreation areas.

4. Forty percent of Yakataga City's population depends primarily on fishing for its livelihood. Thirty percent of the population is unemployed during the winter.

5. Yakataga City gets its energy from a diesel-powered generator. Energy costs are extremely high.

6. The Chinook River is a salmon stream, it is navigable for power boats but not ships, and it supplies adequate water for Yakataga City. Chinook Bay is a productive estuary.

7. Citizens of Yakataga City are interested in maintaining a scenic regional environment.

8. The abandoned cannery qualifies as a historic site, but has not been classified as one. Two archeological sites are situated on adjacent Native land at Clam Neck and Mummy Island.

9. Raw sewage enters the ocean through outfalls, and solid waste disposal is an increasing problem.

10. Sand and gravel are available from along the Chinook River, but presently it is not being commercially removed.

11. Prior Forest Service management of the selected land and Native lands was as roadless backcountry, with emphasis on wildlife habitat and recreation. Adjacent national forest land will continue to be similarly managed.

12. The nearest airport is 30 miles away in Red Dog City.

13. The Chinook River estuary is part of a migratory flyway for a number of species of ducks and geese. Every fall there is a moose-hunting season.

14. The Alaska Borough is an organized borough. Recently the area on the map marked "State Selection" (in gray) was conveyed to the State. The rest of the borough's Coastal Management plan is complete. The borough is now planning the management of the newly transmitted state selection area.
The federal government has conveyed to the state a six square mile tract of land in the coastal zone of the Alaska Borough. This land may remain in state ownership, may be selected by the borough, or portions may pass into private ownership by way of a land sale. Read the background information for the Alaska Borough. You will be helping to decide what to do with this state-selected land.
PLANNING COMMISSION RATING FORM

Directions: Give each plan 1-5 points (5 points is best, 1 is worse) depending on how the plan contributes to the Alaska Borough.

<table>
<thead>
<tr>
<th>Plan</th>
<th>Marina</th>
<th>Airport</th>
<th>Park</th>
<th>Logging Mill</th>
<th>Homes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribution to Community Lifestyle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economics (Money)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife and Fisheries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water-Dependent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Beauty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jobs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Points</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Things to consider:

. Are all of the criteria equally important? ____________________________________________

. What additional criteria should be used? ____________________________________________

. Are there any criteria that should be deleted? ______________________________________
## Sea Mammal Characteristics

Directions: Cut out the squares and sort them with the underlined headings.

<table>
<thead>
<tr>
<th>All Mammals</th>
<th>Sea Mammals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most are remarkably intelligent, especially the cetaceans</td>
<td>Have true hair at some stage</td>
</tr>
<tr>
<td>Breathe air through lungs</td>
<td>Four-chambered heart</td>
</tr>
<tr>
<td>Give birth to live young</td>
<td>Depend completely on food taken from the sea</td>
</tr>
<tr>
<td>Generally peaceful, unaggressive animals</td>
<td>Suckle young with milk produced by mother</td>
</tr>
</tbody>
</table>
Directions: Use reference books to answer these questions:

1. Write a sentence that explains the characteristics common to all animals that are pinnipeds.

2. Draw a picture of (a) the front flippers of a pinniped, and (b) the rear flippers of a pinniped.

3. If your hands and feet were taped together to resemble a pinniped, what might you be able to do well?  a. 

What would be difficult for you to do?  b. 

4. Under the following family names, list all the animals you can.

PHOCIDAE

OTARIIDAE

ODOBENIDAE
5. Sometimes pinnipeds are killed and parts of their bodies are removed, yet the meat is not used for food. Where are some places this happens?

6. What parts are removed? ____________________________

7. What are the parts used for? ____________________________

8. Should this be allowed to continue? ____________________________
   Why? ____________________________
   Why not? ____________________________

9. List how pinnipeds are useful to humans and how they are destructive.

   USEFUL THINGS

   DESTRUCTIVE THINGS

10. Draw a picture of your favorite pinniped.
Cetaceans

Directions: Use reference books to answer these questions.

1. What is the difference between a dolphin and a porpoise?

2. Under the following subgroups, list all the animals you can.
   ODONTOCETI
   MYSTICETI

3. What does Odontoceti mean?

4. What does Mysticeti mean?

5. Draw a picture of some different kinds of plankton.

6. What are krill?
7. Why do scientists think cetaceans are very intelligent?

8. Why are many whale species endangered?

9. Draw a picture of your favorite cetacean.
Other Marine Mammals

Directions: Use reference books to answer these questions.

1. The order Sirenia includes something called the Steller's Sea Cow. When was the last time this animal was seen?

2. Draw a picture of a Steller's Sea Cow.

3. If you saw a Steller's Sea Cow, how would you be able to distinguish it from any other marine mammal?

4. Where are manatees found?

5. Describe what a dugong looks like.

6. How do polar bears keep warm?

7. How does a sea otter feed?
8. What are the differences between sea otters and river otters?

9. Why did sea otters almost become extinct?
START

1. toothed whale
   ➞ 2
   Triangular shaped dorsal fin
   ➞ 3
   no dorsal fin
   ➞ 4

2. it is a KILLER WHALE (ORCA)

3. large, square head; one third of body length; thin lower jaw
   ➞ 5
   head is not large and square; lower jaw juts out
   ➞ 6

4. it is a SPERM WHALE.

5. it is a BOWHEAD

6. it is a BELUGA WHALE.

