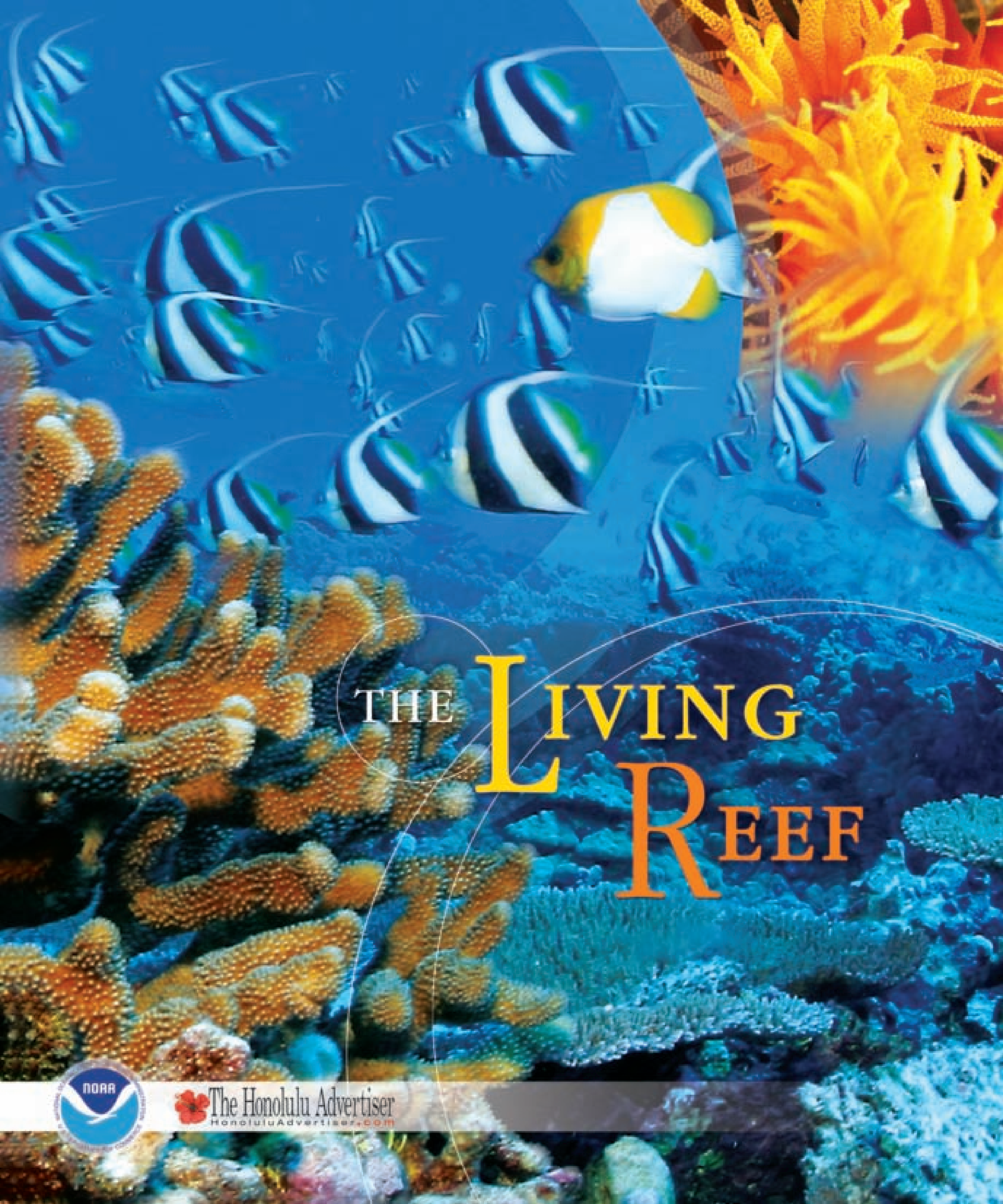

THE LIVING REEF

The Honolulu Advertiser
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NOAA in Hawai‘i and the Pacific:

Honoring the Past, Building the Future

The National Oceanic and Atmospheric Administration (NOAA) in the Pacific Region is proud to co-sponsor the Living Reef insert in celebration of the International Year of the Reef. This worldwide campaign to raise awareness about the value and importance of coral reefs and threats to their sustainability will help educate and motivate people to take action to protect our marine resources.

For more information about NOAA, please visit:
www.NOAA.gov

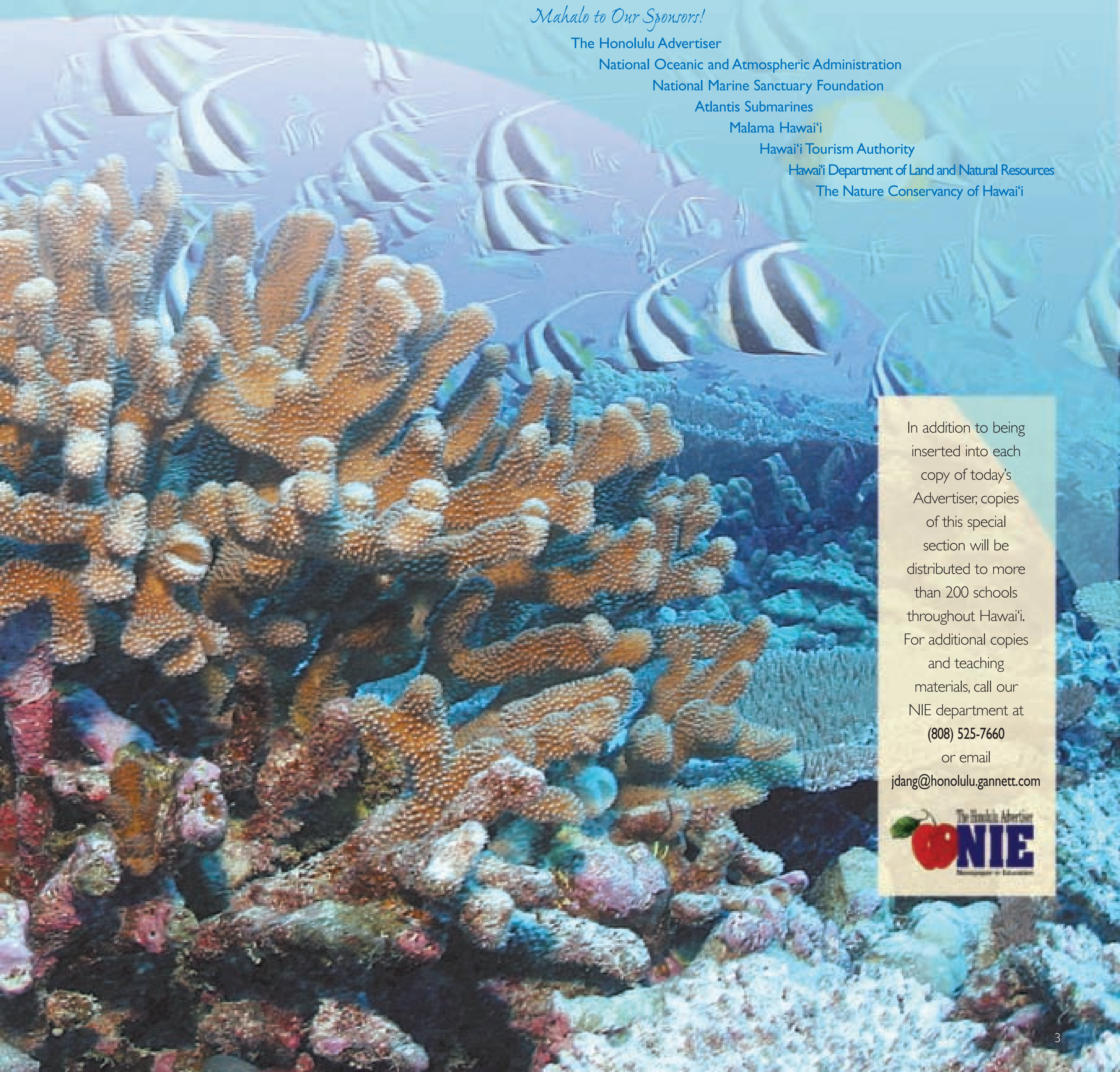
NOAA's Pacific Region provides convenient and timely access to accurate and reliable information as well as technology, training, products and services to conserve and manage the Pacific Islands' coastal and marine resources in a way that ensures economic, social and environmental sustainability, and integrates global, science-based approaches with local knowledge and practices based on generations of experience.

