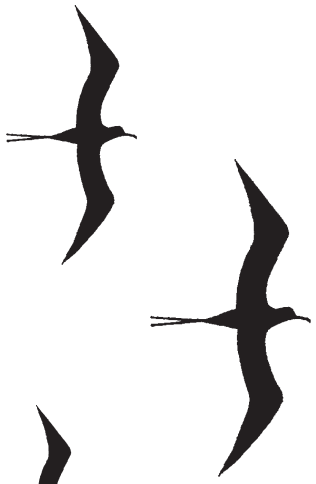
Nature as a Guide

Lesson at a Glance

Like voyagers on a canoe, students use clues from clouds, wind, and birds to predict change in weather conditions. Students validate their weather predictions by observing weather conditions over a one-week period. Students read week two of Aunty Momi's journal and write journal entries recording their observations and their notes about incorporating Hawaiian values into their lives.



Focus Question

How did voyagers interpret environmental conditions from signs in nature, and how can we apply this kind of knowledge to our lives?

Key Concepts

- The voyagers' keen sense of nature reflects a close spiritual relationship with the natural world and a deep understanding of their island environment.
- Respect for the environment is critical to successful voyaging and to living successfully on islands.

Hawaiian Values

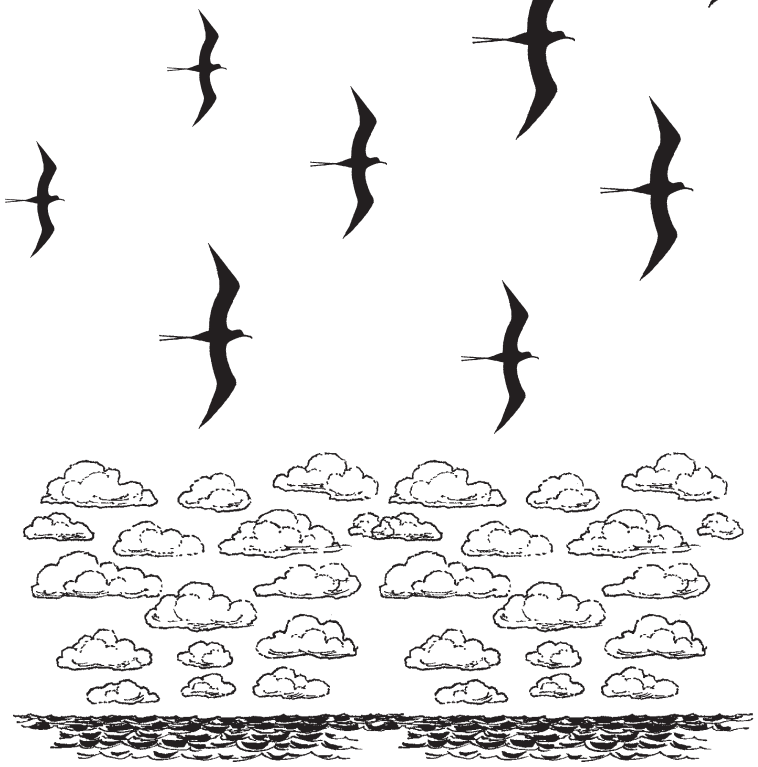
ʻimi ʻike (seek knowledge)
hō ʻihi (respect)

Time

one - two class periods; with brief follow-up sessions during the unit

Performance Standards

- Produce evidence that demonstrates understanding of changes in earth and sky.
- Ask questions about natural phenomena; objects and organisms; and events and discoveries.
- Demonstrate comprehension of text by writing about theme/ author's message.
- Apply themes to own life experiences.



Subject Areas

science, Hawaiian studies, language arts

Materials

Values illustrations (provided)
Momi's journal (provided)
Sky Clues student activity sheets (provided)
Lunar Log take-home sheets (provided)
clipboards or cardboard (1 for each group of four students)
rubber bands
pencils
compass (optional)

Preparation

- Make a copy of the Sky Clues student activity sheets and Lunar Log for each student.
- Make an extra copy of the student activity sheets for each group of four students to use outside.
- To make it easier to work with pencil and paper outside, place each sheet on a clipboard or piece of sturdy cardboard, put a rubber band around it, and place a pencil under the rubber band.
- Go outside and find an area to conduct this activity with students. If needed, use a compass to orient yourself. Review the items on the student activity sheet to see what students will be able to interpret at the site. Since sea birds are not visible from all schools, students may need to make some of their observations at the beach after school hours.

