



JAMES BATT

PAPA KO'A • 2006 • THE REEF

STATE OF HAWAII • DEPARTMENT OF LAND AND NATURAL RESOURCES • PROTECTING OUR PAST

2006
\$3.00



THE HONORABLE
LINDA LINGLE
GOVERNOR OF HAWAII

The Department of Land and Natural Resources receives financial support under the Federal Aid Program. Title VI of the Civil Rights Act of 1964, the Americans with Disability Act, and the laws of the State of Hawaii prohibit discrimination on the basis of disability, race, color, religion, sex, or national origin. If you believe that you have been discriminated against in any program, activity or facility, or if you desire further information, please write:

Office of Equal Opportunity
U.S. Department of Interior
Washington, D.C. 20240

U.S. Department of Justice
950 Pennsylvania Ave. NW
Civil Rights Division
Disability Rights Section-NYAV
Washington, D.C. 20530

Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809
Attn: ADA Coordinator

If you require this calendar in alternate formats, please contact the Department of Land and Natural Resources at 587-3250.

This calendar is partially funded under the Aquatic Resources (Wallop/ Breaux) Trust Fund administered by the United States Coast Guard.

SPONSORS

A project of the State Department of Land and Natural Resources (DLNR) and the Hawaii Heritage Center. We extend our deepest appreciation to those who have supported this project:

- Alexander & Baldwin Foundation
- Belt Collins
- Chris Hart & Partners, Inc.
- Cultural Surveys Hawaii
- Div. of Boating & Ocean Recreation
- Fung Associates
- Hawaiian Electric Company, Inc.
- Ku'iwalu
- Outrigger Hotels & Resorts
- Peter Vincent & Associates, LLC
- Scientific Consultant Services, Inc.
- Spencer Architects
- Coral Reef Outreach Network
- National Oceanic Atmospheric Administration
- Division of Aquatic Resources
- Hawaii's Living Reef Program

PHOTOGRAPHY:

Ric Noyle, James Watt, Hal Hammatt

DESIGN & PRODUCTION:

Clarence Lee Design & Associates, Inc.

PRINTING:

Edward Enterprises, Inc.

ASTRONOMICAL INFORMATION:

Bishop Museum Planetarium

TIDE PREDICTIONS:

Larry E. Brower, P.E.

Edward K. Noda and Associates, Inc.



RIC NOYLE

The *kōlea*, or plover, frequently feeds on the near shore reef. In traditional Hawaiian culture women were responsible for gathering *limu* (seaweed) and other food items from the reef. On Maui these ladies were called *papakōlea*, correlating to the bird and their activities.

Tide Corrections

The tidal predictions are based on the high and low tides at Honolulu Harbor, O'ahu. To find the correct times and heights for other locations, use the chart below to adjust the times and heights.

Tidal corrections are listed in hours and minutes. A plus (+) sign means that the tide will occur later than in Honolulu, therefore, add this number to Honolulu time. A minus (-) sign indicates that a tide will occur earlier than in Honolulu, therefore, subtract this number from Honolulu time.

