

Activity #2

Where Does the Sand Come From?

● ● ● In Advance *Setting Up Information Stations*

- Set up four information stations around the room using the “Information Station Graphics” (master, pp. 25-30) for three of them and vials of sand from Oneuli and Oneloa beaches for the fourth. (See class period one materials & setup below.)

● ● ● Class Period One *Where Does the Sand Come From?*

Materials & Setup

- Small, labeled vials containing sand samples from Oneuli and Oneloa beaches (samples included with Activity #1, or instructions for collecting more in “Guidelines for Collecting Sand,” p. 8)
- “Information Station Graphics” (master, pp. 25-30)

For each student

- Student Page “Where Does the Sand Come From?” (pp. 31-32)

Instructions

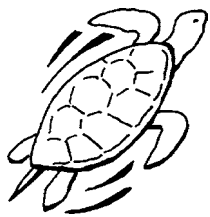
- 1) Hand out a copy of the Student Page “Where Does the Sand Come From?” to each student.
- 2) Have students visit the stations, transferring relevant information to their own maps, and answering the questions on the student page.
- 3) Near the end of class, discuss students’ hypotheses about where the sand that comprises Oneuli and Oneloa beaches originates, and what accounts for the differences in particle size and composition that they observed during Activity #1 “Sand Analysis Lab.”

Journal Ideas

- Find out the meaning of the Hawaiian names, Oneuli and Oneloa. Write a chant or poem, or draw a picture that illustrates where the sand from each of these beaches seems to originate and how it might be deposited on the beach.

Assessment Tools

- Student Page “Where Does the Sand Come From?” (teacher version, p. 24)
- Journal entries



Teacher Version

Where Does the Sand Come From?

Note: You may evaluate student maps, sketches, and notes if desired, looking for thoroughness and accuracy in transferring information from the information stations. In answer to the questions below, look for well-reasoned responses in addition to, or instead of, the suggested answers listed.

- 1) Where does the sand on Oneuli beach come from?

The dark sand on Oneuli beach is primarily from the basalt wall and cinder slopes. Material from these formations erodes into the ocean (and is eroded by ocean waves) and is deposited by the current on Oneuli beach. (The aerial photo shows an eroded cinder area just up-current from Oneuli beach.) The photos of Oneuli beach show deposits of coral rubble (larger chunks of the reef) among the dark sand. These come from the live coral formation offshore.

- 2) Where does the sand on Oneloa beach come from?

The light sand on Oneloa beach is primarily from the living coral reef up-current of the beach and dead coral reef offshore. Over time, these biogenic sands have accumulated into offshore sand deposits that also provide sand to the beach.

- 3) What factors may explain the differences in sand composition and particle size between the two beaches?

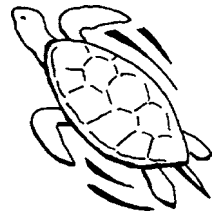
The differences in sand composition may be explained primarily by the prevailing ocean currents and the different sand sources available to the two beaches.

Differences in particle size may be explained primarily by the relative hardness of the source materials. The basalt that forms the bulk of the sand on Oneuli is more difficult to wear down than the coral reef and other living sources that provide most of the sand on Oneloa. Another factor affecting particle size may be wave energy. One may anticipate waves of higher energy at Oneuli where average particle size is higher.

- 4) What additional information would you need to have to be more confident in your hypotheses?

How could you collect that information?

Well-reasoned responses are acceptable.



