



WATER WORDS

How are streams in our *ahupua'a* important in our lives today?

HAWAII DOE STANDARD BENCHMARKS

Science 2: The Scientific Process: NATURE OF SCIENCE:

- **SC.5.2.1** Use models and/or simulations to represent and investigate features of objects, events, and processes in the real world.

Language Arts 1: Reading: CONVENTIONS AND SKILLS:

- **LA.5.1.1** Use new grade-appropriate vocabulary learned through reading print and online resources and word study, including meanings of roots, affixes, and word origins.

Language Arts 4: Writing: CONVENTIONS AND SKILLS:

- **LA.5.4.1** Write in a variety of grade-appropriate formats for a variety of purposes and audiences, such as:
 - poems that use figurative language to convey a theme or impression
 - notes summarizing what they have read or heard.

KEY CONCEPTS

- Many streams in our *ahupua'a* drain from the *pali* and combine to form the few streams that flow into Kāne'ohe Bay.
- Streams provide important habitat for native stream animals and water for human uses such as recreation and farming.
- By increasing my vocabulary with new words related to streams, I'll have a deeper understanding about the value of streams in our *ahupua'a* today.

ACTIVITY AT A GLANCE

Students read sections of a book about Hawaiian streams, view a video, and play a Water Words game to develop new vocabulary they will use to write about the importance of streams in our *ahupua'a*. They interpret a map to create an *ahupua'a* model showing the drainage patterns of streams.

ASSESSMENT

Students:

- Create a model of the *ahupua'a* showing the drainage pattern of streams and how those patterns can be altered if streams are channelized.
- Complete Learning Log 1, which includes writing a poem or a



descriptive paragraph about streams using at least six new vocabulary words, including three Hawaiian words.

TIME

3 – 4 class periods

SKILLS

reading
comprehension,
writing, vocabulary
development, map interpretation,
model building



MATERIALS

Provided:

- ✓ Kāne'ohe *Ahupua'a* Streams Map
- ✓ Water Words cards
- ✓ Student Assessment Overview (See Unit Introduction)
- ✓ Learning Log 1

Needed:

- ✓ *Flowing to the Sea* (6 books for students in groups to share or copies of chapters)
- ✓ *Flowing to the Sea* video
- ✓ 6 dictionaries (English and Hawaiian)
- ✓ marking pens
- ✓ 6 plastic dishpans
- ✓ 6 half-gallon containers of sand (for models)
- ✓ 6 large paper cups (for pouring water on models)
- ✓ folders (1 per student)
- ✓ glue sticks
- ✓ 1 skein of blue yarn, box of toothpicks, and Post-its™ (Optional materials for students' models)

VOCABULARY

- '*auwai*- ditch or small canal created by Hawaiians for moving water
- carnivore – an animal that eats other animals
- channelize – modify a natural stream channel, usually by straightening the course and cementing the streambed
- decomposer – an organism that feeds on dead plants and animals and helps break them down into nutrients to be used again by plants
- diadromous - migratory between fresh and salt water
- diversion – in the context of this lesson, the rerouting of a stream's flow
- endemic – unique to an area; naturally occurring only in that place
- endangered – in danger of becoming extinct
- groundwater – water found beneath the Earth's surface
- hapawai* and *hihiwai* – native snails found in streams
- herbivore – an animal that eats plants
- indigenous – naturally occurring in one area, but not unique to that area
- larvae – early stages of an animal that must undergo metamorphosis to mature
- omnivore – an organism that eats both plants and animals
- '*o'opu* – native stream fishes; gobies
- '*ōpae* – native shrimp or prawn ('*ōpae kala'ole* - native shrimp that live in fast-moving riffles in streams; '*ōpae oeha'a* - native prawns)
- percolate – in this context, water moving through porous soil



TEACHING SUGGESTIONS

Unit Essential Question: How is *lōkahi* (balance, harmony) among native stream plants and animals affected by human activities and what can we do to care for the stream community?

PART ONE: INTRODUCING THE UNIT AND BUILDING VOCABULARY

- 1. Introduce the unit essential question and create Learning Logs.**
 - Distribute the folders and copies of the Learning Log cover sheet for students to glue on the outside of their folders.
 - Review the Student Assessment Overview and discuss the activities students will be completing.
 - Have students glue the overview to the inside cover of their folders where it will be the checklist for their work.