Ola nā papa i pūlama ʻia – *Cherish the living reefs*

In celebration of the Hawaiʻi International Year of the Reef, a worldwide campaign to raise awareness about the value and importance of coral reefs and threats to their sustainability, we invite you to dive into "The Living Reef."

We hope this special publication will motivate you to take action to protect our precious living reefs – for today, more than ever, they need our help to survive . To learn more about Hawaii's reefs, the IYOR-Hawaiʻi campaign, and the many ways in which you can help, go to iyor-hawaii.org.

An earlier version of "The Living Reef" was originally produced by The Nature Conservancy of Hawaiʻi and the Hawaiʻi Department of Land and Natural Resources, and published with funding provided by the National Oceanic and Atmospheric Administration (NOAA). Thanks to NOAA and other generous sponsors, "The Living Reef" is now being brought to a much wider public, through the Advertiser's Newspapers In Education (NIE) program.



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In addition to being inserted into each copy of today's Advertiser, copies of this special section will be distributed to more than 200 schools throughout Hawaiʻi. For additional copies and teaching materials, call our NIE department at **(808) 525-7660** or email **jdang@honolulu.gannett.com**

Restoring the health of our coral reefs is essential if we are to create a sustainable future for our islands.

A coral reef is a living organism, and a living reef gives our islands life.

It is both protector and provider – a reservoir of food as well as a buffer against the destructive power of the sea. Hawai‘i's coral reefs and nearshore waters are home to more than 7,000 marine life forms – a quarter of them found nowhere else in the world. This spectacular diversity can still be seen in the protected waters of the Northwestern Hawaiian Islands. But in the main Hawaiian Islands, pollution, sedimentation, alien species, overfishing, and other threats are degrading our reefs. Scientists estimate that our nearshore fisheries have declined by 75% over the last century. Fishermen tell us there are “way less fish.”

Today, many scientists, fisherman, local communities, and native Hawaiians are calling for greater conservation of our marine resources – through enhanced management, stepped-up enforcement, and a new spirit of cooperation that serves the greater good.

Hawai‘i’s cultural traditions and our island way of life are intimately tied to the sea.

When we allow our reefs to degrade, we lose the important ecological and economic services they provide, as well as a big part of the collective natural and cultural heritage of our islands. The quality of our environment and the quality of our own lives are diminished. So, too, is the quality of life that we pass on to our children.

It is time we take care of our ocean, and not just take from it. Healthy, living reefs are in everyone’s best interest. We all have a stake in their future, for in many ways they determine ours.

GIFTS FROM THE REEF

In more ways than we might realize, our island lifestyle depends upon our coral reefs.

Existing just below the surface of the ocean, out of ordinary sight, coral reefs provide us with countless benefits – from the fresh fish we eat to the surf we ride and the beaches we enjoy.

Corals are one of the oldest life forms on Earth, and coral reefs have existed for tens of millions of years. They are home to such a rich diversity of life that they rival rainforests as biological storehouses. Coral reef communities fringe the entire Hawaiian archipelago, sheltering us from the destructive power of the sea. More than 300,000 acres of reefs surround the main islands alone – an area comparable in size to the island of Kaua'i. In more ways than we might realize, our island lifestyle depends upon our coral reefs.

THE OCEAN'S SUPERMARKET

Coral reefs occupy less than 1 percent of the ocean's surface, yet they are home to one-quarter of the world's fish species. Filled with crevices, holes, niches, and ledges, coral reefs provide shelter, breeding areas, and lifelong habitats for fish. They are nurseries for the newborn, secure hideaways for juveniles and adults, and abundant sources of food for fish, shellfish, and invertebrates. Around the world, hundreds of millions of people rely on coral reefs for food. Here in Hawai'i, fresh seafood is an island tradition. Visit any local fish market, seafood emporium, or restaurant and you can enjoy the bounty of the reefs. Lobster, squid, octopus, 'opihi, limu, and tasty reef fish like kole and kumu are among the many delicacies our reefs provide to Hawai'i's people.

NATURE'S BREAKWATERS

For the people of Hawai'i and millions of others who live on tropical islands, coral reefs are nature's breakwaters. They buffer the land and coastal inhabitants from the ocean, stabilize the shoreline, provide natural harbors, shelter nearshore homes from storms and big waves, and protect seashores from sand erosion. Without the protection of the reef, our beaches would be severely eroded and our coastlines in jeopardy.

UNDERWATER PARKS

As islanders, we snorkel in the coral at Kealakekua Bay and Shark's Cove, swim in reef-protected waters, scuba dive and fish reefs throughout the islands, and ride waves at dozens of reef-generated surf breaks. More than 7 million visitors come to Hawai'i every year, and almost all of them engage in these same ocean-related activities. It is estimated that Hawai'i's offshore reefs contribute $360 million a year to the state's economy, or about $1 million a day.

SANDMAKERS

We can thank our living reefs for Hawai'i's white, sandy beaches. Beach sand is created from coral fragments ground down by wave action. Coral is also ground up into sand by parrotfish, which feed on soft, thin coral tissue and excrete pulverized limestone in their waste. The native marine algae *Halimeda* is yet another source. It deposits calcium carbonate/limestone in its leaves, which break down and become sand.

SUBSISTENCE AND RECREATION

Fishing is a way of life in Hawai'i – part of our cultural heritage and our local culture. The reef provides food for subsistence fishing families in Hawai'i, and is an important recreational activity for many others. Sharing our catch with family and friends is an island tradition as old as fishing itself.

NO REEF, NO SURF

In Hawai'i, the quality of the surfer's wave is dependent on the shape of the reef. Because there is no continental shelf (a gradual decline from the shoreline to the deeper ocean) around the Hawaiian Islands, ocean swells approach the shore unhampered. Most of the waves that surfers ride are formed when the swells hit reefs – rising, breaking, and curling.

THE ARCHITECTURE OF THE REEF

Rising out of the monotony of the open ocean, the coral reef appears like a submerged metropolis, its structure a riot of form and color.

Vast branching orchards give way to sleek plateaus. Rivulets of tiny grains wend their way into serpentine canals. Imposing monuments are capped off by everything from jagged turrets to rows of domes in the shape of cauliflower heads. The entire reef pulsates with the comings and goings of thousands of marine creatures. They drift past in great schools, dart furtively in and out of labyrinthine passageways, and hide out in cracks and cervices and dark, cavernous holes. Forget the idea of the ocean as a watery void – in reality, it is a finely integrated cosmos and the coral reef, more than anything, is what keeps it alive and vibrant.