Information Station Graphics

Station #1: Aerial Photos of Oneuli and Oneloa Beaches

Oneuli Beach

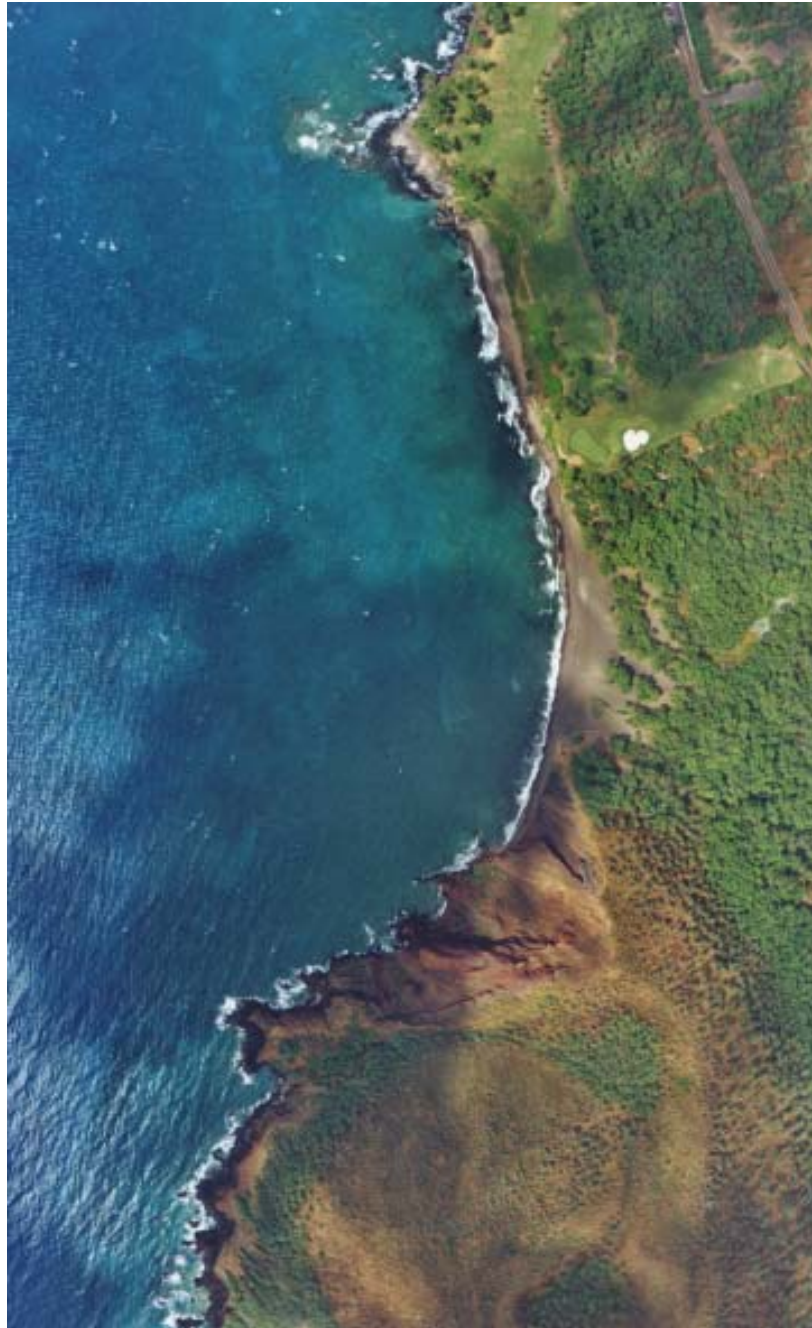
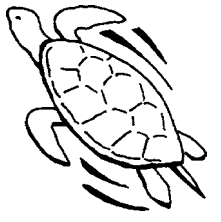


