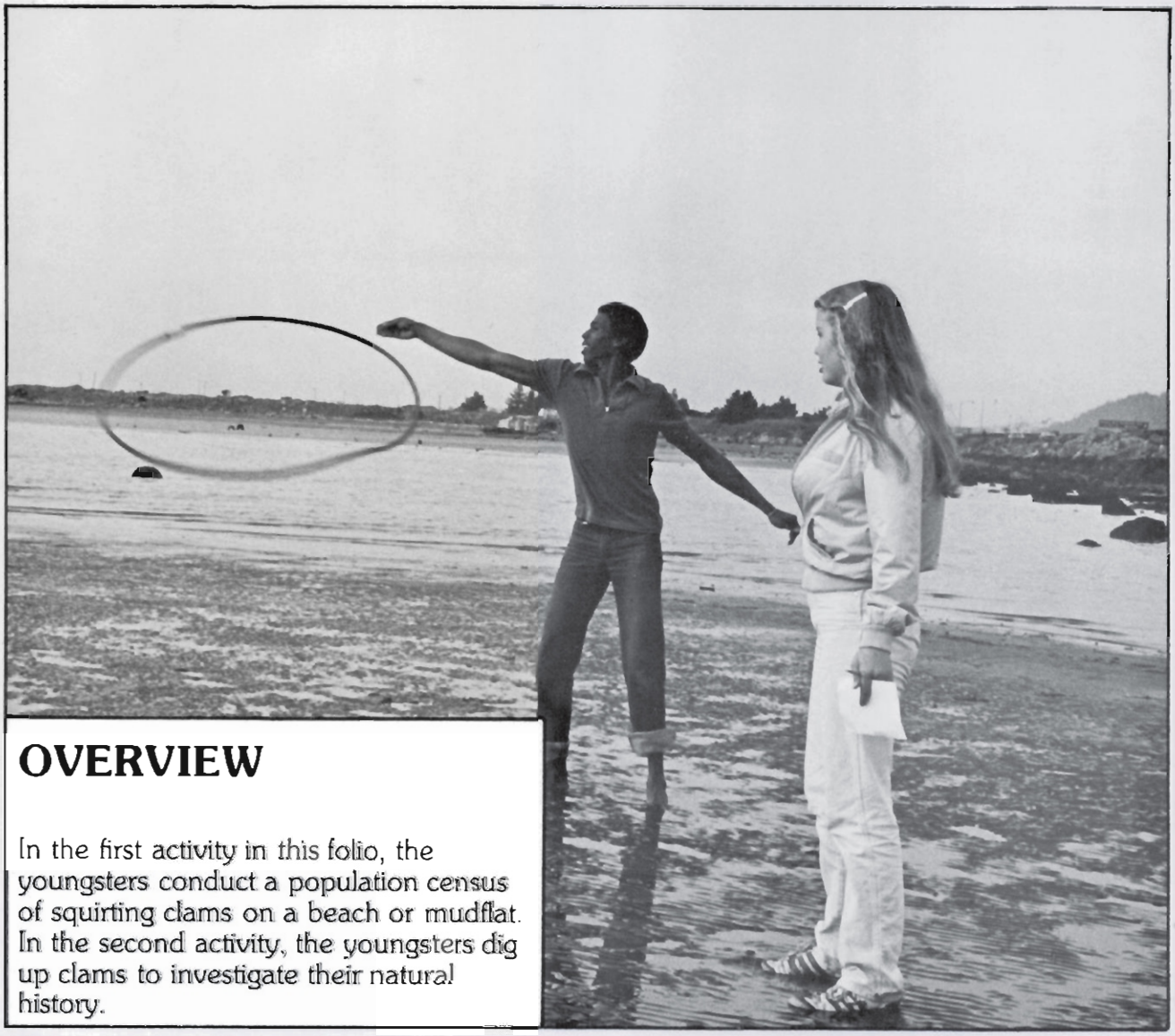
CLAM HOOPING

BIO KEY

Bio-Technique
Population Census
Natural History



OVERVIEW

In the first activity in this folio, the youngsters conduct a population census of squirting clams on a beach or mudflat. In the second activity, the youngsters dig up clams to investigate their natural history.

BACKGROUND

Clams and other burrowing animals are frequently abundant in bays and estuaries. Clams, however, are often overlooked because they live buried in the sand or mud with only their siphon tubes reaching the surface. The siphon tubes pump steady streams of water into and out of the clams, bringing in oxygen and food, and carrying away wastes and reproductive products. If disturbed, many beach clams retract their water-filled siphons so rapidly that jets of water shoot out. When a clam bed is exposed during a low tide, disturbances such as a person walking through the bed will cause clusters of little water jets and fountains to spring up around the person's feet. Each jet reveals the location of a hidden clam.