MASTER BUILDERS

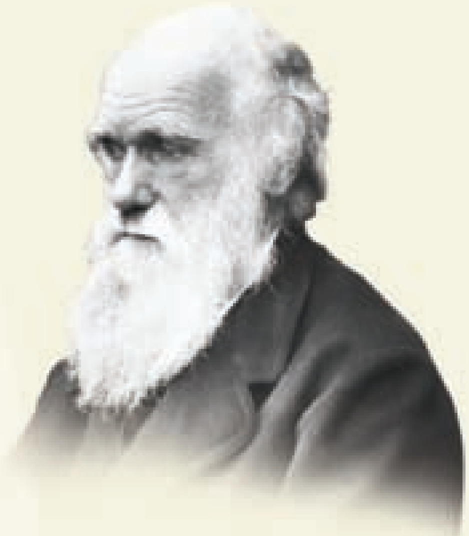
Coral reefs are the planet's largest living structures, reaching the dimensions of Australia's 92,000 square-mile Great Barrier Reef. The raw material of this construction is the calcium that polyps take in from the sea and convert to an external limestone skeleton. One generation of coral colonies builds atop the last, creating the foundation of a vast underwater architecture.

A SYMBIOTIC RELATIONSHIP

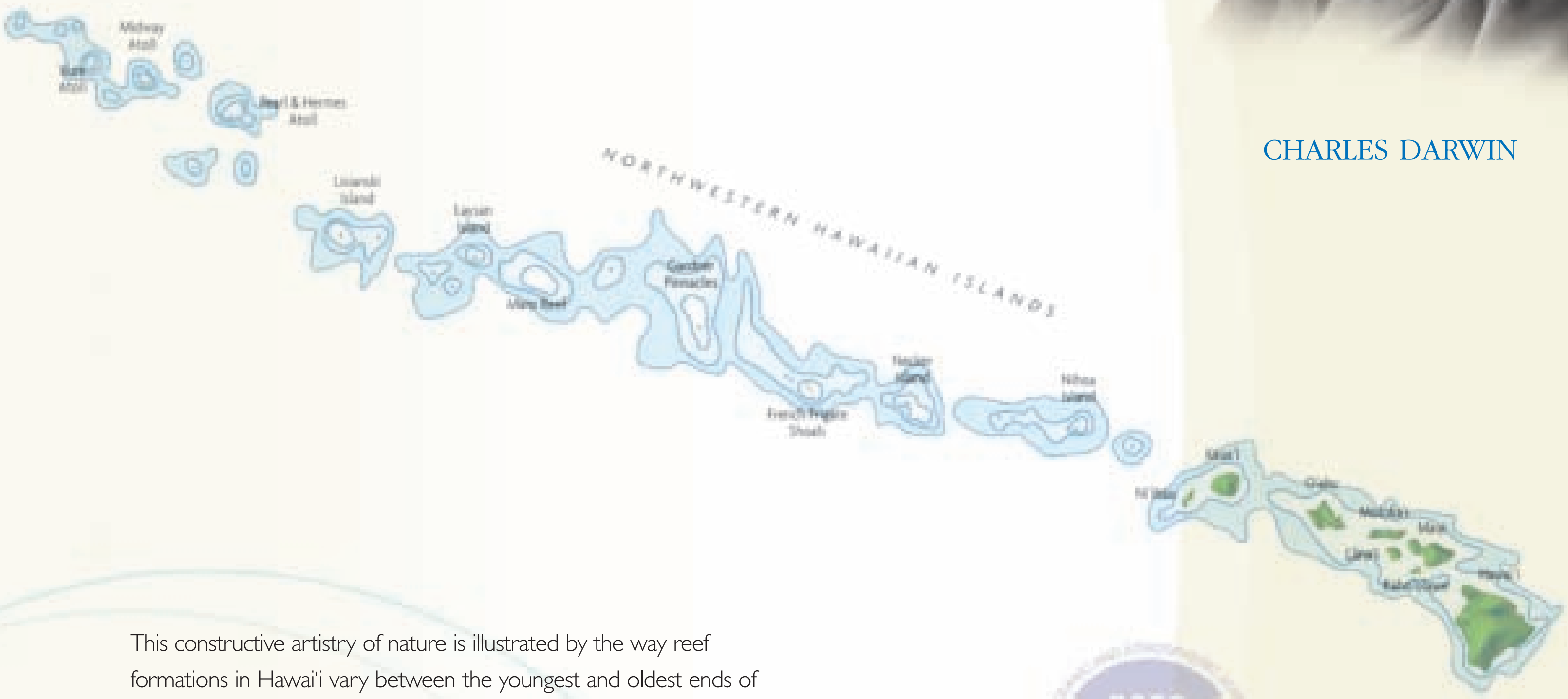
At the core of the coral reef is a remarkable exchange of "goods and services" between two different life forms – one animal and one plant. The coral polyp, one of the simplest of all animals, is little more than a tube, capped with a mouth and fringed with stinging tentacles. The polyp has many reproductive strategies, but it mostly makes new life by cloning itself. This produces colonies of genetically identical polyps attached to one another. The polyps nourish themselves with their very own internal gardens of single-celled algae plants known as *zooxanthellae*. The algae keep the polyps healthy by converting the sun's energy into carbohydrates and oxygen. In return, the algae reap fertilizer and food from the polyps, released in the form of carbon dioxide and other waste products. Up to a million algae can live inside a single polyp. Scientists call this cooperative arrangement a "symbiotic relationship."

DARWIN'S POINT

Coral reefs form rings around volcanic islands. Why this is so remained a mystery until the 19th century, when Charles Darwin proposed an explanation confirmed by scientists today. The process begins when corals encrust onto a newly cooled volcano. Reef expansion proceeds in shallow and warm water where the corals can access the sunlight they need. Over the millennia, the reef continues to build upward while the volcano slowly sinks into the sea. Eventually, this leaves only an atoll, a ring of reef enclosing a lagoon.



CHARLES DARWIN


Midway Atoll
Kure Atoll
Pearl & Hermes Atoll
Lisianski Island
Laysan Island
Maro Reef
NORTHWESTERN HAWAIIAN ISLANDS
Gardner Pinnacles
French Frigate Shoals
Necker Island
Nihoa Island
Kaua'i
Ni'ihau
O'ahu
Moloka'i
Maui
Lana'i
Kaho'olawe
Hawai'i

This constructive artistry of nature is illustrated by the way reef formations in Hawai'i vary between the youngest and oldest ends of the chain. On the island of Hawai'i, at the youngest end, coral colonies are still coalescing on the submerged slopes of active volcanoes. Moving northwest, more developed fringing reefs encircle the older islands of Maui, Moloka'i, Lana'i, O'ahu, and Kaua'i.