- 2. Create a K-W-L chart to find out what students know (K) and what they wonder (W) about streams. (The L represents what they learn; to be filled in at the end of the lesson.)**
 - Go around the room and ask each student to list either one thing they know or one thing they wonder about streams.
 - List their responses on the chart.

- 3. Show the *Flowing to the Sea* video and read chapters from the book.**
 - After the video, have students sit in six groups and give each group a copy of the *Flowing to the Sea* book.
 - Have students take turns passing the books around and reading aloud from chapters 6 – 7.
 - Pause during the reading periodically to write new vocabulary words on the board and discuss what students have read.

- 4. Pass out Learning Log 1 and have students record their answers to the questions about the reading.**
 - Discuss their responses and record them under the L on the K-W-L chart to show what they are learning.

- 5. Build vocabulary with the Water Words cards.**
 - Give each group three of the Water Words cards provided with this lesson.
 - Ask students to use the glossary from the *Flowing to the Sea* book and English and Hawaiian dictionaries to define the words.



- Have them write the definitions and use the words in a sentence on the back of the cards.
 - Circulate and check students' definitions. Collect the cards to use in a word game.
6. **Play a Water Words vocabulary game. Each student will need three sheets of paper and a marking pen. To play:**
- Have students in each group count off from 1 to 6.
 - Pull a Water Words card and read the definition of a word. Give students 30 seconds to discuss the definition in their groups.
 - Call a number from 1 to 6. Challenge the student with that number in each group to write the vocabulary word for the definition on a sheet of paper.
 - Give a signal and ask the students in each group to hold up their words.
 - Award 1 point to each group with the correct word.
 - Continue playing, pulling Water Words cards and calling out different numbers so that each student has a chance to answer 3 times.
 - Tally group points and declare a winner!

PART TWO: CREATING MODELS OF STREAM PATTERNS IN THE KĀNE'OHE AHUPUA'A

7. **Introduce the streams in the Kāne'ohe *ahupua'a*.**
- Divide the class into six groups. Give students a copy of the **Kāne'ohe *Ahupua'a* Streams map**.
 - Show students the 3-D map viewer from the Kāne'ohe Bay Advisory Council (KBAC) Web site. (See Background section above.) Click on the directions in the upper right corner of the screen to view the streams in the Kāne'ohe *ahupua'a* from different points of view. This 3-D view should help students interpret their maps and create models.
 - Trace the streams from *mauka* to *makai* and name them beginning with Kawa Stream, which originates in the hills between the two *ahupua'a*.
 - Explain that the three streams: Hi'ilaniwai, Kahuaiki, and Māmalahoa are names of wives of the Hawaiian god Kāne.
 - Ask students to name the streams that flow into Kāne'ohe Bay. (Kawa, Kāne'ohe, and Kea'ahala).
8. **Build models showing the drainage patterns of streams in the Kāne'ohe *ahupua'a*.**
- Distribute a dishpan and sand to each group. Make sure the sand is moistened (sand castle quality).



- Have students mound most of the sand into an approximation of the *pali* and the hills between Kailua and Kāne'ohe *ahupua'a*. Leave sand in the rest of the dishpan (about one half-inch depth) to represent the land in the rest of the *ahupua'a*.
 - Have students create the highest point in the *ahupua'a* - Pu'u Keahiakahoe above Luluku Stream. Point out Kamo'oali'i Stream and explain that students will be visiting this stream later in the unit, to study a channelized stream.
 - Using the streams map, have students count the streams that originate in the *pali* and in the hills between the Kāne'ohe and Kailua *ahupua'a*.
 - Make a crimp in the lip of a paper cup (a spout) and demonstrate how to pour water slowly on the "pali" to create the headwaters of a stream.
 - Give each group a cup. Have them crimp part of the rim to make a "spout" and then fill the cups with water.
 - Challenge students to create a pattern of streams similar to that shown on their maps. Students should take turns pouring water onto the sand. They may need to shape some of the stream courses with their fingers as well.
 - If desired, have students place blue yarn in their stream courses so that they are easier to see. They could also use toothpicks and Post-its™ to label some of their streams.
9. **Have students move around the room and view each group's model.**
Ask students to explain their models and discuss the drainage patterns they have created.
- How many streams converge? How many streams flow into the bay?
 - Why do Kāne'ohe and Kawa streams appear as straight lines on the map where they flow into the bay? (These streams have been channelized.)
10. **Ask students to write a poem or a descriptive paragraph about streams to complete their Learning Logs. Revisit the K-W-L chart.**
- Their writing should include at least six new vocabulary words, including three Hawaiian words.
 - Record new questions and new discoveries on the K-W-L chart.