Teacher Background

Polynesian voyagers traveled vast distances over the open ocean in search of new lands and new resources. To make the long voyages, they had to be accomplished seafarers as well as keen observers of nature. These two elements were vital to ensuring a safe and successful voyage.

Each group of islanders used their own reading of nature to help guide them on their journeys. The Gilbert Islanders knew that when a particular shellfish remained on the surface of a rock in the ocean, the weather would be fair. If it burrowed itself into the crevices of the reef, bad weather would prevail. Tahitians would impress their Western visitors with weather predictions using no instruments. And up until the 14th century, ancient Hawaiian wayfinders observed signs in the sky to predict wind and weather conditions for sailing.

Ancient Hawaiians used their keen observational skills to navigate their canoes and to predict weather changes. Directions of ocean swells, cloud shapes and colors, wind, stars and sea birds all provided vital information to navigators who were highly skilled at reading even the most subtle changes in nature.

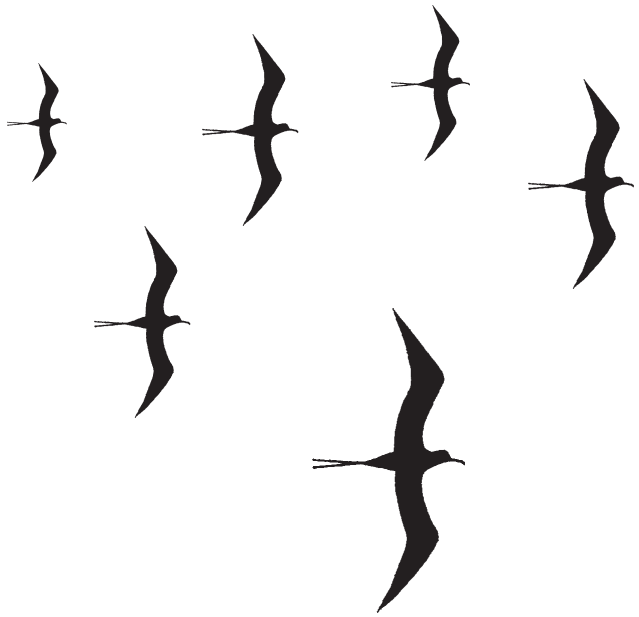
This sensitivity to nature was a way of life for all islanders, not just navigators. It was important for islanders to know the right time to head out to sea to fish, or when to travel up into the forest, or to plant crops.

Recognizing these seasonal changes assured the ancient Hawaiian a productive year. Today, many of us are not as sensitive to the subtle shifts in weather, surf, plant growth or animal life. Becoming more attuned to nature brings us closer to our island environment and deepens our respect for the skills of ancient Hawaiians.

Supplemental Resources

Kotsch, William J. Weather for the Mariner, 3rd edition. The Naval Institute Press, Annapolis, Maryland, 1963.

O'Connor, Maura ed., *'Ōhi'a* Project, "Seasons of Nature," (grade 4). Bishop Museum and Moanalua Gardens Foundation, 1992. This activity provides background information and illustrated activity sheets to assist students in creating a calendar of natural history, documenting seasonal changes in Hawai`i. *'Ōhi'a Project* guidebooks are available in main public libraries and in many school libraries.



Pacific Resources for Education and Learning. Reading the Wind Teacher's Guide and video, VHS, 23 minutes, 1996. (Video features children from Hawai`i and Yap learning about voyaging. Master navigator, Mau Piailug, demonstrates his traditional teaching of reading stars and swells and Master navigator Nainoa Thompson shares his methods of wayfinding.) Available from Pacific Resources for Education and Learning, Ali`i Place Suite 2500, 1099 Alakea St., Honolulu, HI 96813. Ph: (808) 533-6000.

Polynesian Voyaging Society's web site. http://leahi.kcc.hawaii.edu/org/pvs - for information about clouds and other signs that navigators use in wayfinding.

Pukui, Mary Kawena. `Ōlelo No`eau. Honolulu: Bishop Museum Press, 1983.

Teaching Suggestions

✓ **1.** Have students work in groups to read and discuss week two of Aunty Momi's journal. Move the canoe cut-out along the "voyaging line" (200 miles for each day). Display the values illustrations for *hō`ihi* and *`imi`ike*.

2. Distribute the student activity sheet and review cloud types with students.

3. Discuss the role of the wind in predicting weather. Ask students to describe how weather changes when there are trade winds vs. *kona* winds.

