Coral Reef Habitat Assessment for U.S. Marine Protected Areas:

State of Hawaii: NW and Main Hawaiian Islands

National Oceanic and Atmospheric Administration
NOAA's National Ocean Service
Management & Budget Office
Special Projects

February 2009

Project Overview

About this Effort

The United States Coral Reef Task Force (USCRTF), in both its National Action Plan to Conserve Coral Reefs (2000) and its National Coral Reef Action Strategy (2002), established a key conservation objective of protecting at least 20% of U.S. coral reefs and associated habitat types in no-take marine reserves. NOAA's Coral Reef Conservation Program has been supporting efforts to assess current protection levels of coral reefs within Marine Protected Areas (MPAs) and quantify the area of U.S. coral reef ecosystems protected in no-take reserves. The official federal definition of an MPA, signed into law by Executive Order 13158, is "any area of the marine environment that has been reserved by federal, state, tribal, territorial, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein." A significant source of information for these assessments has been the National MPA Center's Inventory of Marine Managed Areas (MMAs) in the U.S (2006a)[1]. This report provides a preliminary assessment of the areal extent of coral reef habitat and associated habitat types within MPAs, as well as the level of protection afforded them, by using GIS-based MPA boundaries from the MMA Inventory–MPA Classification System (2006a,b), and U.S. Coral Jurisdiction benthic habitat data developed by NOAA's National Centers for Coastal Ocean Science Biogeography Team (NOAA 2007; 2003).

More information on the state and territory sites included in this assessment, including their goals and objectives and how they are established and managed is available in the NOAA Coral Reef Conservation Program Technical Memorandum, *Report on the Status of Marine Protected Areas in Coral Reef Ecosystems of the United States: Volume 1 Marine Protected Areas Managed by U.S. States, Territories and Commonwealths* (Wusinich-Mendez, D and C. Trappe. 2007). This document (pdf, 5.26 MB) is available for download at http://www.coralreef.noaa.gov/Library/Publications/cr%5Fmpa%5Freport%5Fvol%5F1.pdf.

1 Data for the MMA Inventory were collected by many individuals from a variety of sources. As a result, the content and level of detail of the overview text may vary from site to site.

NCCOS Habitat Mapping Effort

The National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS) initiated a coral reef research program in 1999 to map, assess, inventory, and monitor U.S. coral reef ecosystems (Monaco et al. 2001). These activities were implemented in response to requirements outlined in the Mapping Implementation Plan developed by the Mapping and Information Synthesis Working Group (MISWG) of the Coral Reef Task Force (CRTF) (MISWG 1999). NOS's National Centers for Coastal Ocean Science (NCCOS) Biogeography Team was charged with the development and implementation of a plan to produce comprehensive digital coral-reef ecosystem maps for all U.S. States, Territories, and Commonwealths within five to seven years. In response to the Executive Order 13089 and the Coral Reef Conservation Act of 2000, NOS is conducting research to digitally map biotic resources and coordinate a long-term monitoring program that can detect and predict change in U.S. coral reefs, and their associated habitats and biological communities (Friedlander et al. 2007(1); Friedlander et al. 2007(2); Monaco et al. 2001).

Acknowledgements

Hawaii / Department of Land & Natural Resources / Division of Aquatic Resources
(Special Thanks to M. Kimberly Lowe)

National Park Service
NOAA / Coral Reef Conservation Program
NOAA / NOS / Special Projects
NOAA / NOS / NCCOS / Biogeography Team
NOAA / NOS / Ocean and Coastal Resource Management
NOAA / NOS / National Marine Protected Areas Center
U.S. Fish & WIldlife Service