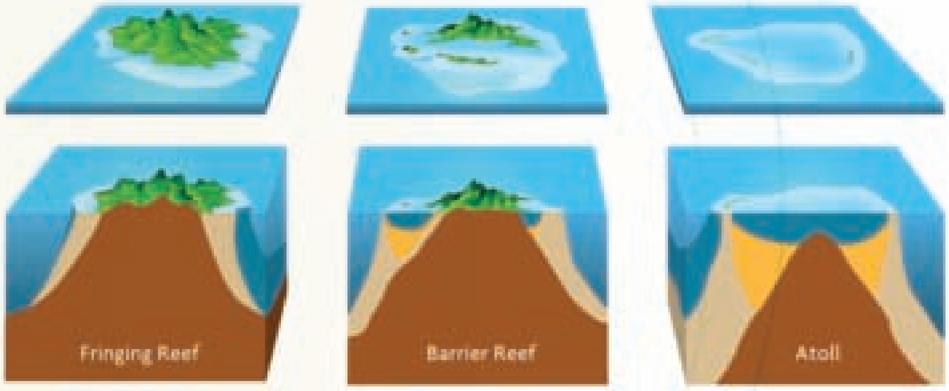
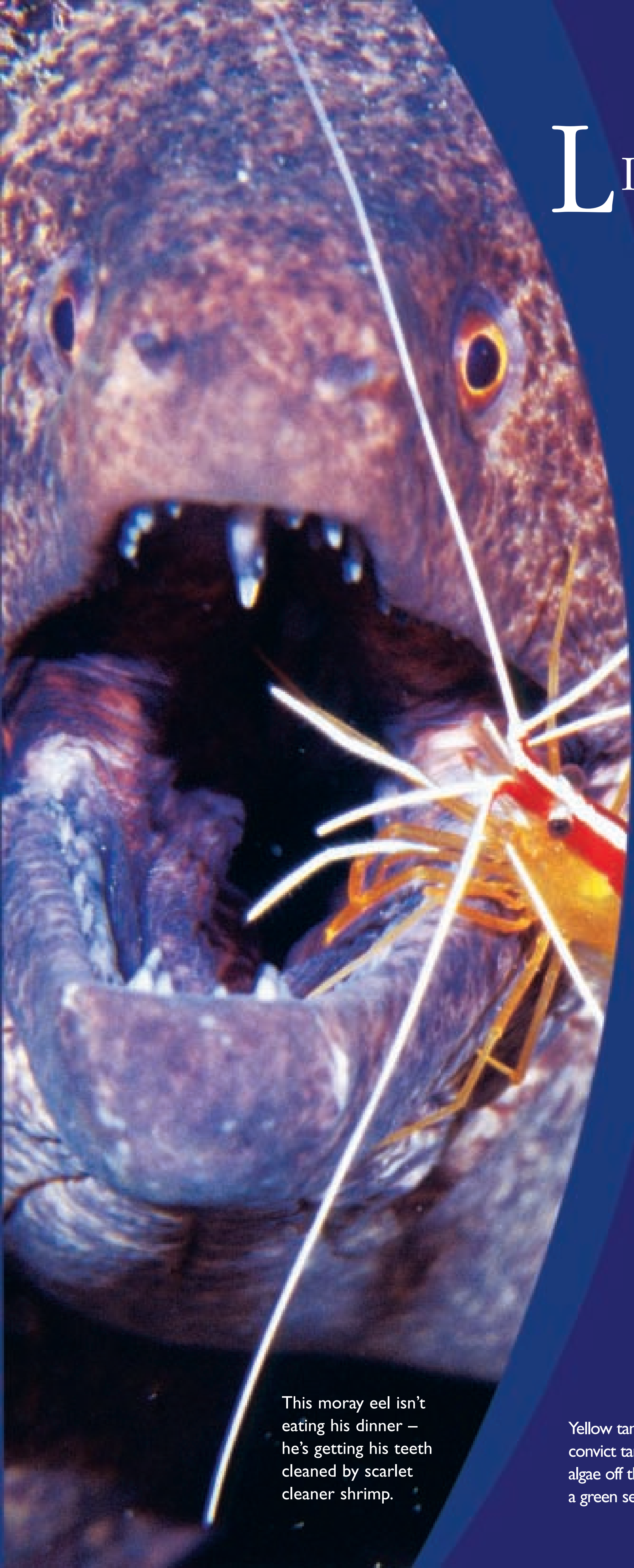

Fringing Reef
Barrier Reef
Atoll

Illustration adapted from Larry Friesen, Saturdays.net

Finally, marking the spot where magma first erupted from the Earth's molten core and heralded the existence of the mid-Pacific chain some 50 million years ago, there are the seamounts and atolls of the Northwest Hawaiian Islands. Their embrace of blue lagoons extends 1,200 miles to Kure atoll. Beyond Kure, the land is subsiding so fast it outpaces coral growth, and the reef is literally drowning. This end point, which paradoxically was once the beginning of the volcanic chain, is known as the Darwin Point.



LIFE LIKE NOWHERE ELSE

Over evolutionary time, Hawaii's isolated Pacific location gave rise to one of the world's unique coral reef communities.

The first corals and marine creatures floated here on ocean currents and then hunkered down to begin life anew, 2,500 miles from the nearest continental land mass. Strong currents and cooler temperatures at the northern edge of the tropics presented challenges for the new species, which depend on warm, shallow water. Out of hundreds of genera of coral, just five came to dominate in Hawai'i. Within these hardy groups, remarkable species evolved that were adapted to the new habitat.

This moray eel isn't eating his dinner – he's getting his teeth cleaned by scarlet cleaner shrimp.

Yellow tangs and convict tangs eat the algae off the back of a green sea turtle.

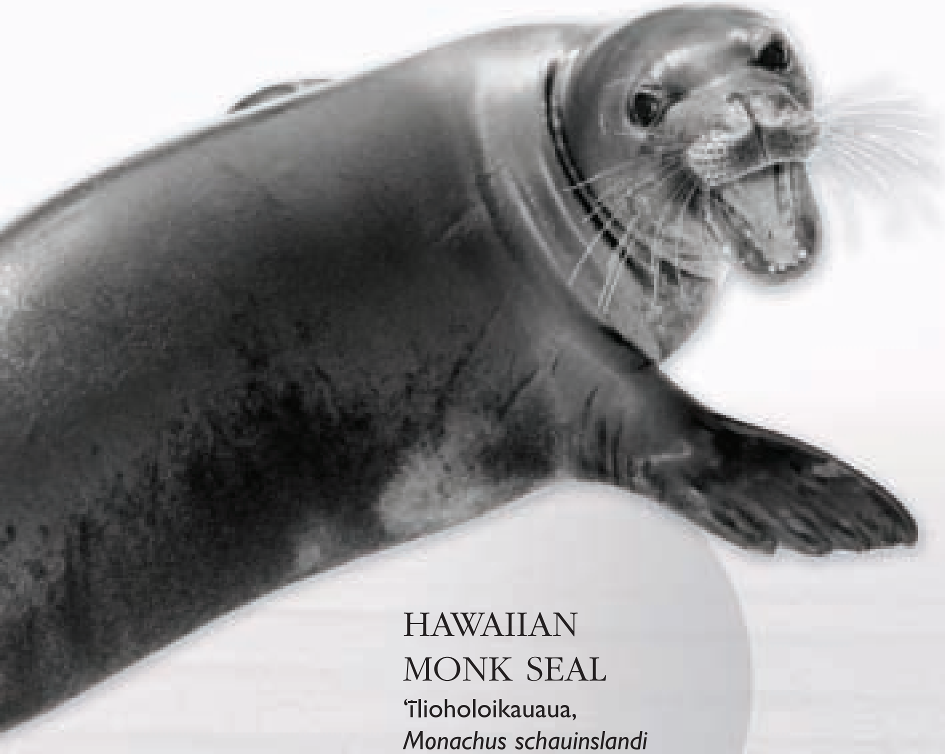
ENDEMIC SEA LIFE

This tailored attunement of species to a specific place is called **endemism**. No other coral reefs of similar size on the planet have a higher rate of endemism than Hawai'i.

SADDLE WRASSE
Hinālea lauwili,
Thalassoma duperreyi

CHOCOLATE CHIP
SEA CUCUMBER
Ioli, *Holothuria sp.*

Today, about 25 percent of Hawaiian corals are found nowhere else in the world. The same is true of roughly a quarter of the 7,000 marine creatures supported by Hawai'i's coral reefs.