FOR TIDE TIMES AT FOLLOWING PLACES, ADD OR SUBTRACT FROM HONOLULU TIME

PORTS	HIGH WATER HR/MIN	LOW WATER HR/MIN
KAUAI		
WAIMEA BAY	-0 20	-0 07
PORT ALLEN, HANAPĒPĒ BAY	-0 36	-0 22
NĀWILIWILI BAY	-0 27	-0 25
HANAMAŪLU BAY	-0 17	-0 21
HANAŪLEI BAY	-1 28	-1 47
O'AHU		
HALEIWA, WAIALUA BAY	-1 02	-2 05
WĀĀNAE	+0 20	+0 18
HANAŪMA BAY	-0 59	-0 45
WAIMĀNALO	-1 15	-1 09
MOKU O LO'E	-1 24	-1 14
WAIKĀNE, KĀNE'OHĒ BAY	-1 46	-1 18
LĀ'IE BAY	-1 45	-1 46
MOLOKA'I		
KOLO	+0 05	+0 01
KAUNAKAKAI	-0 05	-0 08
KAMALO HARBOR	-0 37	-0 16
PŪKO'O HARBOR	-1 03	-0 48
LĀNA'I		
KAUMĀLAPAU	+0 02	+0 03
MAUI		
KAHULUI	-1 53	-1 41
HĀNA	-1 13	-1 23
MAKENA	-0 32	-0 32
KIHEI, MĀ'ALĀEA BAY	-0 01	-0 22
LAHAINA	-0 35	-0 40
KAHO'OLĀWE		
KUHEI BAY	-0 09	-0 09
SMUGGLER COVE	-0 15	+0 03
HAWAII		
MĀHUKONA	-0 26	-0 17
KAWAIIĀI	-0 04	-0 03
KĀHĀUA KONA	-0 26	-0 22
NĀPO'OPO'O, KEĀLAKEKUA BAY	-0 16	-0 12
HONŪĀPO	-0 26	-0 16
HĪLO	-1 04	-0 59

PAPA KO'A

The Reef and Hawaiian Culture



The words *papa ko'a* refer to a coral flat or reef, with the word "*papa*" referring to a flat surface, stratum, or foundation, and "*ko'a*" to coral. Fittingly, in Hawaiian culture the reef is viewed as a foundation. A foundation with the ocean, sky, and clouds layered above it, and a foundation supporting marine life, which in turn nourished the Hawaiian people. In the *Kumulipo*, the Hawaiian creation chant, the coral polyp *'uku ko'ako'a*, is the first mentioned organism to be born. From it springs the *ko'ako'a*, or coral colony, and all other life forms follow.

A superb habitat, Hawaiian reefs support over four hundred near shore species of fish in the islands. Algae and seaweeds growing on the reef give sustenance to a multitude of urchins, limpets, and shellfish, as well as turtles and small herbivorous fish. The latter, in turn, attract larger, carnivorous fish, such as the *ulua*, to come close to shore. In addition, the crevices and holes in the reef



The waves break on the reef to provide ideal surf conditions, Kapoho, Island of Hawai'i

("If you care for the ocean, the ocean will care for you.")

With the abandonment of the *kapu* system, and the introduction of western customs and foodways the reef was not cared for as before, sometimes over-exploited, other times disregarded and even abused as different priorities came to the fore. A number of reefs lost much of their marine life. As throughout the course of history, if the reef is to remain a viable ecosystem, it must be respected and nurtured. Today, it needs our care. About a quarter of the 7,000 marine life forms supported by Hawaii's coral reefs are endemic, found no where else in the world. Should they disappear from our waters, they are gone forever.

offer protection for the *he'e*, (squid, octopus), young fish, and eels. All these marine resources were harvested by Hawaiian families, contributing vital protein, vitamins, and trace elements to their diet. A healthy reef assured a healthy Hawaiian community.

Near shore fish were the major source of protein for Hawaiians of yesteryear, and Hawaiian names have been recorded for over sixty kinds of edible seaweeds. The resources that sustained human life were recognized as gifts from the gods, and were carefully managed through the *kapu* system. The reef was the *kuleana*, the right and responsibility, of those families living in its immediate area. They depended on it for their nourishment and knew its nuances. *Kapu* were placed or lifted according to an understanding of local conditions, seasonal and lunar cycles, and corresponding reproductive cycles of marine life. Wave conditions changed from winter to summer, and the moon influenced currents and tides, all of which effected the dynamic rhythms of life on the reefs. By observing the peak spawning cycles of fish, or when sea urchins produced eggs, or seaweed produced spores, Hawaiians avoided harvesting at those times that disturbed these natural cycles. "*Īna mālama 'oe i ke kai, mālama no ke kai ia 'oe.*"