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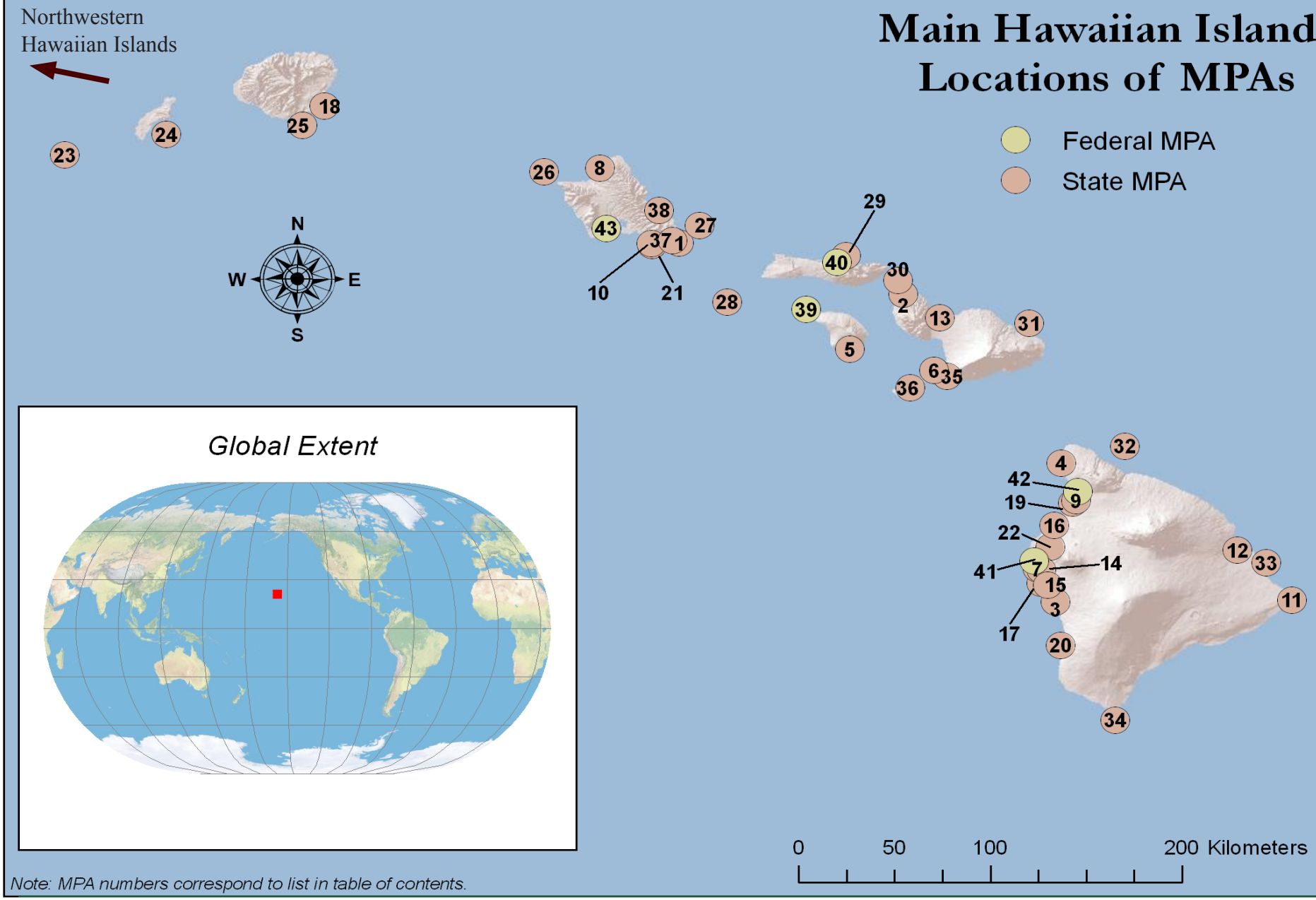
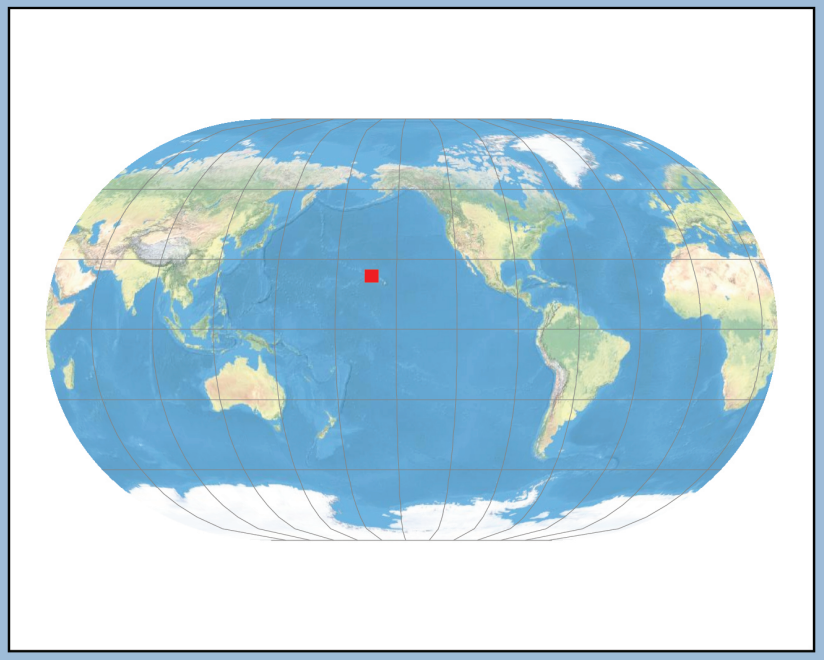


Note: MPA numbers correspond to list in table of contents.