HAWAIIAN MONK SEAL

ʻĪlioholoikauaua, *Monachus schauinslandi*

BANDIT ANGELFISH

Apolemichthys arcuatus

The downside of Hawaiʻi's endemism is that there is no replacement pool should our corals and marine life perish. This vulnerability underscores one of nature's hard-won lessons: that the rarest of creatures are sometimes the most valuable.

MASKED ANGELFISH

(female above, male below) *Genicanthus personatus*

BANDED SPINY LOBSTER

ula, ula poni, ula hiwa *Panulirus marginatus*

Species photos © David Liittschwager and Susan Middleton

ANCIENT TIES TO THE REEF

‘Åpapa (coral reefs) and the inshore ocean world were of enormous importance to ancient Hawaiians.

The major source of protein in the Hawaiian diet was seafood, so careful management of ocean resources was essential. The Hawaiians affectionately referred to inshore areas as the “meat bowl” and fished or foraged in the shallows or on the reefs daily. Women did the bulk of the gathering, accompanied by children who soon learned the skills to tease lobster and octopus from their holes, pry shellfish from the rocks, identify the tastiest limu (seaweed), and trap fish with basket and net. Yet even with a pre-contact population estimated as high as 1 million people – comparable in size to our population today – the Hawaiians harvested from the sea in a manner that sustained healthy and resilient fish populations and reef life. Their approach to caring for resources was both spiritual and highly practical, and based on a simple conservation ethic:

Inā mālama ‘oe i ke kai,
mālama no ke kai iā ‘oe

If you care for the ocean, the ocean will care for you

LOKO I‘A

The development of loko i‘a (fishponds) allowed Hawaiians to extend and control the bounty of the reefs. Hawaiians developed a sophisticated system of aquaculture by walling in areas of inshore water, usually around estuaries where fresh water entered the sea. Gates allowed water to circulate and pua (young fish) to enter while keeping undesirable fish (such as larger predators) out. As the pua matured and became too large to escape from the pond, they were harvested for food. The fish that were not big enough to harvest were released back on to the reef where they would spawn and replenish the food supply. The fishpond was thus part of the larger ahupua‘a system in which resources were sustainably managed from the mountains to the open sea.

KONOHIKI

Under the traditional system, the ali'i (chiefs) held all land "in trust" as gifts from the gods, and apportioned use rights within each ahupua'a to their representatives, or konohiki, who were responsible for proper protocol in how resources were to be managed. The konohiki enforced seasonal kapu linked to religious observances, but they would also put in place or remove kapu based on close observation of local conditions. The konohiki were guided by centuries of passed-down knowledge, often in proverbs such as Pala ka hala, momona ka hā'uke'uke: when the pandanus fruit ripens, the sea urchin is fat (with eggs). The wisdom and authority of konohiki were considered absolute.

LAWAI'A NUI

Knowledge of the ocean fisheries and reefs, and their resources was embodied in the lawai'a nui, a select group of fishing experts whose ranks included both chiefs and commoners. For these men, fishing was a science that carried with it a vast legacy of knowledge. The lawai'a nui knew all the different types of fish, their habitats and food preferences, spawning seasons and migration patterns, as well as the various techniques for catching them. Together the konohiki and lawai'a nui, as well as a wide range of other practitioners in environmental matters, worked to implement the sustainable management and use of their ahupua'a.

AN INTIMATE KNOWLEDGE OF PLACE

The Hawaiian ahupua'a system of land management allowed for local control over resources. Each island was divided into ahupua'a, typically wedges of land running from an apex at a high point on the island to the coast and out to the far edge of the reef. Each ahupuaʻa sustained a community of extended families – ʻohana – linked by intermarriage and the span of generations living in that place. Thus each community intimately knew the land and adjacent marine world that sustained them.

Hawaiians revered ocean life forms, considered manifestations of major gods and ʻaumakua (ancestral deities). This heʻe (octopus) was offered as a symbol of the god Kanaloa on a fishing shrine at Kahoʻolawe.

Hawaiians were masters at utilizing the resources of the reef. For example, limu (seaweed) was used for food, medicine, ritual purposes, or as a lei worn by hula dancers.

KAPU!

The kapu system was an important way that the Hawaiians conserved resources. Placing a resource under kapu (proclaiming the taking of it as taboo) at certain times of the year acknowledged that the things that sustained humans were gifts from the gods. Kapu were placed or lifted according to an understanding of natural cycles (seasonal and lunar cycles, and the corresponding reproductive cycles of marine life), and close observation of local conditions. By observing the peak spawning cycles of fish or when sea urchins produced eggs or seaweed produced spores, Hawaiians would avoid harvesting at times that disturbed these natural cycles.

TROUBLED WATERS

Coral is a living animal, and a coral reef resonates with life. But like any living system, it suffers from prolonged exposure to disturbance and stress.

If the threats are not removed, a reef becomes susceptible to invasion, disease, fragmentation, and even death. Biologists tell us this is happening throughout the main Hawaiian Islands, and that people are causing most of the damage. Overfishing, pollution, sedimentation, heavy recreational use, and the introduction of alien species are all human activities that jeopardize the long-term health of our reefs. Hawai‘i is not alone. Coral reefs in at least 80 countries are threatened, and within the next 50 years the majority may be damaged beyond repair. The good news is that coral reefs are resilient. If we act in time, we can still heal our troubled waters and bring our reefs back from the brink.

COASTAL DEVELOPMENT

Improper coastal development creates runoff of sediment and pollution that covers and chokes coral. In Hawa'i, where the terrain slopes dramatically seaward, no place is more than 29 miles from the coast, and most development is within three miles. Many kinds of runoff damage coral reefs: sewage discharge; fertilizers, herbicides, and insecticides from homes and golf courses; and oil, grease, and toxic chemicals from city streets and storm drains. The effects are especially pronounced in harbors and bays, such as Kāneohe Bay on O'ahu, which have less natural flushing action from the tides and currents that normally cleanse coral reefs.

ALIEN SPECIES

A host of invasive species threaten Hawai'i's coral reefs. Alien algae, seaweed, coral, fish, and other foreign organisms introduce disease and out-compete native species for food and space. Alien algae already dominate Kāneohe Bay, O'ahu's south shore, and the west shore of Maui. They are also spreading to remote areas of Moloka'i and Kaua'i. Ships from around the world bring alien marine species to Hawai'i on their hulls and in their ballast water. People who empty exotic fish from their salt-water aquariums into the ocean can compound the problem.

RECREATIONAL OVERUSE

Simply stepping on a reef can harm or kill coral. Coral trampling by uninformed snorkelers, divers, surfers, and other marine recreational users can cause severe localized damage to reefs. So can improper boat anchoring and mooring. With so many people utilizing our coral reefs, the damage adds up. Eight million people annually flock to Waikīkī Beach, and the declining health of that reef reflects the severe overuse. Even Molokini islet off Maui, which is accessible only by boat, receives 750 thousand visitors each year, and that number is likely to continuing growing.