7. long grooves on underside of whale
   ➞ 8
   no obvious grooves on underside
   ➞ 9

8. white markings on chin
   ➞ 12
   no white markings on chin; has calloused "bonnet" above mouth
   ➞ 13

9. whale has bumpy backbone ridge near tail
   ➞ 10
   no bumpy backbone ridge near tail
   ➞ 11

10. it is a GRAY WHALE.

11. it is a BLUE WHALE.

12. it is a RIGHT WHALE

Developed by Laurie Dumdie, Washington Sea Grant, Pacific Science Center, Seattle, Washington.
<table>
<thead>
<tr>
<th>Right Whale</th>
<th>Bowhead Whale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Killer Whale (Orca)</td>
<td>Gray Whale</td>
</tr>
<tr>
<td>Beluga Whale</td>
<td>Blue Whale</td>
</tr>
<tr>
<td>Sperm Whale</td>
<td></td>
</tr>
</tbody>
</table>
Directions: Read the Alaska Department of Fish and Game's Wildlife Notebook Series on beluga whales (sometimes spelled belukha) or do your own research. Then fill in blanks to fit the bubble puzzle below.

1. Adult belugas are white in ________.

2. The ________ Delphinapterus leucas ever recorded was 22 feet.

3. The ________ part of a beluga's head changes shape, possibly with the reception and production of sound.

4. As an ________, a beluga will have 40 teeth.

5. Belugas range from the ________ to the subarctic regions of North America and Europe.

6. The ________ is believed to be the wintering area of the beluga.

7. A beluga was once sighted near ________ many miles up the Yukon River.

8. Belugas eat ________, other fish, squid and shellfish.

9. Through ________ of their habitat, we will help the beluga survive.

1. ---------
2. ______
3. ______
4. ______
5. ______
6. ______
7. ______
8. ______
9. ______
**Whale in the Water**

Adapted from the ORCA Whales curriculum developed by the Pacific Science Center and Washington Sea Grant.

Directions: Read and answer the questions.

1. Whales are the largest creatures ever to have lived on earth. A blue whale may grow to be 100 feet long. Whales are so big that they can only live in the ocean. Like Brontosaurus and other large dinosaurs, they need water to help support themselves. On land, they would be crushed to death under their own weight. Look at the skeleton of a right whale below. Note the three bones coming off the backbone toward the rear of the whale. What purpose do you think they serve?

2. Compare the number and arrangement of bones in a whale's flipper with a human arm and hand.
   
a. How many "arm" bones does a whale have?  
   
   human have?  
   
b. How many "digits" are in the human hand?  
   
   in the whale flipper?  
   
c. What does this tell you about whales and humans?
3. Whales have adapted to the water in many ways. One thing that helps them survive in the cold arctic water is their huge size. Figure the volume of these two cubes.

\[ V = lwh \]

a. \[ V = \]  
b. \[ V = \]

c. How many of the 1-inch cubes would fit in the 2-inch cubes? 

Imagine the 1-inch cubes inside the 2-inch cube.
Adding up the inner surface areas of the 1-inch cubes gives the amount by which their surface area is greater than the 2-inch cube's. Similarly, a baby whale has a larger surface area in proportion to its volume than its mother, and loses heat much faster.

d. Give another example of this principle.

4. What other adaptations would be helpful to a whale? Circle yes or no to the following possibilities and give your reasons.

a. glands that oil the eye. Yes/no because 

b. fur. Yes/no because 

c. young born head first. Yes/no because 

d. sweating. Yes/no because
e. streamlined shape. Yes/no because ____________________

f. layer of blubber. Yes/no because ____________________

g. arms and legs. Yes/no because ____________________

h. concentrated urine. Yes/no because ____________________

i. curling up to keep warm. Yes/no because ____________________

j. low heart rate while diving. Yes/no because ____________________

k. echolocation system. Yes/no because ____________________

l. tear ducts. Yes/no because ____________________

m. tail and flippers. Yes/no because ____________________

n. hold breath while diving. Yes/no because ____________________

o. breathe through the top of the head. Yes/no because ____________________
Gray whales make the longest migration of any mammal—10,000 miles round trip. Gray whales breed and calve in the warm water lagoons of Baja California from late December to early March. Then they head north past California, Oregon and Washington, and on to Vancouver Island in British Columbia. There, they gather in groups for the trip across the Gulf of Alaska. No one is sure what route they take to their summer feeding areas in the Bering, Chukchi and Beaufort seas where they spend May through September, feeding on 1-inch-long amphipods and other bottom-dwelling invertebrates. These amphipods in turn feed on the rich growth of plankton (tiny plants and animals) that result from the long hours of sunlight. In October, as the ice pack starts to form, the whales head south through Unimak Pass in the Aleutians. They travel very close to shore on their southward migration. Today's date is __________. The gray whales are probably __________.
Mark the gray whale's migration route on this map. Label the landmarks along the way, plus their breeding and calving area and feeding area. Also, list the time of year spent in each area.
Say "Roool-bee!"
by Malcolm Brenner

Editor's note: Malcolm is a person who wanted to find out something about dolphins, so he began working with a captive female dolphin, named "Ruby," in Florida.

It occurred to me that I could use this game of catch as a reward in an attempt to get Ruby to vocalize. It seemed like an ideal reward; we were both enjoying the game, and her participation was voluntary. I decided to try to get her to mimic her own name.