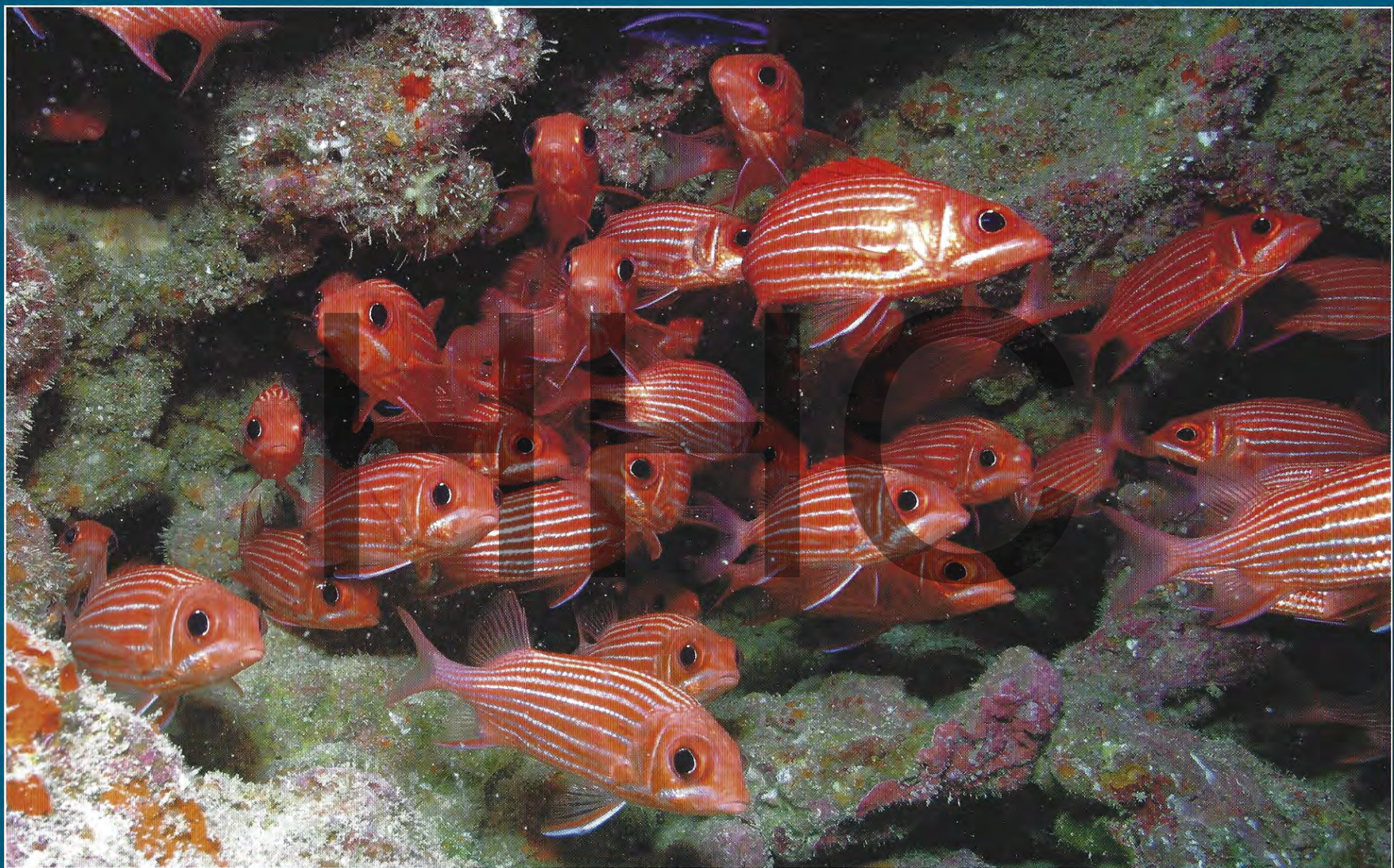


Above: The layers of the Hawaiian world. Below: The residents of *Nu'alolo Kai* relied on the bountiful reef for their sustenance. To exchange their ocean harvest for crops grown in *Nu'alolo'Āina*, the cliff in the background had to be scaled with ladders.