4. Divide the class into teams of four students each. Assemble students outside and establish boundaries for the activity. Ask students to work together with their teammates to make observations and predictions, using the student activity sheet as a guide.

✓ **5.** Call the teams back together after 10 or 15 minutes. Ask students to take turns sharing some of their observations. Discuss how this kind of knowledge is useful if you are a farmer, fisher, or hiker.

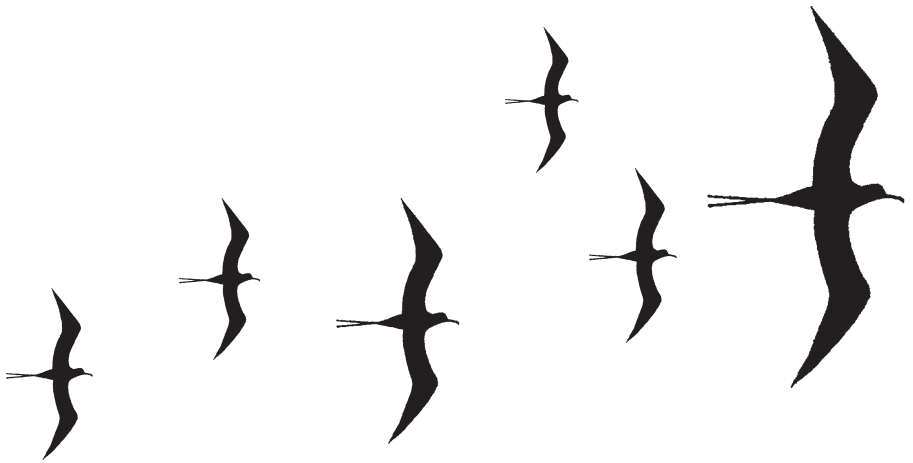
✓ **6.** Have students summarize their observations and add to their journals. The following day, students should compare actual weather conditions to their predictions.

✓ **7.** Have each team select one of the clues on the student activity sheet and write a question to explore, such as:

- How often will cirrus clouds in thick patches precede showery weather?
- Will cirrostratus clouds that are not increasing and are not continuous mean that a storm will pass to the south?
- Are *kona* winds always followed by a storm?
- When *`iwa* birds fly out to sea, is the sea calm?

Have each team decide on a time frame for their investigation and record their observations daily during that time.

✓ **8.** Ask students to create pages for *hō`ihi* and *`imi`ike* in their journals and keep track of ways that they bring these values into their lives.



Extended Activities

- Distribute a copy of the Lunar Log to each student. Have students fill in the Lunar Log each night as they observe the different phases of the Hawaiian moon with their families. Each morning, ask for a lunar update. Have white cut-outs of moon shapes that students may place on a bulletin board display to chart the lunar cycle. After the 30-day moon cycle, have students compare/contrast their results.

- Make "clouds" to hang from the ceiling of the classroom. Students could use foam, gauze, or cotton to create cloud shapes and label them with "cloud clues" based on their observations.

- Have student groups decide on a way to "interpret" their observations creating chants or stories, murals, or skits. Ask each group to share its interpretations and display students' work for others to see.

- Have students conduct research on chants and songs that reflect their feelings about being close to nature. From the students' findings, have them create a chant/song book that can be distributed to each student's family.

Nature as a Guide

Meeting Standards

Focus Question: How did voyagers interpret environmental conditions from signs in nature, and how can we apply this kind of knowledge to our lives?

Standard	Student Tasks	Assessment: Meet Criteria	Assessment: Exceed Criteria
✓ **1** Demonstrate comprehension of text by writing about theme/author's message 	Students read the journal and discuss: • What clues in nature caused the navigator to postpone the voyage? • What kinds of feelings would you be experiencing if you were to go on a long journey? Why? • What clues in nature help you to predict the weather? (How can you tell if it's going to rain or be a sunny day?) • How would this kind of knowledge be useful in your life? • Which Hawaiian values were important to Aunty Momi as she prepared and began her journey?	During class discussion each group will: • list at least one answer to each question discussed; • share the answers of two questions with the whole class.	Students write a journal describing how they would feel if they had just been chosen to be part of the crew of a long canoe voyage. The journal includes two skills and values the student has developed that qualified the student as a crew member.
✓ **5 + 6** Produce evidence that demonstrates understanding of changes in earth and sky.	Students work in groups to: • identify types of clouds in the sky • determine wind direction • observe birds • use clues in nature to predict the weather • record observations of seasonal signs in nature The following day students record their observations of weather conditions and compare their observations to their predictions.	Student Activity Sheet will have: • description of clues in nature describing cloud conditions, wind and plant and animal observations; • weather predictions based on these clues. Journal will have: • a summary of students' observations, predictions and actual weather conditions the next day.	