"Ruby," I said. "Say, Roool-beee!"

All I got back at first was a bunch of dolphinese, somewhere between a whistle and a squawk. I threw the ball, and she returned it.

"All right, now, say 'Ruby!' Roool-beee!"

...I noticed that she was repeating the same sound every time; it wasn't just any old squawk, but one with recognizable characteristics...

Suddenly her vocalization changed. Her squawk came out in two distinct syllables, rather like the way I had been syllabificating "Roool-beee!" I hurled the ball, and she returned it. Our progress became unbelievably rapid. In the space of five minutes, she began to copy the syllabification, rhythm, time, and inflections of my pronunciation of the word "Ruby," and she did so with an accuracy and a speed I found amazing. We became completely wrapped up in each other, the outside world ceased to exist... Never in my life have I known such an intimate feeling of being in contact with an incredible non-human creature. It felt as if it were what I had been created to do. Our minds seemed to be running on the same wave-length. We were together.

She repeated the word with accuracy a couple of times, then started babbling at me in dolphinese, shaking her head up and down with her jaws open in that gesture, usually associated with pleasure, that I called "ya-ya-ing." I tried to get her to say "Roool-beee!" again; more ya-ya-ing. Then she swam back a few feet and made a peculiar noise, a kind of "kee-orr-oop," but about three times faster than you pronounce it. It occurred to me--I don't know why--to repeat that sound. Ruby seemed to be expecting it of me. I did the best I could with it. She repeated it, but now it sounded slightly different; I mimicked her changes. Gosh, she's doing to me what I was just doing to her! Where will this lead? By now the ball was forgotten; I was totally absorbed in listening to Ruby's vocalizations and attempting to mimic them as accurately as possible with my inadequate lips and vocal cords. She repeated the sound again, changed still more, and I copied that, she repeated it again, and
as I tried to mimic her I thought, this sounds vaguely familiar--"kee-orr-opp." The light in my head went on. The sound I had just successfully imitated was the one she had been giving to me in the beginning, in response to my first attempt to make her say "Ruby!"

This realization struck me as the sound was coming out of my lips. Several fuses in my mind blew simultaneously and I did an incredible double-take, nearly falling over, and staring at Ruby, who was watching me with great concentration. When she saw the double-take, and knew I knew, she flipped out, and went ya-ya-ing around the pool, throwing water into the air, and apparently happy that this two-legged cousin of hers was progressing so rapidly.

What do I think the meaning of that experience was? I don't really know. I have some ideas, however. In response to an English word, Ruby had given me a dolphinsese word or phrase, which I had ignored. She succeeded in taking control of the situation--although I had been willing to relinquish control--and had then tricked me into producing the sound I had at first ignored! I had been the one slowing down the communication between us! But what was the meaning of that sound? I can only guess. Certainly Ruby was sophisticated enough to recognize her human name. It occurred to me that she was most likely either telling me her name for me or telling me her name for herself.

Years later, I told a couple of "straight" dolphin researchers about the experience. (By "straight" I mean they regard the possibility of a high dolphin intelligence as undemonstrated, and therefore not worth investigating.)

"It's too bad you didn't have a tape recorder with you," they told me. "So often one hears what one wants to hear." Some outside impartial reference source is necessary to evaluate experiences like this in a truly scientific context. One's own subjective sensory impressions are, alas, so often subject to distortion.

Answer these questions:

1. What's your opinion of what was happening in the story--was Ruby really trying to teach Malcolm something, or did Brenner hear what he wanted to hear?

2. What experiments would you like to try with Ruby?

3. How would you try to learn to talk with Ruby?
There's a Whale On My Beach

Sometimes marine mammals get stranded and need human care and concern for a short time. If a whale was ever stranded on your beach, would you know how to give first aid? _________

Here's what the International Fund for Animal Welfare recommends:

Be careful. The sheer massive size and power of a stranded whale may be dangerous.

Check to see if the animal is alive. In some whale species, there could be a 10-15 minute span between movements.

Try to correctly identify the animal. Measure its length and note its color and distinctive features.

Send someone to call the Alaska Department of Fish and Game, the State Troopers, or the University of Alaska. Give them information on the stranding and its exact location. Also call the Scientific Event Alert Network at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. Dial (800) 325-6000 and charge to ID #1776. And call the regional National Marine Fisheries Service at (206) 442-7676.

Do not try to push the animal back to sea. Remember, it is a mammal and needs to breathe air. If it is too sick or injured to support itself, it can drown. With first aid, it is better off left where it is found. If the animal appears healthy, however, and scientists cannot come to investigate and assist with first aid, then try to document the animal's identity with photos and descriptions. Then carefully attempt to return it to the water.

For single strandings of whales, porpoises, and dolphins...

1. If an animal is caught in pilings, rocks or other obstructions, remove it into a stable position. And keep the animal belly down whenever possible, as animals on their sides in water are likely to drown.

   On beaches, scoop out the sand that's propping up the front flippers. Dig a hole (without a drain) so the animal is not resting on its flippers. The primary objective of first aid for a stranded whale or dolphin, at least in warm weather, is to get rid of heat. If the animal rests on its flippers, this position will cut off circulation.