D.J.

ON THE COVER: *Ulua*, once a common near shore fish, are seldom found around the major islands today, due to over fishing. A symbol of the god *Ku*, this strong fighting fish's name metaphorically referred to powerful warriors in ancient Hawaiian culture. Traditionally, it was only eaten by men, and could substitute for a human in sacrifices.



JAMES WATT

JANUARY

Nocturnal feeders, the *ʻalaʻahi*, or squirrel fish, may be found in holes and caves in the reef. This small, endemic fish with its spiked fins was said to be a favorite food of Kamehameha III. Because of its red color, it was used as an offering to Pele.



JAMES WAIT

FEBRUARY

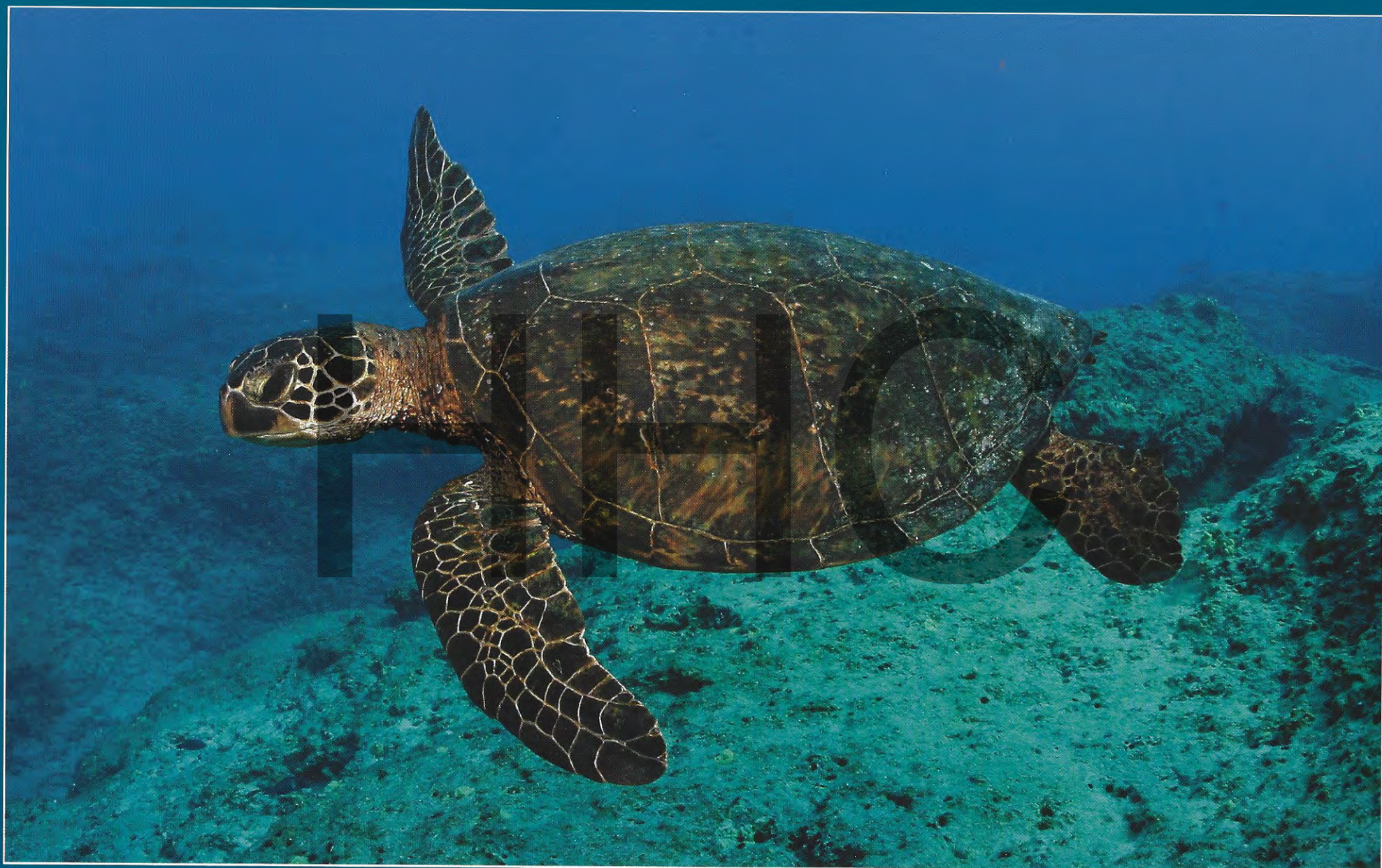
The Hawaiian monk seal, or *ka 'ilio holo i kauaia*, the dog that runs in the rough [sea], receives scant mention in traditional Hawaiian lore. Hawai'i's only year round marine mammal, it eats creatures that dwell on the islands' reefs, such as lobster, octopus, and fish. It is endangered and if you encounter one please remain at least fifty yards from the animal.