Driven by thoughts of clam chowder or steamed clams, hordes of clam diggers often descend on beaches during low tides. In many areas, size and bag limits have been established to protect clam beds from overharvesting by clam diggers.

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In deciding which organisms need protection and what form of protection they need, biologists must first determine how many of the organisms currently exist. A ***population census*** is one means of estimating the number of organisms of one kind in a given area. A ***population*** is a group of organisms of the same kind that lives and reproduces in a particular area.

This folio contains two separate activities. You can conduct each activity independent of the other or combine them into a two-part series. Both activities are designed for coastal areas containing clams.

CLAM HOOPING

CHALLENGE: ESTIMATE THE NUMBER OF SQUIRTING CLAMS ON A BEACH OR MUD FLAT.

MATERIALS

For each buddy team:
1 Clam Hoop*
1 copy of the Census Card
1 5″ × 8″ index card*
1 pencil

For the group:
1 data board* and marking pen*
4 boundary markers* (flags)
1 meter tape*
1 10-meter length of heavy string* or twine* marked off in 1-meter intervals
1 "Clam Hoop" Equipment Card*
1 "Use of the Tide Table" Technique Card*
1 Census Card*
1 copy of a tide table†
1 copy of local Fish and Game Regulations†
towels*

* Available from Delta Education.
† Available from local bait and tackle stores.

PREPARATION

Group Size. Both activities are suitable for any size group if the clam bed is large enough.

Time. Plan on forty to sixty minutes for each activity. Select low-tide periods to search for a suitable site and to conduct the activity. (See the "Use of the Tide Table" Technique Card.) If possible, schedule the activity for a minus tide.

Site. To locate squirting-clam sites, check with Fish and Game representatives, clam diggers, or a bait

and tackle shop. Avoid sites with very soft mud. Each team of two or three will need about 100 square meters (10 m × 10 m) of clam bed in which to work.

Checking for Clams. Squirting clams are found in the middle to low intertidal zone (the area that is exposed during low tides). Walk out on the mud flat or beach towards the water and look for siphon holes (tiny pools of water one to five centimeters across) and water jets. Jump on the ground. Jumping disturbs clams and causes them to squirt. Choose an activity area that seems to contain the greatest number of squirting clams.

Safety. When working around the water, use the buddy system. (See the "Safety" section of the *Leader's Survival Kit* folio.) Ask the kids to walk with caution on mud flats to avoid falling or getting stuck.

Materials

1. Clothes. The kids are likely to get muddy and wet during this activity. Ask them to wear tennis shoes and, if it is cold, warm clothes. Have a couple of towels ready.

2. Census Cards. Make one copy of the Census Card for each buddy team. Fold each copy in half (print side out), place a 5″ × 8″ index card inside the halves, and staple together.

3. Clam Hoops. Make one clam hoop for each buddy team. (See the "Clam Hoop" Equipment Card.)

4. Data Board. Draw a large version of the Census Card on the data board.

Fish and Game Regulations. Before the activity, look up the current regulations on personal bag limit per day and clam season dates (if you or your group plan to take any clams to eat).

ACTION

1. Gather the youngsters in a group about twenty meters away from the census area as you flag the site boundaries. (This will minimize the disturbance to the clams.)

2. Tell the youngsters that they are going to estimate the number of clams living in the marked-off area. Explain that when clams are disturbed, they often pull in their siphons so quickly that water in the tubes squirts out in a jet. Describe the Clam-Hoop census technique outlined below:

a. The teams of two to three youngsters will spread out along the edge of the census area—at least 10 meters apart.
b. To select a small area in which to count clams (that is, a "quadrat"), one of the team members will close his eyes and toss the clam hoop into

the census area. The clam hoop encloses an area of 1 square meter.

c. The team members will then run to the hoop, jump up and down around the *outside* of the hoop, and watch for water jets to locate the siphon holes. The youngsters count the siphon holes *inside* the hoop.

d. After recording the number of siphon holes on the Census Card, each team will repeat the procedure three to five times. Emphasize that each count should be taken in an area that has not been disturbed.

3. Demonstrate the Clam-Hoop census technique and have the whole group jump around the hoop and count siphon holes. Make sure everyone sees what a siphon hole looks like. Record the siphon count on a census card and go over the card with the group.

4. Divide the group into buddy teams and hand out the census materials. Position the teams at least 10 meters apart in the census area. Let the clam hooping begin.

5. While the teams are taking their census counts, measure the length and width of the census area with the 10-meter length of twine.

6. Call the teams together when each team has taken four to six hoop counts.

7. Use one team's results and the data-board census sheet to demonstrate how to calculate the average number of squirting clams per square meter of clam bed. Ask the teams to average their hoop counts. Check their figures for accuracy.

8. On the data board, fill in the length and width of the census site, and multiply to obtain the area (e.g. 50 m × 50 m = 2,500 square meters).