2. If possible, erect a make-shift shelter to provide shade. This may be a simple lean-to, constructed from tarpaulins.
3. Apply water-soaked, light-colored towels, sheets or cloths to as much of the body as possible. Resoak the towels frequently to keep the animal's skin moist. If the whale is extremely large, be sure to at least keep the appendages cool--since the flippers and tail flukes are instrumental in body heat regulation. The biggest problem for a stranded whale or dolphin is getting rid of body heat. Under ideal conditions, plastic bags filled with crushed ice should be placed around the flippers and flukes only.

4. Do not obstruct the blowhole coverings. Keep water out of it. The blowhole is the means by which a whale or dolphin takes in and breathes out air.

5. Apply lanolin, vaseline or zinc oxide to areas you have to leave exposed to the sun. Do not use suntan lotions or other preparations.

6. Cooperate in careful crowd and noise control. Try to ensure a minimum of handling and disturbance for the animal, since it is already--by the nature of its stranding--undergoing considerable stress. At night, no lights or flashbulbs should be shone directly in its eyes.

In case of a mass stranding...

1. Deal with the animals in the water first. Keep them from coming out onto the beach. Hold the animals bunched together in sheltered, shallow water in an upright position. Remember, if manipulated improperly the animals will thrash around, causing further injuries to themselves and probably to the personnel working with them. Use the utmost care in moving the animals in the water: Push only on the sides of the animal or at the base of its dorsal (back) fin; never push or pull hard on the flippers; completely avoid the head and tail. If an animal is lifted or pulled in an improper manner, it may be severely injured. Always wait for experienced persons to apply any mechanical means to move the animals. Severe injury may be inflicted from ropes, hooks, crowbars, etc.

Using minimal physical activity and force, try to keep any additional animals from getting out of the water and piling up one on top of one another on the beach.

Do not, however, try to push them back into the open sea. This action could result in scattering--then you will be dealing with many single strandings over many miles of beach.
Keep in mind that more harm could be done to the animals by well-intentioned pushing and pulling than if the animals are allowed to come out of the water and pile up on the beach.

2. If the shore formation allows, dig trenches from the water in toward the beach. The trenches should be deep enough to allow seepage of sea water at low tide. By digging irrigation ditches, you will make the sea accessible to animals already on the beach, and significantly cut down on suffering from retention of heat.

The trenches should lead to scooped-out areas in the sand, forming big, shallow pools for stranded animals closest to the water. Fortunately, most mass strandings in North America have occurred on long, shallow beaches, facilitating the channeling of water to the stranded animals.

3. Apply individual first aid to those animals already far up the beach.

NOTE: The following approximations of length-weight ratios may be an aid in handling considerations:

- 6 ft. = 200 lbs.
- 8 ft. = 400-500 lbs.
- 12 ft. = 1,500 lbs.
- 15 ft. = 3,000-4,000 lbs.
- Large whales = 1,500-2,000 lbs./foot

1. Now apply what you know to this stranded __________________ whale. Explain what you would do. Draw arrows to the points of its body requiring special assistance.

2. Figure the person (you) in the picture is 5 feet tall. How long is the whale? __________________

3. How much does it weigh? ________________
The humpback whale (*Megaptera novaeangliae*) used to be an important part of the whaling industry. In the early part of this century, many humpbacks were taken by the shore stations in the North Atlantic. By 1916, there were only a few dozen animals left. Harvesting stopped until the 1940s when their numbers had recovered enough to make hunting profitable again. The population was drastically reduced again, and finally in 1966, the humpback whale was given complete protection by the International Whaling Commission. No one knows for sure how many humpbacks there were originally, but scientists think the number in the North Pacific Ocean has remained at about 1,200 since 1966. There are probably about 2,000 in the North Atlantic, and populations may be increasing slightly. Humpbacks in the southern oceans number about 3,000; there may have been as many as 100,000 at one time.

Although the humpback is no longer hunted, there are new threats to its existence. The number of humpback whale sightings has gone up the past few years in the Newfoundland area; during this same time, report of whale-caused damage to fishing gear has also gone up. The whales get accidentally entangled in the trap-lines. It is not that they are attempting to get the fish or bait in the trap—they just don’t seem to be able to sense the lines. Damage to the traps is costly, and fishermen lose many fish while they are repairing whale-damaged traps. The result is that fishermen end up paying the cost of a conservation policy (i.e., the hunting ban on the humpbacks). Some have concluded that since more humpbacks are seen close to shore, the population has risen and whaling should be allowed. It may be, however, that humpbacks are feeding closer to shore than before because of over-fishing of their favorite food-fish—capelins—by humans. It could also be that more whales are caught because cod fishing has become more popular, and there is more fishing gear (traps and nets) in the water than ever before.

Another threat to the humpback may be coming from whale lovers. Charter boats are running whale-watching trips, and many pleasure boaters are cruising the whales’ breeding grounds to get as close as possible to the animals. Not only are cows and calves being frightened away from their traditional places, but courting whales are often interrupted by boaters. This could affect humpback birth rates. In California, there have already been collisions between gray whales and hydrofoils. That is bound to happen off Maui, too. A scientist has reported that he observed a humpback that stopped singing when a hydrofoil came near. We still do not even know why humpbacks sing; how can we know what might be the effect of hydrofoil or other boat noise on their lives?
Now answer these questions:

1. What is one of the problems facing humpback whales, and what is a possible solution?

2. You are a biologist proposing a long-term study of humpback whales that migrate between Alaska's Glacier Bay and Hawaii. The study will attempt to identify and keep track of individuals and pods from year to year. In order to get money for the study, you must convince the National Science Foundation that there is much useful information to be gained. What do you tell them?

