

Discovery Hike for Sandy or Muddy Beaches

Objective:

To explore the beach and become familiar with the plants and animals in this marine intertidal habitat, while making a personalized identification chart of the key macroinvertebrate burrow openings and plants.

Concept:

Students need time to "discover" the beach. An initial Discovery Hike can provide a hands-on learning environment by familiarizing the students with the habitat and common organisms.

You Will Need:

- ◆ Hand Trowels or other small shovels
- ◆ *Species Diversity Checklist*
- ◆ Marine invertebrate guides or ID charts
- ◆ Rulers
- ◆ Field notebooks and pencils
- ◆ Camera (numerous disposable or a digital)
- ◆ Rubber Gloves (optional)

What to Do:

Introduction:

All classes should participate in a beach discovery walk as an initial field trip to observe local organisms, identify macroinvertebrate burrow openings and to do an initial species biodiversity checklist. This will help classes who are participating in the collection of the Sandy or Muddy Beach data familiarize themselves with the local species and get the students excited about their field work to follow. If you only have the opportunity to visit a soft bottomed (sandy or muddy) beach once with your school group, then use this hike as a great introduction to this unique habitat.

Pretrip Preparation

Carefully select a sandy or muddy beach that will be safe for your students to explore. There are many beaches that have these types of soft sediments that are too dangerous for student field trips; feel free to contact the Center for Alaskan Coastal Studies if you need suggestions of appropriate beaches in your area. As with the Rocky Shore Discovery Hike, you will want to consult your tide chart and make sure that you are arriving at the beach when the tide is going out and that it will be low for the majority of your stay. Students should be dressed warmly with rubber boots and have an idea of what they will be looking for on their beach walk.

Before hitting the beach you will want to have your class split into groups of three to four. As with any field trip it is highly recommended that you solicit as many chaperones as possible. Either in the class before the trip or the day of, remind your students about appropriate beach manners, in particular stress how important it is to fill in holes that have been dug up in the intertidal.

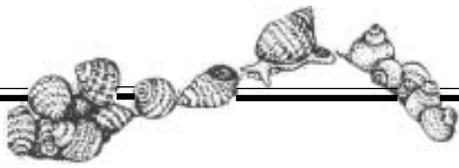
Activities on the Beach

We recommend that you allow some initial free exploration in their small groups. It is helpful to set up boundaries (as best you can on a wide open mudflat!) and have the students report back in 10 minutes to a central meeting area for hand trowels and the next task.

Make your own Burrow Hole ID Chart:

Ask the students for their initial observations from the free exploration. See if they noticed the variety of burrowing openings/holes and piles of castings. In this next activity the students will use hand





Discovery Hike *continued...*

trowels to dig down below the various holes identify which invertebrate is associated with which holes. In each group there will be a *Recorder*, *Photographer*, and *Digger*.

Students should focus their efforts on the most common burrows and castings seen during the free exploration. Before the students dig down below they should make some basic observations in their notebooks about the hole or casting. They should record the following:

- 1) Clarity and shape of outline of hole
- 2) Presence and/or shape of fecal pellets or castings
- 3) Presence and/or shape of adjacent mounds of sediment,
- 4) Presence and or type of visible tentacles or siphon
- 5) The width of the hole or casting
- 6) Arrangement of other related holes

After recording these observations and doing a quick sketch of the burrow or casting, the students should take a picture with the ruler next to the hole or casting to give size comparison. The students should record the picture number down on their notebooks for later reference. If you do not have access to cameras additional time should be allowed for a more in-depth sketch.

Once the students have recorded this information and taken the picture, they may carefully dig down under the hole or casting to try to identify which burrowing macroinvertebrate is creating the burrow or casting. Often times it is best to come in at an angle to the hole/casting instead of digging directly down on the hole/casting. If the students are not able to clearly identify the associated invertebrate, they should repeat the digging process

with an identical hole or casting until the students are convinced they have found the organism that is creating the sediment formation they are identifying. A picture of the organism should also be taken. Using the marine invertebrate guides the students

The students should strive to identify 5 different burrowing organisms. Students can switch group roles (recorder, photographer, and digger) with each new burrow or casting they are trying to identify.

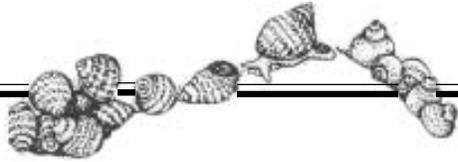
Back in the class have the students collate their drawings, recorded observations, and photographs into an ID chart that they can use the next time they go to this beach. Have the students compare their identification.