ERIC NOYLE

MARCH

A *papa alani* along Maui's west shore, a mix of lava and coral, supports a wide variety of seaweeds including *limu kōhu*, *limu kala*, *līpoa*, and *līpe'e*. The islands of Kaho'olawe and Molokini are in the background.



JAMES WATT

APRIL

The *honu*, or green sea turtle, is on the endangered species list.
Under the *kapu* system only members of the *ali'i* class
were allowed to eat this delicacy.



ERIC NOYLE

MAY

The reef at Anahola Beach Park is one of the longest and widest reefs on Kaua'i.

Josea Lovell and his granddaughter Randi Arinaga have initiated a *limu* (seaweed) re-vegetation project on this reef.

Kumu Kalei Arinaga's fourth grade class at Kapa'a Elementary School centers its scholastic activities on this reef.



JAMES WATT

JUNE

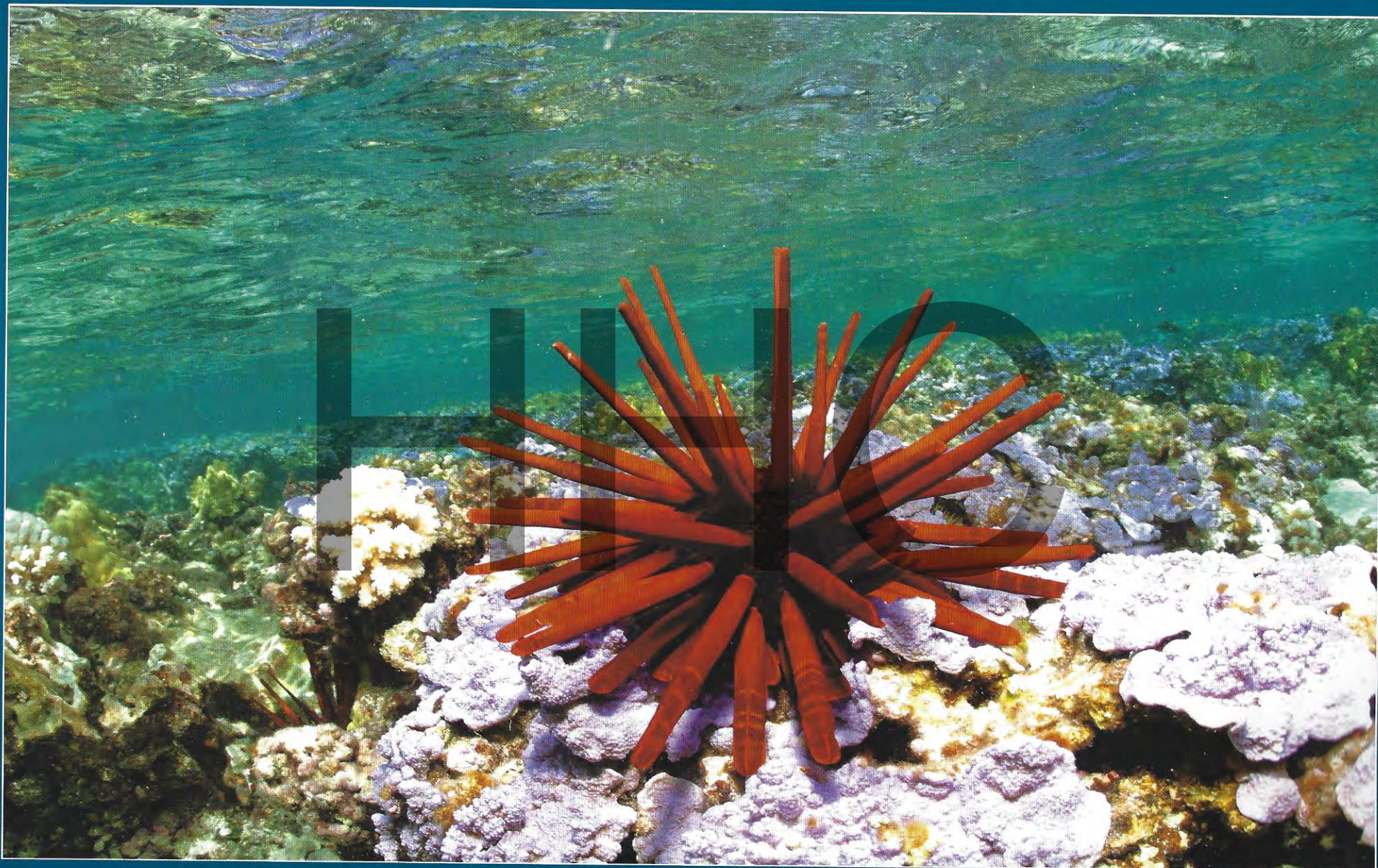
The upright stones of an ancient Hawaiian shrine on Mokumanamana, or Necker Island. The island's large reef with its abundant near shore marine resources helps support the 60,000 birds that today nest on the island, just as it previously nourished Hawaiians who inhabited the island on a transient basis.



RIC NOYLE

JULY

The 110 acre Hanauma Bay was designated a Marine Life Conservation District in 1967, the first of eleven such districts statewide. The government protection has allowed the reef to rejuvenate, resulting in a dramatic increase in marine life. This former volcanic crater was a popular fishing ground for King Kamehameha V.