9. Explain that by multiplying the average number of clams per square meter by the total census-site area, each team can obtain an estimate of the total number of clams in the activity site. Help the teams figure their estimates.

CLAM CHATTER

List each team's estimate for the total number of clams in the census area on the data board and compare the estimates. Ask the group for suggestions that might explain why each team did not come up with the same estimate. Find the average of all the teams' estimates. Mention that this group estimate represents a ***population census*** of the squirting clams that live in the census area. Add that a ***population*** is a group of organisms of the same kind that lives and reproduces in a particular area.

CLAM HOOPING

BIO KEY

Bio-Technique
Population Census
Natural History

BRANCHING OUT

Ask your youngsters to pretend to be Fish and Game biologists setting clam harvesting regulations for your beach. Mention the current Fish and Game limit for clams per person per day. On the basis of their population census, ask the group how many people could take their limit of clams from the area. Ask if the current limit seems reasonable for the census area. Why or why not?

CLAM DIGGING

BACKGROUND

Biologists consider many factors besides population size before deciding if a particular organism needs protection. Other factors include the number of clams currently being removed or injured by clam diggers and how much of the clam bed is exposed during low tides and available for harvest. In this activity, your group investigates biological features of clams that help biologists develop management practices. ***Natural history*** refers to the general study of a group of organisms.

CHALLENGE: EXPLORE THE NATURAL HISTORY OF CLAMS.

MATERIALS

For each youngster:
1 pair of leather, cotton*, or rubber gloves and enough masking tape* to seal the glove cuffs

For each buddy team:
1 shovel or trowel*
1 bottomless bucket (five-gallon plastic bucket with the bottom removed)
1 meter stick* or meter tape*
1 index card* and pencil

For the group:
1 copy of each Action Card
1 data board* and marking pen*
2 sheets of Action Cards*
towels

* Available from Delta Education.

PREPARATION

Group Size, Time, Site, Safety, and Clothes. See the "Preparation" section for the first activity in this folio.

Action Cards. Duplicate the Action Cards and cut them apart. Copy the Action Cards on the data board.

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Digging Procedure. See the "Action" section. It is a good idea to visit the activity site and try out the digging procedure beforehand.

Digging Safety. Caution the youngsters to wear gloves to protect their hands from broken shells, glass, and other sharp objects buried in the mud or sand. Taping the gloves at the cuffs prevents the gloves from filling up with sand or mud.

ACTION 

1. Divide the group into buddy teams of two or three kids. Point out the boundaries of the activity site.

2. If you have not already done "Clam Hooping" at this site, announce that clams live here. Ask the teams to predict how deep the clams live beneath the surface of the beach.

3. If you are working in an area where clams live deep beneath the surface, demonstrate the bottomless-bucket procedure outlined below:

a. Jump on the ground near some siphon holes to give the clams a chance to draw in their siphons before you start digging.
b. Use the siphon holes as a center point and carefully (to avoid breaking the shells) start digging around the siphon holes.
c. When the walls of the hole start caving in, center the bottomless bucket in the hole and shove it in until the rim stands a few centimeters above the surface. Make sure that the sides of the bucket are not too close to the siphon holes.
d. Now dig with your hands; the bottomless bucket will keep the hole from caving in.
e. When you feel a clam, loosen it by digging out the sand or mud around it, and then carefully lift it out. Use meter tapes or sticks to measure how far beneath the surface the clam was found.
f. You won't need a bottomless bucket for clams that stay close to the surface. Just dig with your hands or shovel.

4. Hand out the equipment, and challenge the teams to find out how deep beneath the surface clams live. Ask the teams to dig and remove clams carefully to avoid damaging the clams' shells. Warn the group that pulling up a clam by its siphon tube often results in tearing off the siphon tube. Also mention that most clams will die if left uncovered on a beach. At the end of the activity, each team should bury the clams in the holes from which they were taken.

5. After the teams have uncovered a few clams, give each team an Action Card, an index card, and a pencil. Ask the teams to record the results of their Action-Card investigations on the index cards. As the teams finish one investigation, encourage them to try another Action-Card investigation by switching with another team.

6. Near the end of the activity, call the teams together for discussion.

MORE CLAM CHATTER 

Display the Action-Card challenges on the data board. Read the challenges one at a time and ask the teams that investigated each challenge to report what they found.

MAKE SURE THAT ALL CLAMS HAVE BEEN COVERED WITH AT LEAST ONE INCH OF MOIST SAND BEFORE LEAVING!