3. Imagine you are a scientist with the International Whaling Commission (IWC) in 1966. At this time, the IWC is debating the quota of humpback whales to be captured, or whether to completely ban hunting them altogether. You are to provide the information needed to make the decision. What information do you need, and how do you get it?

Directions: What would it have been like to be on an old-time commercial whaler along Alaska's coast? What would you have needed to take with you? As you read through this brief history, begin making a list of needs (see question 7 at the end).

Whalers from New England first reached Alaska in 1835. They reported abundant sperm and right whales around Kodiak. Soon ships were chasing whales up through the Aleutians and into the Bering Sea.

In 1848, Captain Thomas Roys pushed his way through northern mists into seas unknown to whalers. With a terrified, nearly mutinous crew, Captain Roys forced his way through the Bering Strait and into an Arctic Ocean shrouded in fog. But one day in July, the fog lifted, and these once-frightened hunters began to take whales so quickly that in a month they had filled their ship. They soon set sail for Hawaii with 1,800 barrels of oil in the hold. News of this discovery touched off an unprecedented oil rush to the Bering Strait. In 1849, more than 70 ships sailed there, and the number continued to grow annually. By 1852, more than 200 vessels were operating in those waters, but the 1852 season turned sour. On top of that, the subsequent 1853 and 1854 seasons were just as disastrous.
Consequently, ships headed over to the Okhotsk Sea, off the Siberian coast, to hunt whales. But catches quickly declined there, too, and in 1858, ships began returning to the Bering Strait.

Normally the whalers would arrive in mid-June. While waiting for the ice to melt, they would trade with Alaska Natives for fur and ivory. Whalers also killed walruses for their oil and tusks. And by July, they could begin to hunt the bowhead, although they always had to be very careful to get back through the Bering Strait before the ice froze them in. As many Alaskans well know, winter comes early and fast in regions lying at such extreme northern latitudes.

1865 marked the beginning of a series of tragedies for the whaling industry. The last encounter of the Civil War took place near the Bering Strait, when the Confederate raider Shenandoah burned 20 whale ships and caused the wreck of another. In 1871, 32 ships were abandoned between Point Belcher and Icy Cape when ice trapped them. And in 1876, 12 more ships were lost near Point Barrow. Almost every year, one or two vessels were wrecked or crushed in the ice.

Additionally, whale prices began to decline significantly, as people began to substitute petroleum for whale oil. In an attempt to offset this trend, the whalers tried to increase their catches. As they had difficulty finding whales, they turned to walrus. Between 1868 and 1880, as many as 100,000 walruses may have been taken. Oil prices continued to fall, but what temporarily saved the industry was the baleen, or whalebone, market. In the 1870s, the fashion industry began to require baleen for corset stays and skirt hoops. Baleen was the only material available that approximated the qualities of modern plastics.

Because bowheads were becoming increasingly scarce, whaling companies began using steam auxiliary ships that could go among ice floes where no sailing ship dared to go. And the whaling companies decided to start shore-based stations to take advantage of the skills and techniques developed by Inupiat Eskimo whalers. The first station was established in 1884. Within a few years, 15 stations were established between Point Barrow and Cape Thompson. A few men ran each station, with the help of largely Inupiat Eskimo crews. Eight men were needed for each crew, and sometimes a station had 20 crews. The competition for crew
year's supply of flour, as well as rifles, cartridges and other food and manufactured goods, in payment for the two-month whaling season. As a result, Eskimos began to concentrate around the stations, developing a dependence on manufactured goods.

Bowhead whales continued getting more scarce. Then in 1887, Charles Brower, the manager of the Cape Smythe Whaling and Trading Company at Point Barrow, heard from Eskimo traders that they had seen large numbers of whales in the shallow waters of Mackenzie Bay. So Brower outfitted one of his men, Joe Tuckfield, with a whale boat and an Eskimo crew, and sent them east on a reconnaissance voyage. When Tuckfield finally returned in 1889, he reported that whales were "thick as bees." This started the last great whaling rush, and pushed the whales--already severely reduced--toward extinction. The reconnaissance crew had found the bowhead's summer feeding grounds--their last refuge.

Over the next 20 years, more than 100 voyages were made to these waters. But 1897 was the beginning of the end. That year, four ships were lost to the ice pack, and four others were forced to seek emergency quarters on the coast. Ironically, it was the very scarcity of the whales that saved them. As fewer and fewer were caught, the price of baleen rose higher, reaching more than $7 per pound. Consequently, the high price invited cheaper substitutes. Spring steel was soon introduced for corset stays. In 1907, the price of baleen dropped 75 percent, and the whaling market ended for all practical purposes.

1. Make a timeline of commercial whaling events along Alaska's coast.

2. Label the geographic place names mentioned in this history, and put a star next to your hometown.
3. An average bowhead gave 100 barrels of oil. How many bowheads did Captain Thomas Roys' crew kill in 1848?

4. Each barrel held 31\frac{1}{2} gallons of oil. How many gallons of oil did whalers get from an average bowhead?

5. How many gallons of oil did Capt. Roys' crew get in 1848?

6. An average walrus gave 20 gallons of oil. Estimates of up to 100,000 walrus were killed between 1868 and 1880. In this ___ year period, how much oil did these walrus give?