Species Diversity Checklist:

Still in their small groups, have the student use this list to check off all of the organisms you observe on the beach while on your Discovery Hike. This is an opportunity to record other species the students observed beside the ones used in the making of their ID chart. Positively identify your organism by checking with your identification guide and matching the scientific name if possible.

Use this time to have the students look for and identify eelgrass and any red or green algae. Once done, the class data can be combined to get a final comprehensive species diversity list.





Collecting Data for Sandy or Muddy Beaches

Objective:

To explore a sandy or muddy (soft-bottomed) beach and become familiar with the plants and animals in this particular marine intertidal habitat, while collecting some basic observational data.

Concept:

This data will create a baseline of abundance of key species of burrowing macroinvertebrates using visual counts and will assess the abundance of mudflat algae and eelgrass by estimating percent. The data will allow us to monitor the health of coastal ecosystems by providing us with data to track changes in densities of these common organisms over time and across multiple sites.

You Will Need:

- ◆ Frequency Quadrats (up to 10)
(to make these, see instructions at end of section)
- ◆ Student-made and other ID charts
- ◆ Visual Frequency Transect Counts Data sheets
- ◆ Clipboard
- ◆ Pen (with waterproof ink) or pencil
- ◆ Tide chart
- ◆ 50 Meter tape
- ◆ Small wire flags
- ◆ GPS and camera

What to Do:

Pretrip Preparation:

Contact the Center for Alaskan Coastal Studies staff in charge of CoastWatch in your area. Discuss the program with them and the soft bottom beach sites that would be accessible to your group. Make sure to get the GPS coordinates and landmarks so that you can find the exact location for setting up your

transects. Also consult a tide chart to determine a day and time for your group when there will be a low tide during the length of your monitoring event. Prior to your trip divide your class into groups of three.

Before the field trip assemble the Frequency Quadrats. You can do this in the class with the students, ask chaperones or do it yourself. *(See the instructions at the end of the Monitoring section to learn what materials you will need and how to make these basic monitoring tools.)*

As mentioned in the activity before this, we highly recommend that you familiarize the group with the organisms you will be monitoring by visiting this beach before the monitoring event. At that time your students can make their own personalized ID charts to use during the data collection activities. If you do not have time to bring the students to the beach before the monitoring event, try to bring some of the common invertebrates and plants that they would be monitoring into the class for a lab opportunity. There should also have pre-made ID charts

If you know that you will be doing a monitoring trip soon after your Discovery Hike, you will want to select a section of beach for exploration that won't be exactly where you will be setting up the monitoring transects. Footsteps can easily erase the features of the burrow holes and castings and reduce your ability to count the critters. Again make sure students are in pairs.

Activities on the Beach:

Upon arriving to the beach, we recommend that you review beach etiquette again and inform



Collecting Data for Sandy or Muddy Beaches *continued...*

group that this time they will not have hand towels or shovels and all monitoring will take place with visual counts. Discuss briefly the impacts of using hand trowels every visit to the beach.

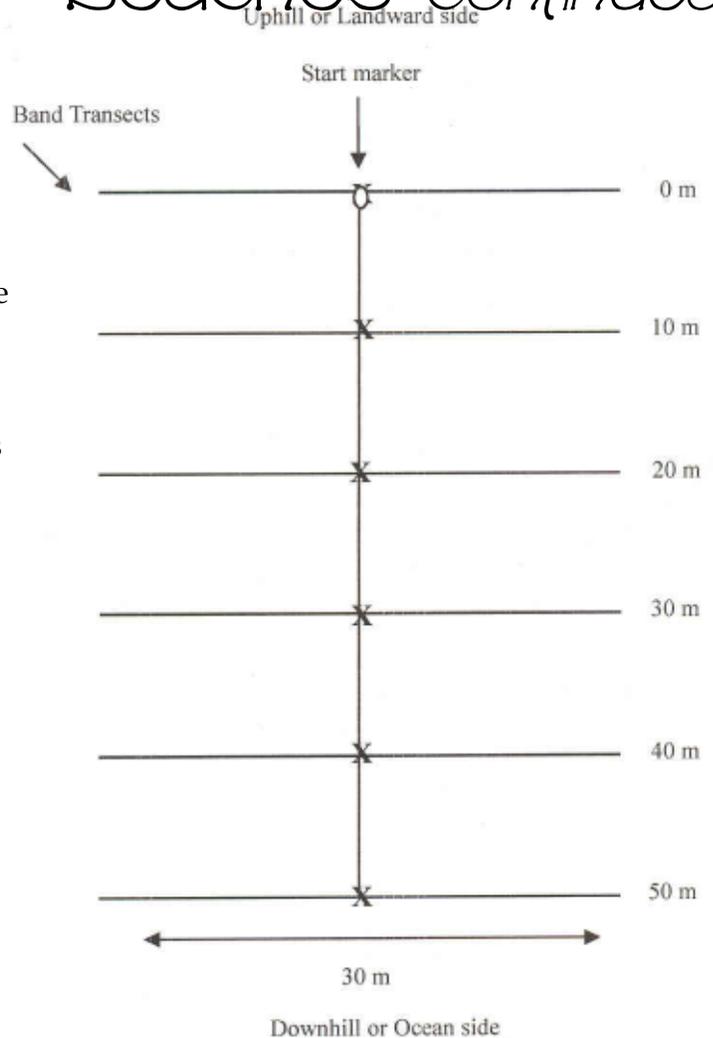
Like with the Discovery Hike field trip, we recommend allowing 10-15 minutes of initial free exploration (again doing your best to establish boundaries). Either on your own while the class is exploring, or with some of the students, find the start markers for the frequency transects using the GPS coordinates and landmarks given to by the Center for Alaskan Coastal Studies staff.