ADAPTATIONS / EXTENSIONS

Have each group of students select one stream from the *ahupua'a* to research. The Kāne'ohe Watershed Web site at http://www.aecos.com/KOOLAU/Kaneohe_Subbasins.html has information about each stream and numerous pictures showing the headwaters in the *pali* area and the channelized stream courses in residential areas.



Have students identify two locations on the island that incorporate the word “*wai*” in the place name and describe how the names fit the place. Refer students to the DAR Web site at http://www.hawaii.gov/dlnr/dar/streams/stream_hawns.htm and have them summarize the importance of *wai* in the lives of early Hawaiians.

Language Arts 4: Writing: Challenge students to write a story from the perspective of a native stream animal that follows the animal through its diadromous life cycle. Have them illustrate their stories. More information on these life cycles is included in the *Flowing to the Sea* book.

Science 3: Organisms and the Environment: Distribute the stream habitat cards found in Unit Resources and have students review the information and share it with their classmates.

- Place the stream habitat illustrations on the board in a random order.
- Distribute a different stream habitat card to pairs of students.
- Ask students to read the description on the card and prepare to match it to one of the illustrations and to prepare a presentation of the information. Their presentations should include a description of the habitat and the organisms found in the habitat.
- Ask each pair to come forward and present their information, matching the reading to the illustration on the board.
- Challenge students to arrange the stream habitat illustrations in order from *mauka* to *makai*. The drawings fit together to form one continuous *ahupua'a* in the following order: waterfall, pool, riffle, run, *muliwai*



Waterfall



Pool



Riffle



Run



Muliwai

REFERENCES

Guinther, Eric. Ko'olau Watershed. Ko'olau Watershed Ring Site. AECOS, Inc.



http://www.aecos.com/KOOLAU/Kaneohe_Subbasins.html This Web site includes maps, streams data, photographs and information about streams in the Kāne'ōhe *ahupua'a*

Kāne'ōhe Bay Advisory Council (KBAC). Not Dated. *Stream Awareness Data Locator*. Retrieved May 18, 2007 from <http://www.kbac-hi.org/mapping/Navigator/Skaneohe.htm>

O'Connor, Maura. 1994. *Flowing to the Sea*. Moanalua Gardens Foundation. Honolulu, HI.

Sterling, Elspeth P. and Catherine C. Summers. 1978. *Sites of Oahu*. Bishop Museum Press. Honolulu, HI.



WATER WORDS CARDS

Copy a set of Water Words cards onto cardstock paper and cut them out to distribute to students.

<i>'auwai</i>	channelize
diadromous	endemic
diversion	endangered

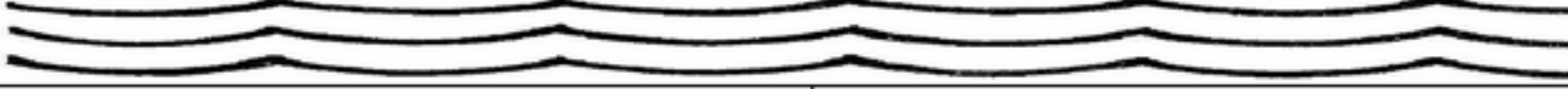
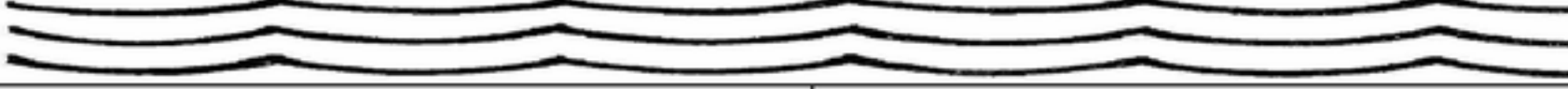


groundwater	porous
<i>hīhīwai</i>	indigenous
larvae	<i>'o'opu</i>



<i>'ōpae</i>	percolates
perennial streams	plankton
riffles	<i>waiwai</i>



	
<p>herbivore</p>	<p>omnivore</p>
	
<p>carnivore</p>	<p>decomposer</p>