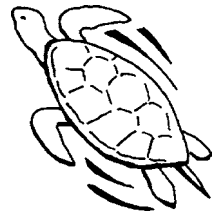
Photo: Air Survey Hawai'i



Oneloa Beach



Photo: Air Survey Hawai'i

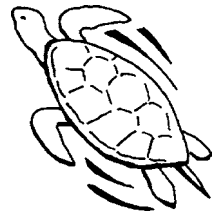


Station #2: Photos of Oneuli and Oneloa Beaches

Oneuli Beach



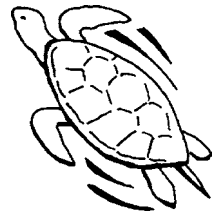
Photos: Ann Fielding



Oneloa Beach

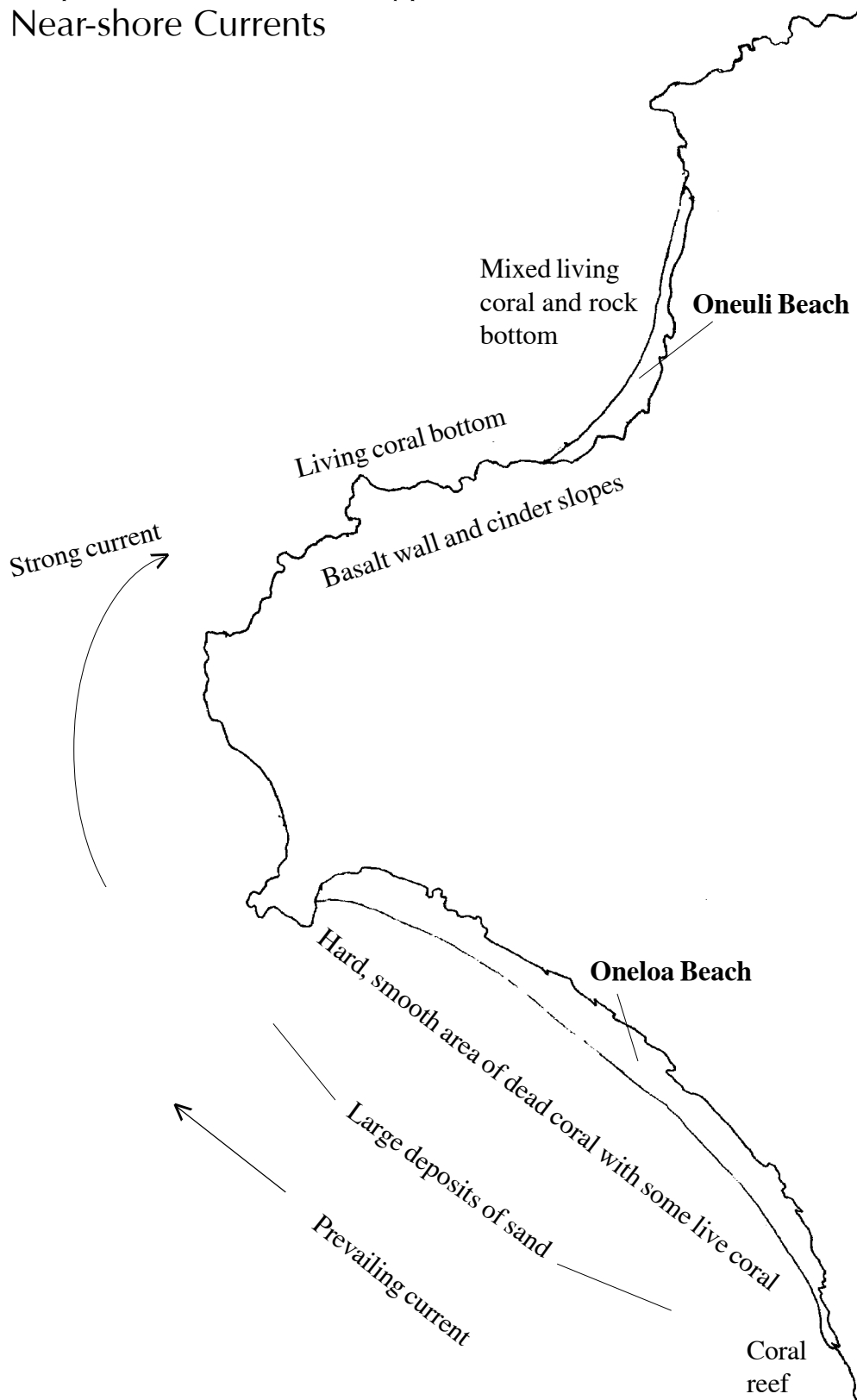


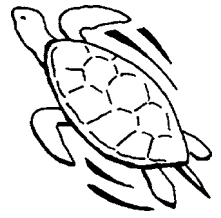
Photos: Ann Fielding



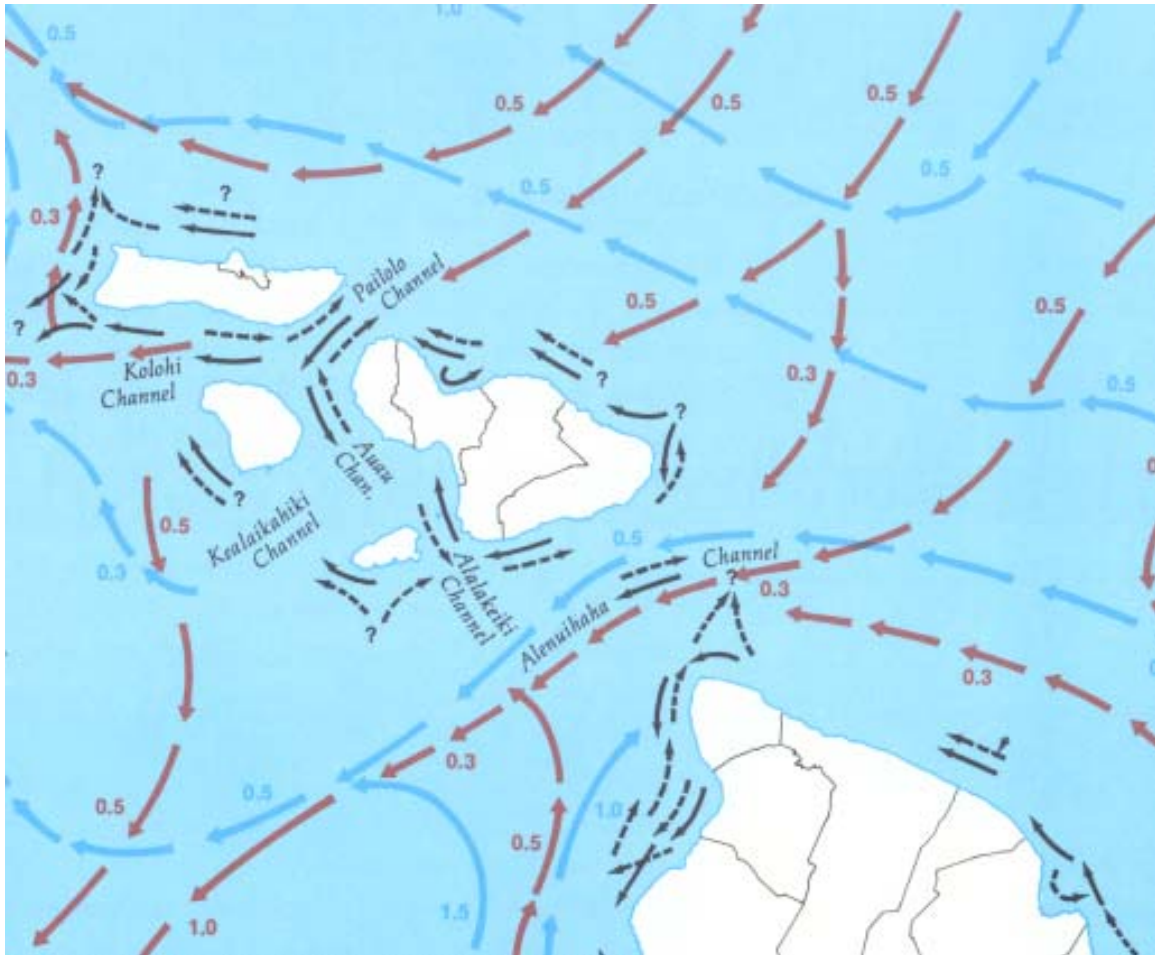
Station #3: Maps Showing Bottom Types and Major Currents

Map of Ocean Bottom Types and
Near-shore Currents





Map of Major Ocean Currents Around Maui



SURFACE CURRENTS

Typical surface currents, velocity in knots

Winter (blue arrow)
Summer (red arrow)

Near-shore tidal currents

Flood current (solid line with arrow)
Ebb current (dashed line with arrow)



Source: Hawaii Institute of Geophysics, University of Hawaii

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Department of Geography, University of Hawai'i, Atlas of Hawaii, 2nd edition, University of Hawai'i Press, Honolulu, 1983, p. 57