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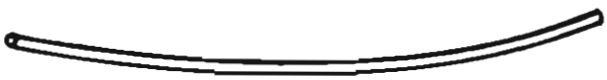
Berkeley, California 94720

Clam Hooping
CLAM HOOP
Equipment Card

PLUG METHOD

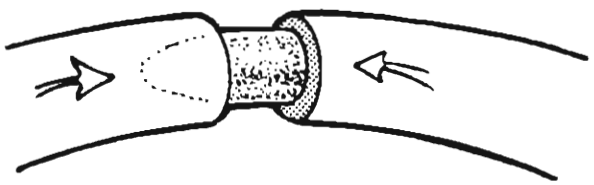
MATERIALS

1 piece of old garden hose, 3.5 meters long*
1 small wooden plug*
* Available from Delta Education.

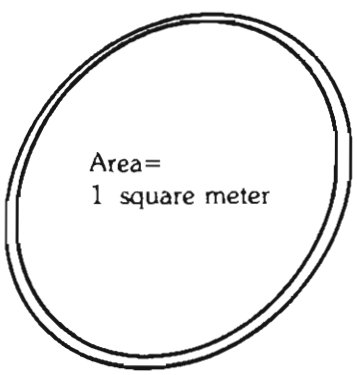


old garden hose

small wooden plug



Tightly jam plug into both hose ends.



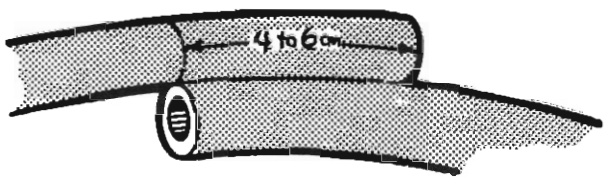
Completed clam hoop

TAPING METHOD

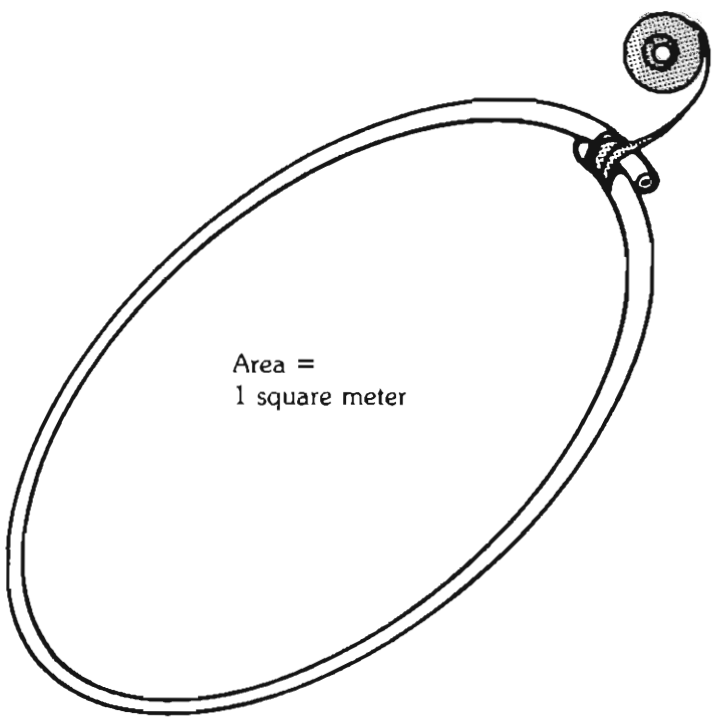
MATERIALS

1 piece of old garden hose*, 3.5 meters long plus 4 to 6 centimeters for overlapping
duct tape* or filament tape*
* Available from Delta Education.

Overlap the ends 4 to 6 centimeters.



Then tightly wrap tape around the overlapped ends to secure the hoop.



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AQUATIC OBSERVATION AIDS:
For Aquatic Activities

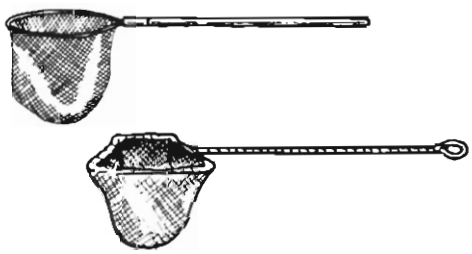
Equipment Card Side 1

Bug Boxes

A bug box is a small, clear plastic box with a magnifying lens for a lid. To use the bug box, place an object or organism in the box and replace the lid to magnify the contents. When exposed to direct sunlight a closed bug box heats up rapidly, so release organisms promptly after observing them. The lid can also be used separately as a magnifying lens.

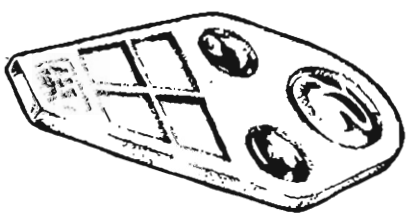
Dip Nets

Nets can either be made or bought. Aquarium nets work fine. You may want to extend the reach of an aquarium net by attaching a dowel, a stick, or a similar extension to the handle. A gradual, gentle scoop of the net is usually more successful and less damaging to organisms than a sudden, violent scooping motion. To prevent eye accidents, ask that the nets never be raised above shoulder level.