JAMES WATT

AUGUST

The spines of the pencil slate urchin, or *hā'uke'uke'ula'ula* or *pūnohu*, were used in early nineteenth century schools in Hawai'i as chalk-like pencils to write upon slates.

Hiding in cracks and crevices during the day, these animals come out at night to graze on the algae living on the reef. Once commonly found, they are now rarely seen, the result of a human penchant for taking them out of the water, thereby killing them.



SEPTEMBER

Pālahalaha, or green sea lettuce, covers this small island-like mound in a *kāhaka*, or tidepool, on the shoreline reef at Ho'okipa. The presence of this seaweed once indicated a rich gathering place.



JAMES WATT

OCTOBER

Weke, or goat fish, remain a popular eating fish. Its name means, "to open," and in the past the fish was used in sorcery in hopes of opening or releasing something, such as evil thoughts, or to seek resolution to some mystery or illness.



REAL HAWAII

NOVEMBER

A fishing *ko'a*, or shrine at Kapiha'a on the island of Lāna'i. Coral was used in ceremonies at such shrines, which bear the same Hawaiian name as coral. These sacred structures were built along the shore or by ponds and streams to assure a bountiful supply of fish.



RIC NOYBE

DECEMBER

The reefs at Waihe'e provide a rich habitat for the squid and octopus, as well as other near shore fish. Once slated for golf course development, this pristine area, formerly a royal center, is now owned by the Maui Coastal Land Trust.