7. Imagine that you were leaving from New England for a 1\frac{1}{2}- to 3-year voyage to Arctic Alaska in 1850.
   a. What would you need to bring?

   b. What ship supplies would you hope they had along?
Blow Ye Winds in the Morning

1. 'Tis advertised in Boston
   New York and Buffalo,
   Five hundred brave Americans
   A whalin' for to go, singing:

   Chorus:
   
   Blow ye winds in the morning
   And blow ye winds heigh ho
   Clear away your running gear
   And blow ye winds heigh ho!

2. They take you down to Bedford
   That famous whaling port
   And give you to some landsharks
   To board and fit you out, singing:

3. They tell you of the clipper ships
   A-going in and out
   They say you'll have five hundred whales
   Before you're six months out, singing:
4. It's now we're out to sea my boys
   The wind comes on to blow
   One half the watch is sick on deck
   The other half below, singing:

5. The skipper's on the quarter-deck,
   A-squintin' at the sails,
   When, up aloft, the lookout sights
   A mighty school of whales, singing:

6. Then clear away the boats my boys
   And after him we'll travel
   And if you get too near his flukes
   He'll kick you to the devil, singing:

7. And now that he is ours, my boys,
   We'll tow him alongside
   Then over with our blubber hooks
   And rob him of his hide, singing:

8. Next comes the stowing down my boys
   We work both night and day
   And we all have fifty cents apiece
   On the hundred and ninety-ninth day, singing:

9. Our ship is full, we're homeward bound,
   And soon we're through with sailing,
   A friendly glass around we'll pass,
   And blast this blubber whaling, singing:
ACROSS
1. The art of carving whale teeth.
2. A carved figure on a ship's bow.
3. Whale fat.
4. A tool used to catch a whale.
5. A ship's officer.
6. A small boat used for chasing whales.
7. The broad tail of a whale.
8. To direct a ship's course.
10. A long metal spear used for killing whales.
11. Near or toward the stern of a vessel.
12. A portion of the ship's company on duty at a given time to run the ship.
13. A plant fiber used in making rope.

DOWN
1. A waxy product found in the sperm whale's head and used to make candles.
2. The crew's living quarters in the forward part of the ship.
3. Whalebone. Strips found in the upper jaw of the right whale.
4. Rope.
5. One who installs rigging.
6. A floor on a ship.
7. A person learning a trade.
8. A sailor's personal belongings.
9. A nautical measure equal to six feet.
10. The front part of a ship.
11. One who steers a vessel.
13. A wooden container.
Battle Over the Bowhead
An Alaska Tidelines TV Special

"BATTLE OVER THE BOWHEAD" is excerpted and adapted from Alaska Tidelines, Volume 1, Number 6, March 1979. Virginia Sims, editor. Published by the University of Alaska Sea Grant College Program, Copyright © 1979. Reprinted by permission.

This is an imaginary TV news special. The people in it are imaginary, too. But the battle over the bowhead is very real. The event described here actually happened. And these arguments have been heard in one form or another at such widely varied places as international meetings in London or Tokyo or over a steaming cup of tea in a tent pitched on the ice at a whaling camp.

Read the script through. Then select members of your class for each part, and let each one choose a team of "advisors." Each part represents a different point of view, but there are many other arguments besides those presented here. Perhaps you and your advisors can add some of your own as you go along.

Cast of Characters

MODERATOR
JOHN, Eskimo whaling captain
KEN, U.S. delegate to the International Whaling Commission (IWC)
ALICE, member of the "Save the Whales" organization, Alaska chapter
EMILY, Alaska state legislator
STEVE, member of the IWC Scientific Committee
MIKE, biologist with the National Marine Fisheries Service (NMFS)
MARGARET, spokesperson for the oil and gas industry

MODERATOR: Good evening, ladies and gentlemen. The so-called "Battle Over the Bowhead" is not about whether or not the whales should be saved. We all agree that they must survive. And the Eskimos, whose traditions are built around the bowhead, know better than anyone else how empty our northern waters would be without them.

Nor is the battle a simple two-sided question of Eskimo subsistence against bowhead protection. It is far more complicated than that. There are many issues involved, including conservation, international politics, the impact of oil and gas development in the Arctic, the energy needs of the world, environmental protection, civil rights of minority people, and last but not least, survival of the great whales, among the most beautiful, fascinating, mysterious creatures ever to live on earth.
Some of these interests are represented on our panel here tonight. Let's start with you, John. We know it took some pretty heavy bargaining to get the International Whaling Commission to lift its ban against Eskimo subsistence hunting and allow you a quota of 12 whales. You agreed to that quota--but under protest. That was last year. What's going to happen this spring?

JOHN: We will be hunting, but under our own rules this time. We do not think the International Whaling Commission has any right to limit the number of whales we can take for food. We went along with the quota last year because we were told that if we cooperated, the quota might be lifted. Well, we did cooperate. But the quotas for this year's hunt are almost as bad as last year's. So this spring we will do it our way.

MODERATOR: Does that mean uncontrolled hunting?

JOHN: No, no! The bowhead whaling will be managed this year by our own Alaska Eskimo Whaling Commission. We will set and enforce limits that will not endanger the whales, but will meet the needs of our people. Let the IWC regulate the commercial whalers. We will regulate ourselves.

MODERATOR: Ken, perhaps you should tell us just what the IWC is and what it does.