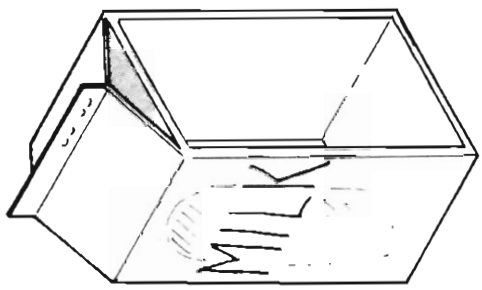
Magnifying Lenses

To use a magnifying lens, hold the lens close to one eye and move either your head or the object back and forth until you can see the object clearly.

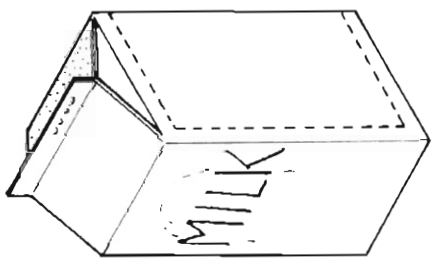


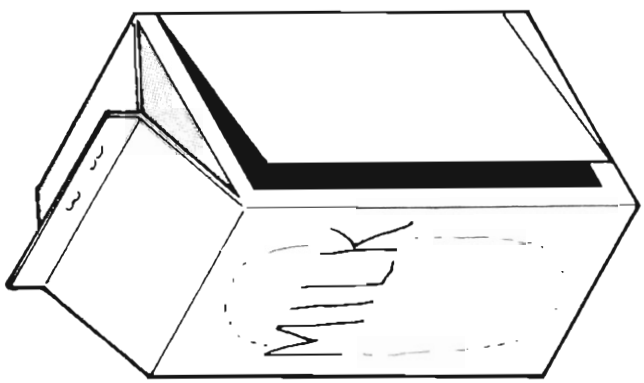
Observation Tray

Any container that will hold water can serve as an observation tray. Containers with light-colored bottoms are best for easy viewing of organisms that have been added. Half-gallon milk cartons can be made into deluxe observation trays. To make one, staple the pouring spout closed and cut out the carton wall on the same side as the stapled pouring spout.



To make a hinged-top observation tray, just cut along three sides (two short and one long) of the carton wall on the same side as the stapled spout.





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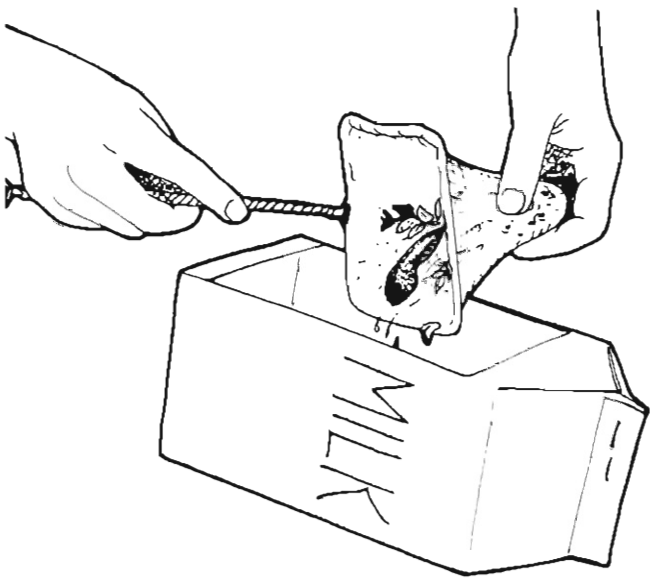
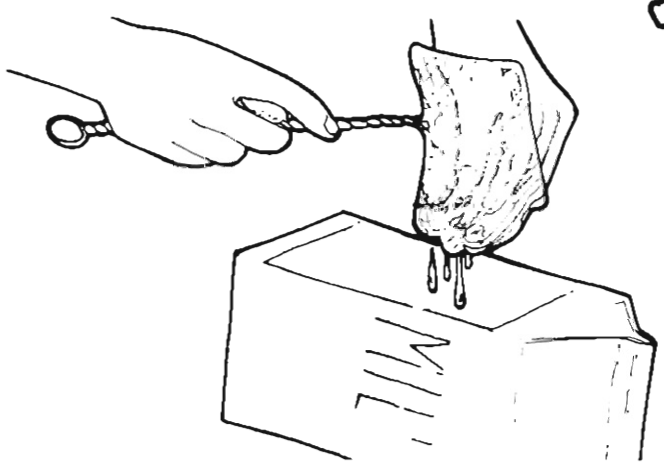
AQUATIC OBSERVATION AIDS:
For Aquatic Activities
Equipment Card Side 2

Transferring critters to observation trays. When using a net to transfer critters, first swish the net through the water without releasing the organisms. (You can use the pond or stream you are investigating.) The rinsing removes any sediment you may have netted. Fill your observation tray about one-half full of water (preferably water from the organism site). Hold the net hoop over the tray,



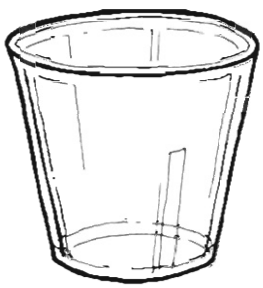
turn the net inside out, and dip the net bag into the water in the tray.