Setting up the Transects:

At this time round up the students for the beginning of their monitoring activities. Hand out data sheets and have them fill in the top part of the data sheet that asks for information like weather conditions and other metadata. After locating the start marker for the transect, place zero of the meter tape on the start marker and pull the tape out towards the ocean. Use the small wire flags to mark the 0 m, 10 m, 20 m, 30 m, 40 m, and 50 m points along the transect.

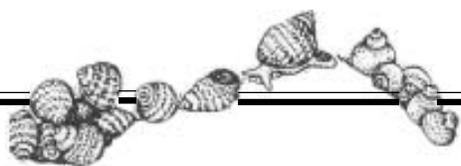
At each flag you will then want to set up additional transects that run parallel to the beach, perpendicular to original 50 m long transect. These are called band transects will be 30 m long with the 15 m point at the initial flags that the group set up at 0 m, 10 m, 20 m, 30 m, 40 m, and 50 m (see diagram on this page).

When at start marker looking toward the ocean with the coastline behind you, the band transect should always start with 0 m on the right side



and ending with 30 m on your left. Once the meter tape is laid out in this correct manner, use additional flags to mark the following points: 0 m, 2 m, 4 m, 6 m, 8 m, 10 m, 12 m, 14 m, 16 m, 18 m, 20 m, 22 m, 24 m, 26 m, 28 m, and 30 m. These will be the points where the students will be putting down their quadrats.

While setting up the transects, again make sure that the participants are not tramping in the area



Collecting Data for Sandy or Muddy Beaches *continued...*

where you will be conducting your monitoring. In particular, you will want to take care when setting up your transects that run parallel to the beach to make sure to only walk on the side which is closer to the water, because the students will not be counting on the uphill or "landward" side. As mentioned earlier footsteps can easily erase the features of the burrow traces and reduce our ability to count the associated invertebrates.

Depending on the amount of time that you have and the size of your group you can set up an additional adjacent transect using other starting markers in the area. Typically, one group is given the first (0 m - 14 m) or second (14 m - 30 m) section of one of the band transect.

Counting the burrow holes and castings:

Have the students place their quadrats centered just uphill of the flags on the band transects. Within the whole quadrat have the students count individual holes/castings for Fat Innkeeper, Razor Clam, Soft-shelled Clam, Lugworm (don't worry that they form two holes/organism we will divide them out later) and any other burrowing invertebrate that leaves large well spaced holes. All of these invertebrates are in *italic* on the datasheet.

For the occasionally abundant sections of eelgrass and *Macoma* just count the number of quadrants in the quadrat (each 0.5 m² quadrat is subdivided into 25 quadrants). Be careful when counting eelgrass to make sure that you are only counting quadrants that have attached eelgrass.

Beaches continued...

When counting algae record the number of quadrants in the top section of the cell and convert to percent cover in the bottom section of the cell.

Make sure to enter a zero (0) on all sections of the datasheet if you did not find any holes or castings (i.e. don't leave cells of the datasheet blank).

Instructions for making quadrats:

Frequency Quadrats: Using PVC tubing and elbow joints, cut tubing so that the inside dimensions of your square measure 50 cm x 50 cm. Divide your quadrat into 25 equal sized squares marked with string or cord. You will need one quadrat for each pair of sampling students.