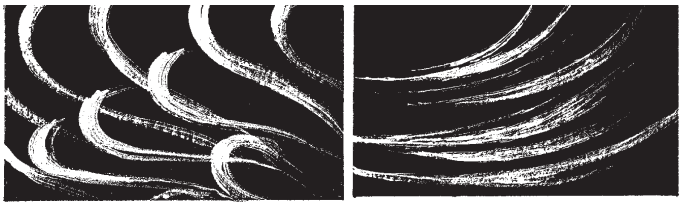
✓ **7** Ask questions about natural phenomena; objects and organisms; and events and discoveries.	Students work in groups to: • Develop a research question related to observing clues in nature and making weather predictions. • Devise a plan for observing clues in nature, predicting weather and testing their predictions systematically for one week.	Journal will have: • daily entry for at least one week; • a research question and a plan for observing nature and predicting weather over a one-week period.	Journal will have: • observations of clues in nature each day for two weeks, with predictions and notes of actual weather conditions; • drawings, poems and newspaper clippings to reinforce observations of weather changes.
✓ **8** Apply themes to own life experiences 	Groups of students write their answers to the following questions: • Why was it so important for voyagers to be in tune with nature? • How does knowledge of nature help you in your life? • What does it mean to have respect (*hō'ihi*) for nature? • How can we demonstrate *hō'ihi* in our lives? How important is *'imi'ike* in your life? Explain.	Each group of students will: • list at least one answer to each question; • share the answer of at least two questions with the class. Journal will have: daily entry for one week about demonstrating *hō'ihi* in student's life.	Student will interview a family member or someone in the community to find out how knowledge of and/or respect for nature helped in that person's life.

Sky Clues (1 of 3)

Student Activity Sheet

■ High Elevation Clouds (above 20,000 feet)

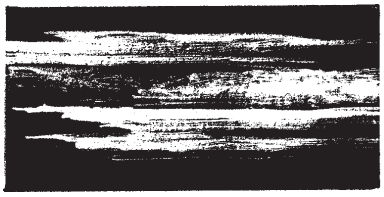
Cirrus *is from the Latin "lock of hair"*



(2 types)

- scattered and not increasing - bad weather is far away
- in thick patches - showery weather is close by
- shaped like hooks - warm weather front is coming with continuous type rain

Cirrostratus



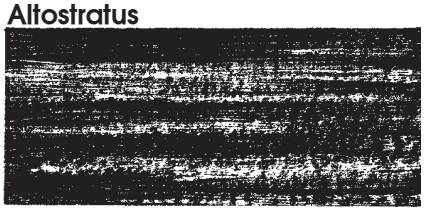
- in continuous sheet and increasing - a warm weather front with stormy conditions is approaching.
- clouds not increasing and not continuous - storm is passing to the south and no bad weather

■ Middle Elevation Clouds (7,000 to 20,000 feet)

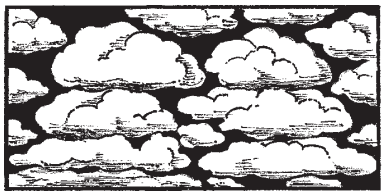
Altostratus

- layers of thick grayish clouds cover all, or part of the sky - new storm approaching with continuous rain

Altostratus



Altocumulus



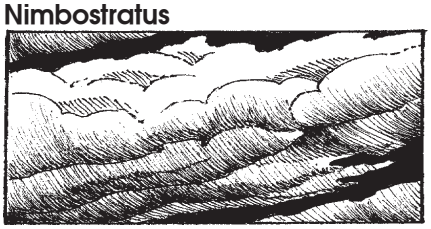
- small "cloudlets" arranged in a pattern - when followed by thicker, high clouds could be the advance of a warm front with steady rain

■ Low Elevation Clouds (up to 7,000 feet)

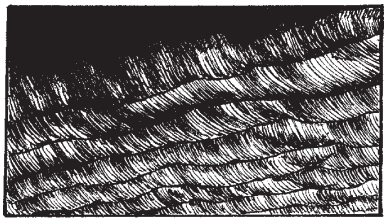
Nimbostratus

- layered, dark cloud, blocks the sun - rain with no wind, Hawaiians call this *poi pu* (sky is shut up)

Nimbostratus



Stratus



Stratus *means "spread out"*

- sheet of dull gray, low clouds - drizzle

Cumulus

Cumulus means "heap"; Hawaiians call them *`ōpua; or ao pua`a; "ao"* is cloud *and "pua`a"* is pig.