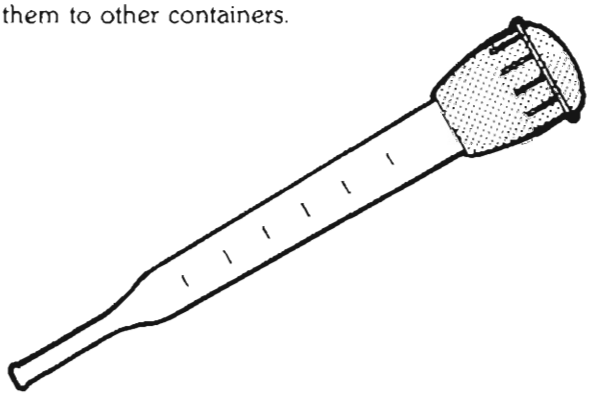
This will release netted organisms into the tray.

Spoons and Clear Plastic Cups

Spoons and cups are useful for transporting tiny organisms and observing them at a close range.



Simply dip up tiny organisms with a spoon or cup and place the organisms in a container partially filled with clear water. Turkey basters are also useful for sucking up tiny organisms and transferring them to other containers.



Note: All of these aids are available from Delta Education.

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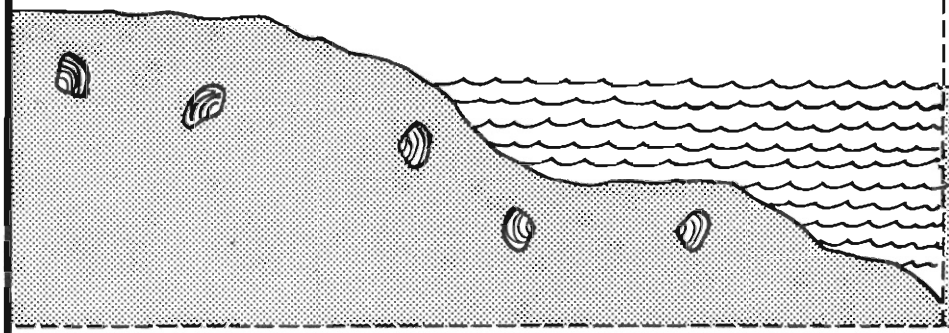
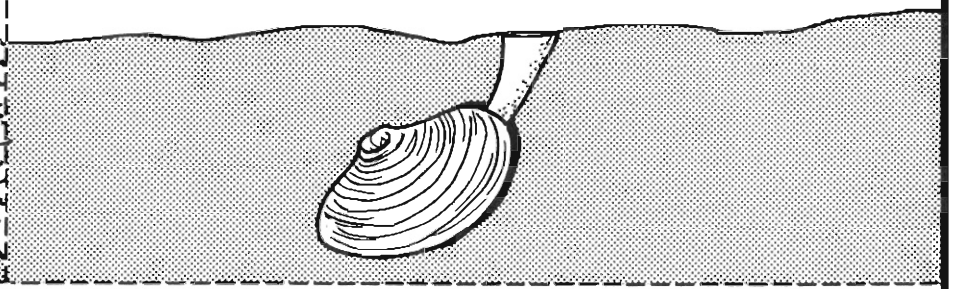
Clam Hooping
Action Card

How high up the beach do clams live?



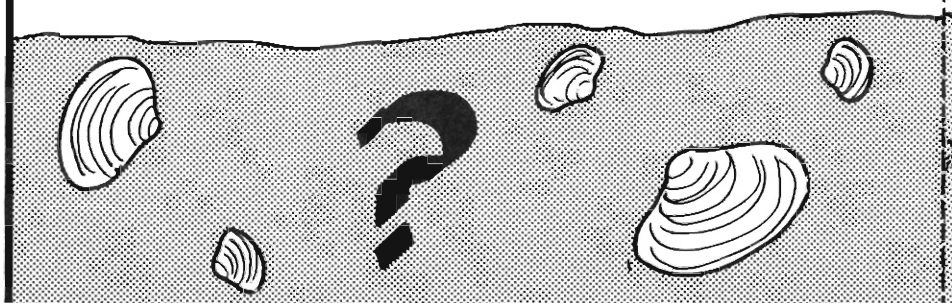
Clam Hooping
Action Card

Is there any connection between the size of the siphon hole and the size of the clam? Could a clam digger pick out the largest clams by their siphon holes?