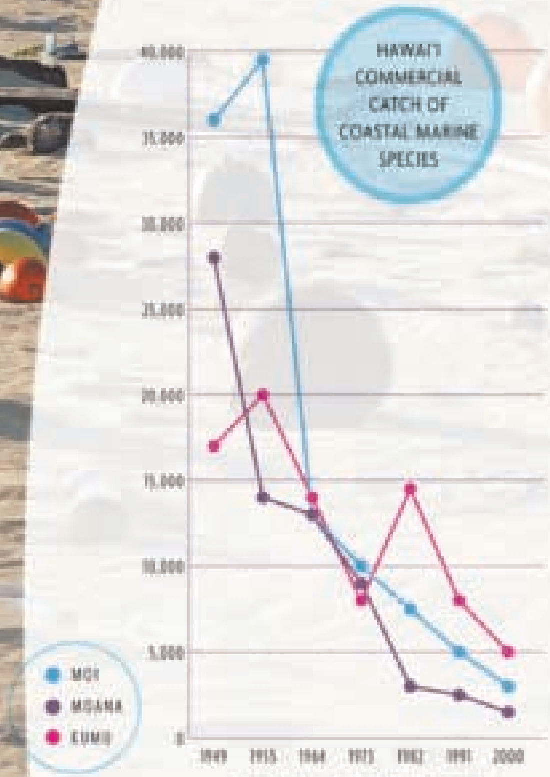
Beach photo © David Liittschwager and Susan Middleton

CORAL BLEACHING

Coral bleaching can occur when a coral reef experiences a change in seawater temperature or carbon levels due to global warming. This bleaching causes the corals to lose algae that provide them with nutrition. Corals can survive if the bleaching is brief, but not if it is prolonged. The problem is compounded when corals are stressed by other threats, such as sedimentation or pollution. Thus far, Hawai'i's coral reefs have recovered from brief episodes of coral bleaching. But if the trend in rising water temperatures and increased run-off continues, any future damage could be permanent.

NATURAL DISASTERS

Coral reefs are subject to damage from hurricanes and storms, high wave action, unusually heavy rains (which causes shallow reefs to be inundated with fresh water), and extreme low tides. Healthy coral reefs can usually recover from a natural event. However, the addition of human-created stresses can diminish their ability to survive.



Source: State Division of Aquatic Resources

DECLINING CATCH

Hawai'i's coral reefs provide us with fish for both food and the aquarium trade. But increasing numbers of people are fishing, and they're using more sophisticated gear, vessels, and technology to increase their catch. As a result, we are harvesting marine life faster than it can be replenished through natural growth and reproduction. Commercial catch data indicates that fish stocks have declined by more than 75% from what they were just a century ago, and that the aquarium trade in west Hawai'i has increased six-fold in the past 20 years.

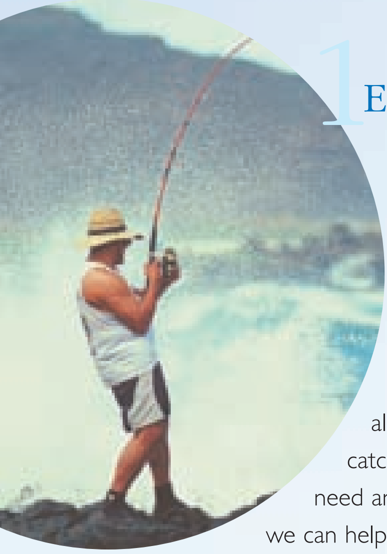
PROTECTING A PRICELESS NATURAL ASSET

Some natural resources are classified as public goods, things that we all share and feel entitled to use for free – for example, our beaches and our reefs. Unfortunately, our reef resources are becoming increasingly scarce public goods.

With a resident population of 1.3 million and 7 million visitors arriving annually, the number of people making demands on Hawai'i's reefs reflects what economists call the tragedy of the commons – too many people trying to get what they want out of the same limited natural resource.

Because Hawai'i's coral reefs are a valuable and essential part of our economy, our lifestyles, and our cultural heritage, we as a community must make difficult choices about who gets what from them. Although our society has instituted rules regarding use of the ocean's resources, they have proven inadequate, and are oftentimes ignored. As a result, many of our reefs are now severely depleted. Unlike traditional Hawaiians, whose conservation ethic and kapu led them to take only what they needed, we lack effective incentives and adequate enforcement of laws to conserve near-shore marine life. Hawai'i's coral reefs generate more than $360 million of income annually in recreation, fishing, aquarium capture, research, and other uses. By comparison, investment in understanding and regulating the growing demands on our reefs is minimal. Given that our reefs are the natural and economic assets on which our lifestyle and tourist-based economy rely, are we investing enough – and are we investing in the right systems – to safeguard these priceless and irreplaceable pieces of our natural heritage?

On our reefs, the desire for short-term profits competes with the long-term survival of a natural and cultural asset that must be carefully managed to yield benefits now and for future generations. Here are six important investments we can make in our reefs to ensure a sustainable future.



1 Encourage Responsible Fishing

Some fishing methods are kinder to the ocean environment than others. If we return to the traditional Hawaiian way of catching only what we need and caring for ocean life, we can help ensure that future generations can use and enjoy our oceans as we have. Everyone who uses our oceans must take responsibility for caring for them as well. By knowing and following the regulations and taking only what is needed, we can ensure fish for today and for tomorrow.

2 Invest Onshore to Protect Offshore

In March 2006, lack of sewer maintenance and limited capacity led to the dumping of 48 million gallons of raw sewage into the Ala Wai Canal, where it quickly flowed into the waters off Waikīkī. While never before this large, sewage spills have become commonplace in Hawai‘i, and their impacts are degrading our reefs. During heavy rains, sewage often combines with wastewater discharge, storm water, fertilizers and pesticides, and the leaching of nutrients from cesspools, injection wells, and other sources of pollution, as it flows to the sea. To protect and restore Hawai‘i's reefs, we need long-term investment in effective sewage treatment facilities and an integrated system for preventing other land-based sources of pollution. You can do your part by replacing cesspools, ensuring that your septic system is installed and functioning properly, using non-toxic cleaners and detergents, properly disposing of toxic chemicals, motor oil, and other solvents, and not putting anything down the storm drains – which flow unimpeded onto our reefs.

3 Support Community-Based Marine Management

Coastal communities as diverse as Maunalua in east Honolulu and Miloli‘i in south Kona are taking responsibility for managing the ocean resources on which their lifestyles depend. Many communities are participating in the state's Makai Watch program, informing snorkelers, kayakers, fishers, boaters, and other ocean users of ocean resource protection laws. They then work to ensure compliance with those laws and chart the progress of their efforts, monitoring human use and biological change over time. In its first year, the Makai Watch program attracted the interest of nearly 30 communities. Their efforts must be encouraged through supportive state laws and funding. To start or join a Makai Watch program in your coastal community, go to www.hawaii.gov/dlnr.

4 Develop the State's Capacity to Ensure Legal Compliance

For a state with the nation's fourth longest coastline, Hawaii's enforcement capacity is under funded and understaffed. The result is that natural resource violations often go undetected and unpunished. A renewed commitment to marine resource management must go hand in hand with a renewed commitment to resource enforcement. The taking of a female lobster out of season or the killing of an endangered sea turtle or monk seal results in the irreplaceable loss of a precious public resource. To help, know the laws and report violations to the Division of Conservation and Resource Enforcement at 643-3567, and start or join a Makai Watch program in your coastal community.