KEN: The International Whaling Commission was formed in 1946 to conserve the whales by bringing commercial whaling under control. Since then, the worldwide whale kill has been cut almost in half, and no more whales have been added to the endangered species list.

The IWC sets quotas on whale populations considered large enough to harvest, and protects those species that are threatened. Most of its 16-member countries were whaling nations when they joined, but now only a few continue to hunt commercially.

ALICE: Yes, but two of those IWC Nations--Japan and the Soviet Union--are the largest commercial whalers left. They account for about 85 percent of the whales killed each year. As you know, our "Save the Whales" group is totally against commercial whaling. And it seems to us that the IWC is dealing more in politics than in protection.

2Australia, Argentina, Brazil, Canada, Denmark, France, Iceland, Japan, Mexico, the Netherlands, New Zealand, Norway, South Africa, United Kingdom, U.S.S.R. and U.S.
KEN: It's a very touchy problem. You see, none of these nations had to join the IWC. We can't force any nation to sign the treaty. But once they are in, they listen to the advice of our IWC Scientific Committee and they are expected to abide by the IWC rulings. That means staying within the quotas for whales not endangered, and staying away from those species that are.

Another problem is that there are still five whaling nations that have not signed the treaty. Those nations take about 10 percent of the total catch, including many whales from endangered populations. So we think it is extremely important to get these nations into the IWC.

MODERATOR: What is the United States official position on whaling?

KEN: The United States wants to end all commercial whaling.

MODERATOR: What about subsistence hunting?

KEN: The government feels subsistence hunting should be allowed to continue. That's the position it took under the Marine Mammal Protection Act of 1972, which provides for subsistence rights.

The IWC's move to limit Eskimo whaling put the U.S. in a very difficult position. On one hand, the government wants to protect the rights of minority people. On the other hand, we were afraid that if the quotas were not followed, other nations would ignore the IWC rulings.

EMILY: I remember how surprised we were in the Alaska State Legislature when the IWC extended the treaty to include subsistence hunting. Why the sudden decision?

STEVE: As a member of the IWC Scientific Committee, perhaps I should answer that. And I can assure you, it wasn't a sudden decision.

---

3 Chile, Peru, Portugal, South Korea, Spain.
In the first place, scientists probably know less about the bowhead than any other species. It's just a guess, but we think there were around 16,000 in the western Arctic before the commercial hunters first came in 1848. A study of old logbooks shows that between 19,000 and 21,000 bowheads were killed before commercial whaling ended 60 years ago. And since 1931, only subsistence hunting by Natives has been permitted.

The problem was that in recent years the Eskimo hunters have been taking more and more. We warned the United States about this, but little was done. Finally in 1976, when 48 bowhead whales were killed and more than 43 were struck and lost, we decided the time had come to call a halt. And in 1977, on our recommendation, the IWC ordered an end to all bowhead hunting. At that time, we thought there were only 800 to 1,300 bowhead left.

JOHN: We couldn't believe it! No one told us the IWC was worried. If we had known, we could have taken some kind of action ourselves.

ALICE: But why did you kill so many whales? Bowheads range up to 60 feet long and weigh more than a ton a foot. Surely, your people didn't need that many.

JOHN: Our population has grown, and we have always depended on the bowhead for our physical and cultural survival. We store the meat in ice cellars dug in the permafrost, and it makes up a major portion of our year-round diet. The whaling feast is the most important celebration in our villages. And the highest honor for a man is to have a whale kill to his credit.

But I admit there were more whaling boats out that year than ever before. Some of our people who had held pipeline or construction jobs could afford to outfit a whaling boat for the first time. Many of them had not been brought up in the old ways where you start as a whale hunter's apprentice at the age of 13. And some of them did stupid things like shooting at the whale with a shoulder gun when there was no way to attach a float to the animal. Or killing a whale too far out, and having part of the meat spoil in the water before it could be towed back to shore. We didn't like those things either, I can assure you.
ALICE: Couldn't you do something about it?

JOHN: Well, after the IWC action, the whaling captains got together and formed the Alaska Eskimo Whaling Commission to develop our own management plan and spell out the responsibilities of the whaling captains. Then the U.S. delegation was able to talk the IWC into lifting the ban and giving us a quota of 12 instead. That wasn't nearly enough, and we were eating canned chicken by Thanksgiving, but it was better than nothing!

ALICE: But at what a cost! In exchange for the quota of 12 bowhead, the U.S. had to stand by while the IWC raised the North Pacific sperm whale quota to 6,500 for commercial hunters from Russia and Japan. That was nearly 10 times the quota of the year before.

JOHN: That wasn't our fault. That was the recommendation of the IWC Scientific Committee. And we Eskimos think some of those scientists don't know what they're doing unless it's playing politics.

STEVE: Now wait a minute! The bowhead is an endangered species, the sperm whale is not. You can't compare the two. A commercial harvest is acceptable if it doesn't endanger the population.

JOHN: Well, we think we know the bowhead better than anyone else. And we always believed there were more than you figured. Last spring we helped set up ice camps on St. Lawrence Island and at Point Hope, Wainwright and Barrow to count the whales on their northern migration. Now scientists agree that there are probably between 1,800 and 2,800 bowhead.

KEN: Yes. That's just a small fraction of the original population, but the bowhead does seem to be in better shape than we thought.