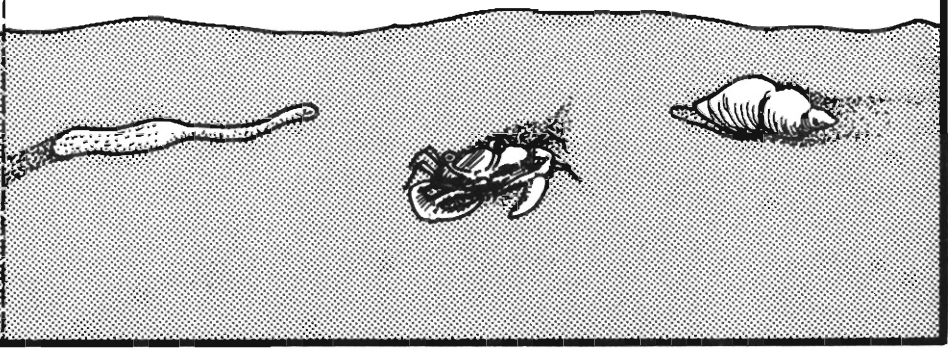
Clam Hooping
Action Card

Do large clams live deeper than small clams?



Clam Hooping
Action Card

What other burrowing animals live in your activity site?



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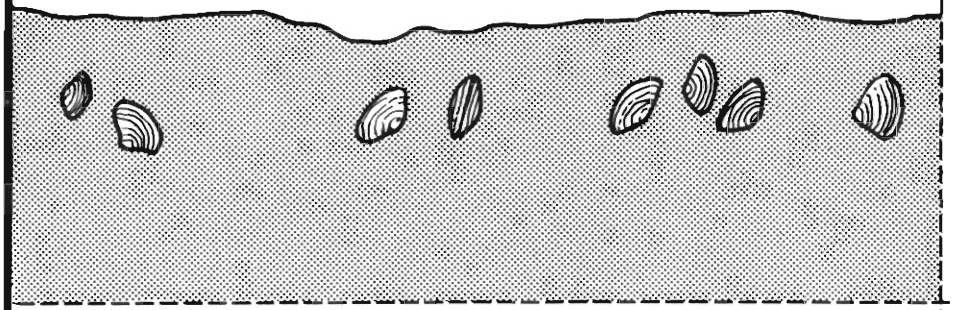
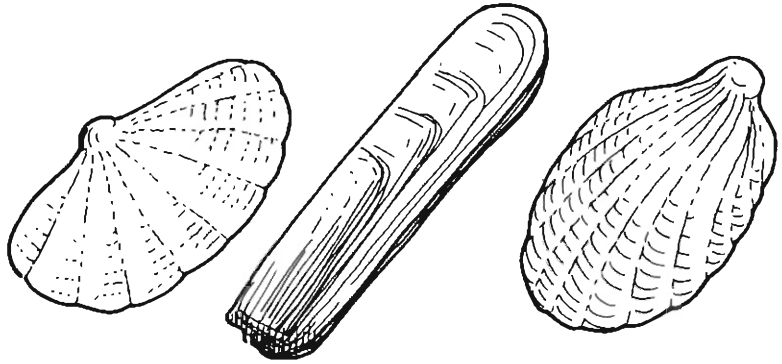
Clam Hooping
Action Card

Are clams usually found alone, in pairs, or in groups?



Clam Hooping
Action Card

Can you find any clam shells on the beach that are different from the clams that were dug up?

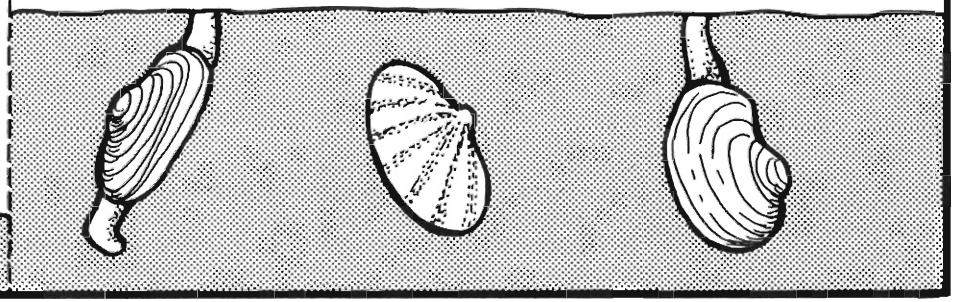


Clam Hooping
Action Card

Is is possible to sneak up on a clam without alarming it? If so, how?

Clam Hooping
Action Card

How many different kinds of *live* clams can you find in the activity site?