5 Stop the Influx and Spread of Aquatic Invasive Species

Invasive marine species in our oceans are causing irreparable harm to our native ecosystems, human health, and economy. At least 19 species of algae, 34 species of marine fishes, and 287 invertebrate species have been introduced to Hawai‘i, some purposefully (e.g. for food fish) and some accidentally (e.g. through hull fouling and in ballast water). Several of these have become unwanted and expensive pests. For example, *Salvinia molesta*, which cost nearly $1 million to remove from Lake Wilson, and the invasive algae, *Gracilaria salicornia*, which has invaded beaches throughout the islands. In September 2003, the state released its Aquatic Invasive Species Management Plan, with recommendations for closer collaboration, new policy, research, and outreach to ensure the prevention, early detection, and rapid response to invasive aquatic species. While some progress has been made, we need to continue to fund the recommendations made in that plan, which was endorsed by more than a dozen public and private agencies. You can help by learning how to identify our most common aquatic invasive species, and reporting new infestations to DLNR. Check your nets, anchor chain and line, boat hulls, and all other ocean gear to ensure that you are not unintentionally spreading alien species from place to place. Don't release non-native animals, plants, or algae into the wild.

6 Establish Marine Nursery Areas for Fish

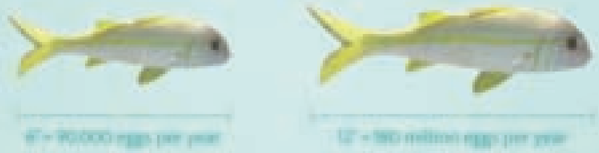
Ultimately, if we want to protect our fishing heritage in Hawai‘i, we need to begin restoring our near shore reef fish populations. To do this, our best hope lies in providing nursery areas for enough fish to grow large and reproduce at a rate that exceeds the rate of extraction. When given a safe haven in which to grow and reach full maturity, fish reproduce at much healthier rates, and are able to replenish fish stocks faster and further from their home range. The process of designating nursery areas must be based on the best available science and credible local knowledge, and must involve fishers, local communities, scientists, and government agencies to ensure that the long-term economic and environmental needs of the state and its residents are met.

Seasonal Closures Do Not Work

Science and experience have shown that seasonal closures are not successful at replenishing fish populations over the long term. For example, at the Waikīkī/Diamond Head Fisheries Management Area, stocks do increase in the year that the area is closed to fishing. However, those increases are immediately offset when the area is re-opened the following year. More disturbing is the data that indicates that the fish biomass (both size and abundance of fish) within the Fisheries Management Area is actually getting smaller over the long term.

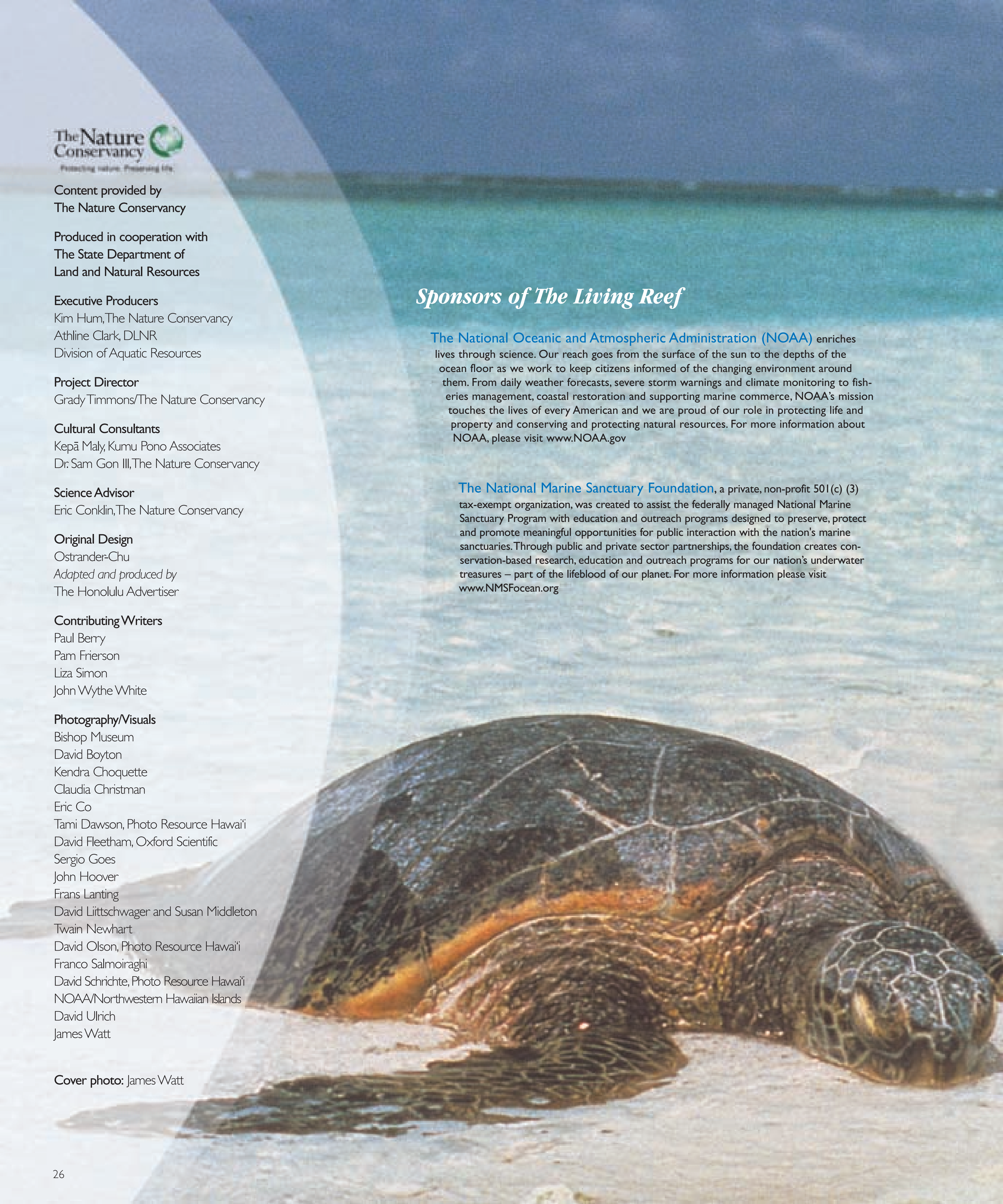
BIGGER FISH = MORE FISH

Larger, older fish reproduce faster and better than smaller, younger fish. The eggs of older fish are also healthier, and therefore more likely to survive into adulthood.



For example, a typical six-inch reef fish such as the weke ‘ula (weke) spawns once a year, releasing 90,000 eggs.

A 12-inch weke, on the other hand, spawns four to five times per year, releasing 45,000,000 eggs each time.



The Nature Conservancy
Protecting nature. Preserving life.