- puffy clouds that change shape - fair weather

Cumulonimbus

- heavy thick clouds, high like a mountain with a flattened top-- heavy, rain, wind; thunderheads

Sky Clues (2 of 3)

Student Activity Sheet

The Sky at Sunrise and Sunset

Watch the sky at sunrise and sunset and see if you can predict weather and surf conditions:

- If the clouds in the east are red before sunrise, Hawaiians call it *"kahea,"* which is a sign of rain.
- If the clouds are laying smooth over the mountains in the morning, it is called *pāpala*, which is also a sign of rain.
- At sunset, if the western sky is blue-black at sunset, Hawaiians call it *pa uli*, and forecast high surf, *"kai ko`o"*.
- If the clouds are orange and yellow in a blue sky at sunset, the weather should be fair.

Wind Watching

The wind provides clues to the weather, too.

Watch the clouds. Which direction is the wind blowing?

_____

How strong is the wind blowing?

_____

Southerly, *kona* wind:

- In Hawai`i, when the wind increases from the south, a storm is usually approaching. When the winds are light and variable from the south, the weather is hot and humid.

Northeast trade winds:

- Fair weather with *ma uka* showers.

Your name _____

Bird Watching

Watch the sea birds and see if you can predict the weather from their behavior. If there are no sea birds visible from your school, try going to the beach with your family and observing sea birds.

Hawaiian Proverbs

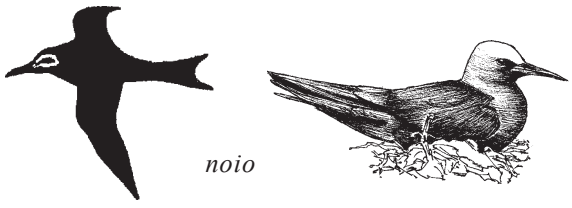
Lele ka `iwa, mālie kai ko`o

"When the *`iwa* flies (out to sea), the rough sea will be calm."

`iwa

Ua ho`i ka noio `au kai i uka, ke `ino nei ka moana.

"When the *noio* bird returns from sea to land, the sea will be stormy."



noio

Sky Clues (3 of 3)

Student Activity Sheet

Your name _____

Date	Time	Observations of clouds, wind & birds, weather conditions	Weather predictions for next few days

Lunar Log (1 of 2)