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USE OF THE TIDE TABLE
For Aquatic Activities
Technique Card

In a tide table (available from boating, fishing, and diving shops), you can find the height of the tide in your area for any time of day. Leaf through your table. You may see a range of tides from minus several feet to plus six to ten feet, depending on your area of the coast. Areas may differ, but the range will be consistent for your area month after month.

From the information in the table, you can determine the vertical height of the intertidal zone. (Subtract the lowest low from the highest high.) Let us say that in looking in the tide table for the day and time you wish to investigate, you find that the tide is two feet. This means that all but two feet of the intertidal zone is exposed.

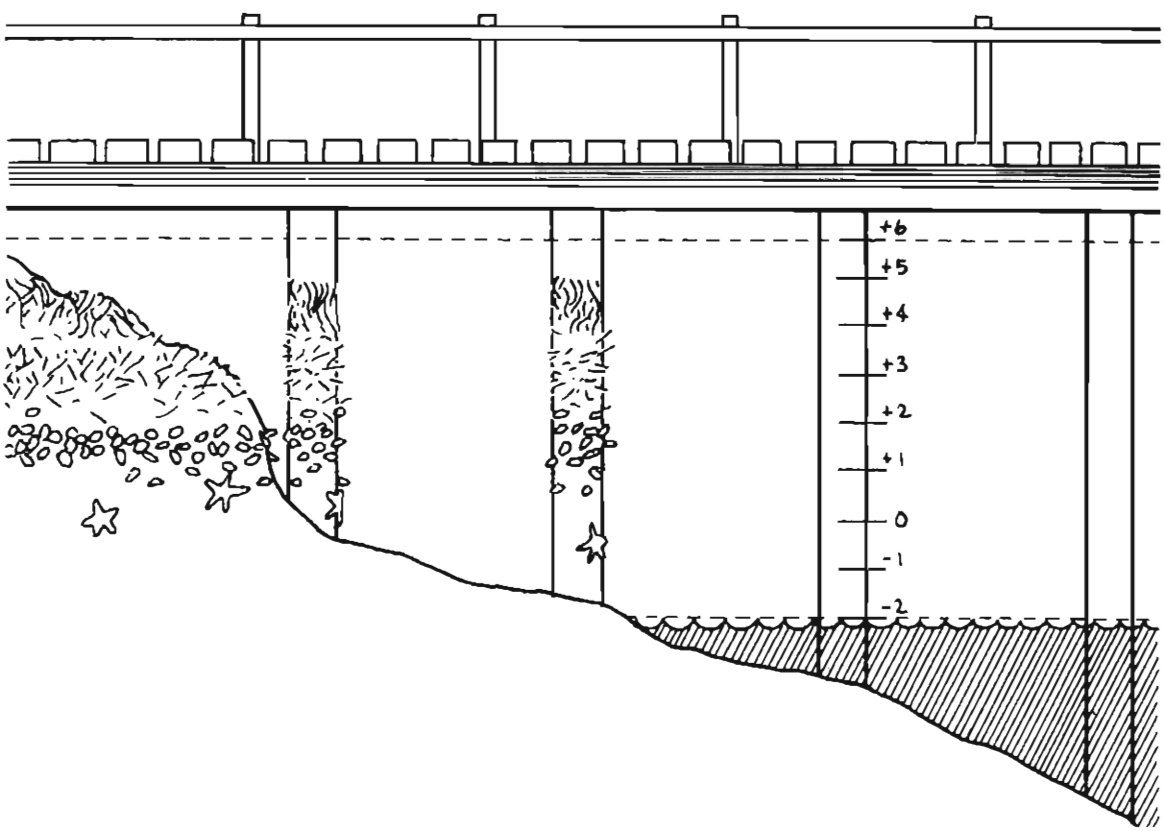
If it is not a high or low tide at the time you want to study your coastal community, you will have to estimate the height of the tide.

Example: You meet your group at 10:00 a.m.

The tide table reports:

Low Tide:	6:53 a.m.	1.5′
High Tide:	1:10 p.m.	5.1′

10:00 a.m. is about half way between 6:53 a.m. and 1:10 p.m., so your tide will be about half way between 1.5′ and 5.1′, or about 3.2′, and coming in (flood tide). After 1:10 p.m. the tide will be going out (ebb tide).



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Clam Hooping
CENSUS CARD

HOOP COUNTS	NUMBER OF CLAM SIPHONS INSIDE THE HOOP
1	
2	
3	
4	
5	
6	

Total number of hoop counts = _____

Total number of clams = _____

AVERAGE NUMBER OF CLAMS

Total number of clams ÷ number of hoop counts = average number of clams per square meter

_____ ÷ _____ = _____

AREA OF CENSUS SITE

Length × Width = area in square meters

_____ meters × _____ meters = _____ square meters

POPULATION CENSUS

Average number of clams per square meter × area of census site = the number of clams in the census site.

_____ clams per square meter × _____ square meters = _____ clams.

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