JOHN: Even so, we stayed within our quota. But a lot of good it did us. Last summer, we went to the IWC meeting in London to appeal their ruling on subsistence. But we weren't allowed to address the convention. We weren't even introduced. So when the IWC set a quota of only 18 whales for us this year, we walked out. And by that act, we symbolically removed ourselves from the regulations of the IWC. As I said, we will hunt by our own rules this spring. Scientists estimated the whale's reproduction rate at four percent, but to be on the safe side, we will take no more than two percent.
MIKE: But John, that reproduction rate is only a guess, and that would still be around 40 whales. You are aware of how little we know about the biology of the bowhead. We don't know about their feeding habits or their natural cause of death. We don't even know for sure where they spend the winter, although we think it's in the southwestern Bering Sea. There is still so much to be learned.

KEN: And until we do know more, we feel there must be some outside regulation, even of subsistence hunting.

JOHN: You would think we are the only human menace to the bowhead of the Arctic. What about oil and gas industry in the Beaufort Sea? How will that affect the whales? Remember, the IWC also recommended that "all necessary measures"--and that's a quote--be taken to preserve the habitat of the bowhead. It's hard to understand how a government that seems so anxious to protect the bowhead can give the go ahead for untested Arctic oil exploration in the midst of the whale's natural habitat.

MARGARET: We in the oil and gas industry are aware of that worry, John. We're concerned with the environment, too. And we certainly don't feel that our operations are untested. We believe we are capable of operating safely in the area.

JOHN: I'm not just talking about the danger of oil spills, which is bad enough. I'm also talking about the effect of such things as noise. Eskimos have always known that the bowhead is very sensitive to sounds. We don't use outboard motors when we're stalking the whale. We approach it silently by paddling our skinboats. If you even hit the water with your paddle, the whale will disappear.

So just think what the noise from the drilling might do! It could change the whales' migration routes, disrupt their feeding and breeding activity, and further endanger the whale population.

MARGARET: The industry has spent millions of dollars on research to provide safe and economical exploration and production of oil in the state.

JOHN: Did you do any research into the effect of sound on whales?
MARGARET: Not in Alaska so far. But some work has been done on this in the Canadian Beaufort Sea...

JOHN: Then perhaps you'd better put giant mufflers on your drilling rigs.

MARGARET: Now just a minute, John. You also have to consider priorities here. The world needs new sources of gas and oil. The state of Alaska needs the income the industry pays in taxes, leases and royalties. That will amount to about $790 million this year, or more than 60 percent of the state's income. This money has helped build schools, hospitals, air strips, small boat harbors, and even this TV network which goes out to villages all over the state. And don't forget that industry and pipeline construction provided training and jobs for nearly 6,000 Native men and women in Alaska.

JOHN: The whale was here long before the money.

KEN: No one here is trying to put a dollar value on the bowhead or any of the great whales. If the largest creature ever to live on earth were allowed to perish, it would be one of the greatest wrongs we have ever done.

ALICE: Well, the commercial whalers from Japan and the Soviet Union are certainly putting a dollar value on the sperm whale--and for shoe polish, pet food, fertilizer...

STEVE: You will be happy to hear that the IWC's sperm whale quota for 1979 has been cut to 3,800--about half last year's quota.

ALICE: A commercial kill of 3,800 whales is still outrageous. And we can't understand how the U.S. got itself into the position of having to bargain for Eskimo subsistence rights with the commercial whalers who were responsible for the decline of the bowhead in the first place.

KEN: The government offered to supply the Eskimos with other red meat, free of charge, as a substitute for whale meat or to give them more food stamps...

JOHN: Just to replace the meat from those 12 whales we killed last year would cost you about $500,000. Do you want to put us on a permanent welfare? How would you like it if the Eskimos could order the rest of the nation to stop eating beef?
MODERATOR: I'm afraid we are running out of time. Perhaps we can summarize quickly where matters stand.

MIKE: We're sending a research vessel into the southwestern Bering Sea this spring to try to find out more about where the bowheads begin their migration. We hope to have data available on a full year cycle of the whale before the next Beaufort Sea oil and gas lease sale is held in December.

MARGARET: And under the federal law, that data will be taken into consideration before the leases are approved or drilling is allowed. And if it appears noise will be a problem, we are prepared to limit drilling activity to the winter months when the whales are gone.

STEVE: The IWC Scientific Committee meets again this month to draw up recommendations for the full convention. We can only hope that the Eskimos stay within the quota that has been set.

ALICE: After observing the hunt last summer, we sympathize with the Eskimos' problem. We were impressed with the difficulty of the hunt and the importance of the whale to their culture. We would be willing to support a limited subsistence hunt, so long as survival of the whale is assured.

EMILY: We will work towards a decision that balances careful conservation of whales with sensitivity to human needs. We think it would be grossly unfair to ask the Native hunters and their families to bear the entire cost of that decision.

KEN: The U.S. delegation will continue to urge the IWC to set up a separate system for regulating subsistence whaling. After all, John, the Eskimos are enjoying some of the good things of the modern world. And you have to accept some of the regulations, too.

JOHN: And we will be hunting as we said we would. We reject the idea that political nations which make up the IWC have any authority over our ancient aboriginal rights. And we will carry our case all the way to the United States Supreme Court and the World Court, if necessary.

Meanwhile, I can assure you, the Eskimo will not kill the last whale.

* * * * * * * * * * * * * * * * * * * * * *

The preceding article is excerpted and adapted from Alaska Tidelines (see credit at beginning).