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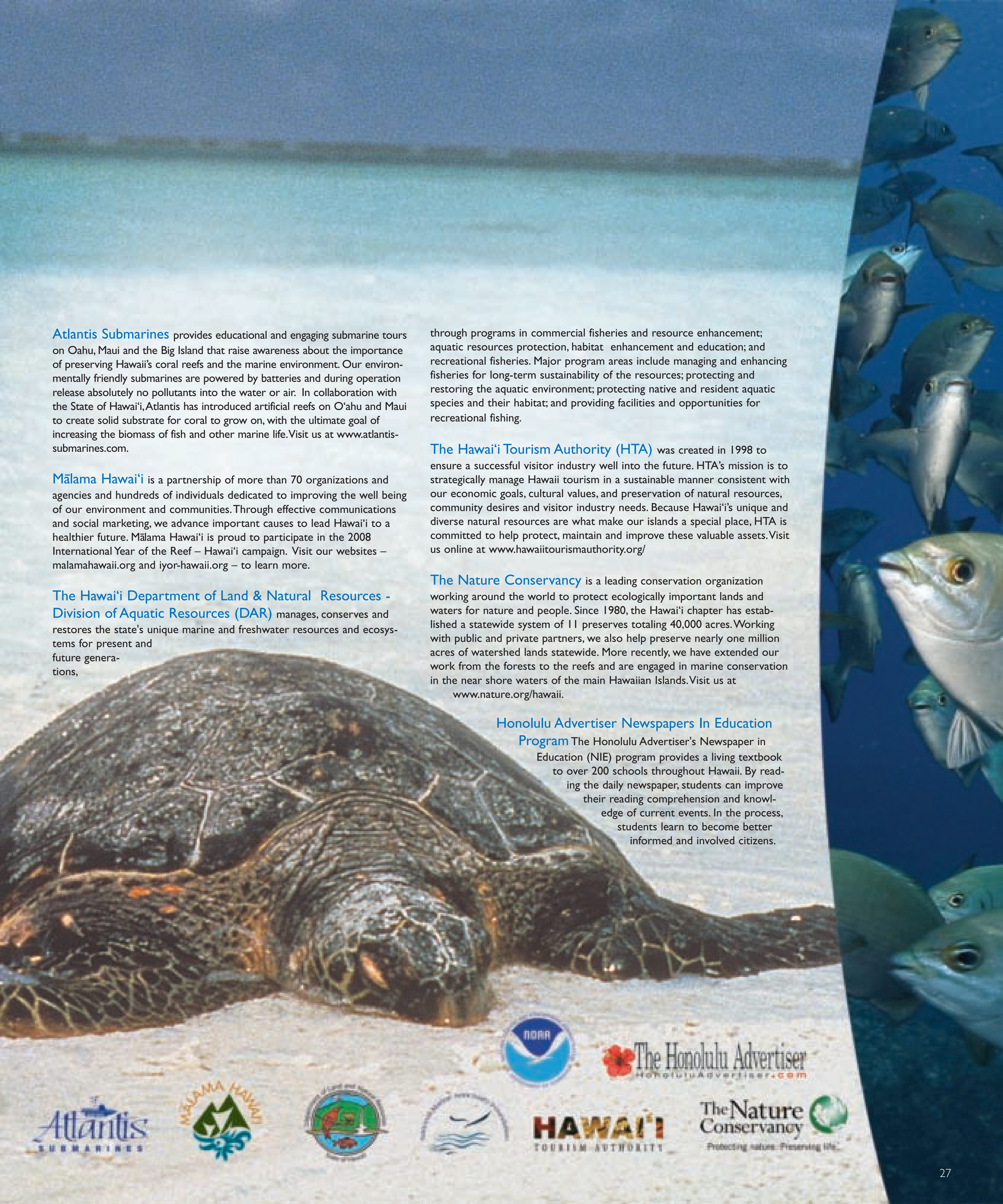
The National Marine Sanctuary Foundation, a private, non-profit 501(c) (3) tax-exempt organization, was created to assist the federally managed National Marine Sanctuary Program with education and outreach programs designed to preserve, protect and promote meaningful opportunities for public interaction with the nation's marine sanctuaries. Through public and private sector partnerships, the foundation creates conservation-based research, education and outreach programs for our nation's underwater treasures – part of the lifeblood of our planet. For more information please visit www.NMSFocean.org



Atlantis Submarines provides educational and engaging submarine tours on Oahu, Maui and the Big Island that raise awareness about the importance of preserving Hawaii's coral reefs and the marine environment. Our environmentally friendly submarines are powered by batteries and during operation release absolutely no pollutants into the water or air. In collaboration with the State of Hawai'i, Atlantis has introduced artificial reefs on O'ahu and Maui to create solid substrate for coral to grow on, with the ultimate goal of increasing the biomass of fish and other marine life. Visit us at www.atlantis-submarines.com.

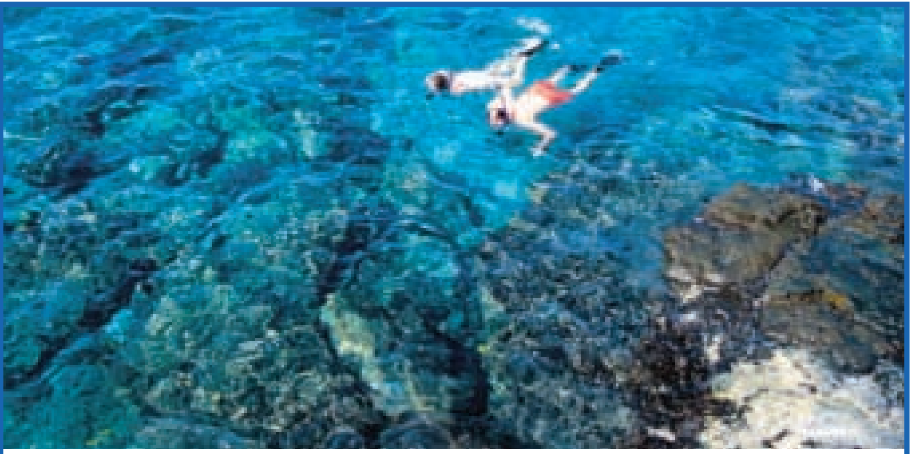
Mālama Hawai'i is a partnership of more than 70 organizations and agencies and hundreds of individuals dedicated to improving the well being of our environment and communities. Through effective communications and social marketing, we advance important causes to lead Hawai'i to a healthier future. Mālama Hawai'i is proud to participate in the 2008 International Year of the Reef – Hawai'i campaign. Visit our websites – malamahawaii.org and iyor-hawaii.org – to learn more.

The Hawai'i Department of Land & Natural Resources - Division of Aquatic Resources (DAR) manages, conserves and restores the state's unique marine and freshwater resources and ecosystems for present and future generations, through programs in commercial fisheries and resource enhancement; aquatic resources protection, habitat enhancement and education; and recreational fisheries. Major program areas include managing and enhancing fisheries for long-term sustainability of the resources; protecting and restoring the aquatic environment; protecting native and resident aquatic species and their habitat; and providing facilities and opportunities for recreational fishing.

The Hawai'i Tourism Authority (HTA) was created in 1998 to ensure a successful visitor industry well into the future. HTA's mission is to strategically manage Hawaii tourism in a sustainable manner consistent with our economic goals, cultural values, and preservation of natural resources, community desires and visitor industry needs. Because Hawai'i's unique and diverse natural resources are what make our islands a special place, HTA is committed to help protect, maintain and improve these valuable assets. Visit us online at www.hawaiitourismauthority.org/

The Nature Conservancy is a leading conservation organization working around the world to protect ecologically important lands and waters for nature and people. Since 1980, the Hawai'i chapter has established a statewide system of 11 preserves totaling 40,000 acres. Working with public and private partners, we also help preserve nearly one million acres of watershed lands statewide. More recently, we have extended our work from the forests to the reefs and are engaged in marine conservation in the near shore waters of the main Hawaiian Islands. Visit us at www.nature.org/hawaii.

Honolulu Advertiser Newspapers In Education Program The Honolulu Advertiser's Newspaper in Education (NIE) program provides a living textbook to over 200 schools throughout Hawaii. By reading the daily newspaper, students can improve their reading comprehension and knowledge of current events. In the process, students learn to become better informed and involved citizens.



Kirk Lee Aeder

*He ha‘aheo ko mākou i ke kāko‘o
aku i nā nani o ko kākou ‘āina.*

The Hawai‘i Tourism Authority
is proud to support the many things
that make Hawai‘i so special.

Celebrating the
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