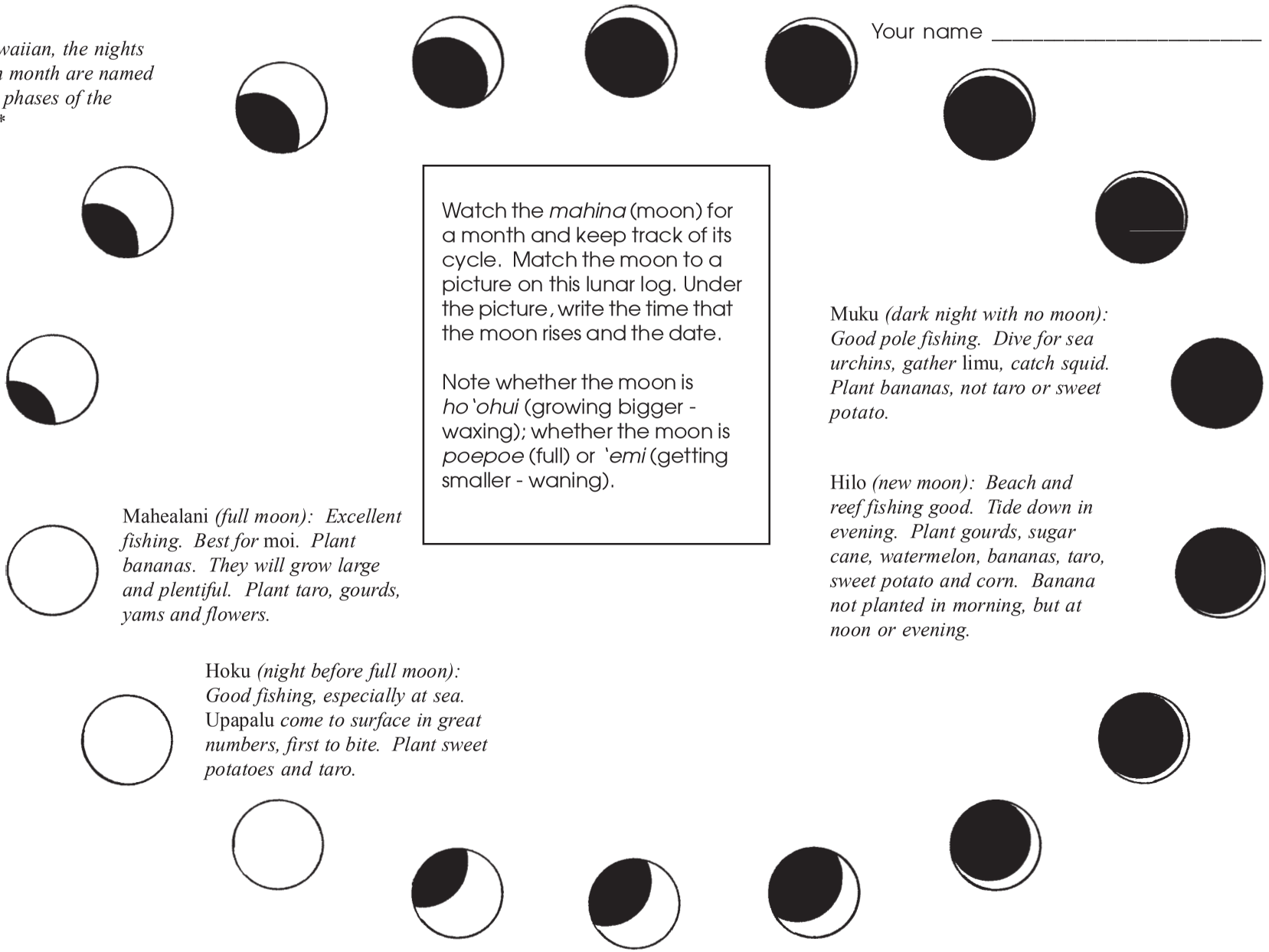
Student Take-Home Sheet

*lIn Hawaiian, the nights of each month are named for the phases of the moon.**

Your name _____

Watch the *mahina* (moon) for a month and keep track of its cycle. Match the moon to a picture on this lunar log. Under the picture, write the time that the moon rises and the date.

Note whether the moon is *ho'ohui* (growing bigger - waxing); whether the moon is *poepoe* (full) or *'emi* (getting smaller - waning).



Muku *(dark night with no moon): Good pole fishing. Dive for sea urchins, gather* limu, *catch squid. Plant bananas, not taro or sweet potato.*

Hilo *(new moon): Beach and reef fishing good. Tide down in evening. Plant gourds, sugar cane, watermelon, bananas, taro, sweet potato and corn. Banana not planted in morning, but at noon or evening.*

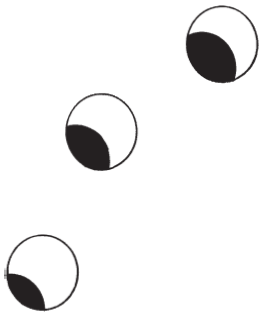
Mahealani *(full moon): Excellent fishing. Best for* moi. *Plant bananas. They will grow large and plentiful. Plant taro, gourds, yams and flowers.*

Hoku *(night before full moon): Good fishing, especially at sea.* Upapalu *come to surface in great numbers, first to bite. Plant sweet potatoes and taro.*

*Source for fishing and planting information: Prince Kuhio Hawaiian Civic Club's "Ancient Hawaiian Moon Calendar Related to Fishing and Farming."

Lunar Log (2 of 2) Student Take-Home Sheet

Your name _____



Predicting the Weather by the Moon

Is there a halo around the moon? Master navigator Mau Piailug from Satawal sees signs of weather changes in the moon's halo. If the halo is thick, rain can be expected; if it is thin and large, there will be strong wind. Use these clues to make weather predictions and see if you are correct.

Date	Halo around the moon is:	I predict the weather will:

Were your predictions correct? Did you discover other weather patterns based on your observations? Repeat your observations over time and see if you have discovered other "moon clues" to reading the weather.