State of Hawaii: Northwestern Hawaiian Islands Locations of MPAs

Federal MPA

42 Papahānaumokuākea Marine National Monument



Main Hawaiian Islands

N
W E
S

0 125 250 500 Kilometers

Note: MPA numbers correspond to list in table of contents.

Hawaii: NW and Main Hawaiian Islands

Introduction

As one of the most isolated archipelagos on earth, 25% or more of most coral species in Hawai'i are found no where else in the world (DLNR DAR 2005). The islands consist of two regions, the Main Hawaiian Islands (MHI) and the Northwestern Hawaiian Islands (NWHI). The MHI, where 99% of the state's 1.3 million residents reside, consists of "high volcanic islands with non-structural reef communities and fringing reefs abutting the shore" (Friedlander, et al. 2005). The NWHI spans over 2,000 km of mostly uninhabited atolls, islands, and banks (Komoto and Gombos, 2007). Currently there are 43 MPAs established in the state (see map on page 1) with 12 of the sites designated as no-take areas (Appendix A)[1]. No-take MPAs allow human access and even some potentially harmful uses, but totally prohibit the extraction or significant destruction of natural or cultural resources.

The table below shows the total area of each biological benthic cover type in all of Hawaii and all MPAs as well as only no-take MPAs. The percentage of the mapped benthic habitat within MPAs and no-take MPAs is also listed. Approximately 54% of the 1,301 square kilometers of mapped coral reef ecosystem (defined below) in Hawaii are within MPAs and 22% are within no-take MPAs. To view the totals for each individual site, see Appendix B.

1 In this report, "No-take" MPAs are MPAs that have one of the following "Levels of Protection" under the U.S. MPA Classification System: 1) No Take, 2) No Impact, 3) No Access, or 4) Zoned Multiple-Use With No-Take Area(s). Out of 12 'Zoned Multiple-Use With No-Take Areas' in the U.S. Coral Jurisdictions only 4 had delineated No-take zones and thus were the only sites from this category to be included in the "No-take" calculations: East End Marine Park (VI), Kealakekua Bay MLCD (HI), Lapakahi MLCD (HI), and Molokini Shoal MLCD (HI).

Cover Types and Characterization

Coral	Substrates colonized by live reef building corals and other organisms. Habitats within this category have at least 10% live coral cover.
Coralline Algae	An area with 10% or greater coverage of any combination of numerous species of encrusting or coralline algae. May occur along reef crest, in shallow back reef, relatively shallow waters on the bank/shelf zone, and at depth.
Emergent Vegetation	Composed primarily of red mangrove and hau trees. Generally found in areas sheltered from high-energy waves, such as shoreline/intertidal or reef flat zones.
Macroalgae	Substrates with 10% or greater coverage of any combination of numerous species of red, green, or brown macroalgae. Usually occurs in shallow backreef and deeper waters on the bank/shelf zone.
Seagrass	Habitat with 10% or more of seagrass.
Turf	A community of low lying species of marine algae composed of any or a combination of algal divisions dominated by filamentous species lacking upright fleshy macroalgal thali.
Unclassified	Areas differentiated from other biological cover types because the major geomorphological structure is primarily terrestrial or artificially created (i.e., artificial).
Uncolonized	Substrates not covered with a minimum of 10% of any of the above biological cover types. This habitat is usually on sand or mud structures. Overall uncolonized cover is estimated at 90%-100% of the bottom.
Unknown	Cover uninterpretable due to turbidity, cloud cover, water depth, etc.

Benthic Habitat Type	Total Mapped Benthic Habitat (km^2)	Total Mapped within All MPAs (km^2)	Percent of Mapped Area within all MPAs	Total Mapped within No-take MPAs (km^2)	Percent of Mapped Area within No-take MPAs
Coral	426.972	259.058	60.67%	110.707	25.93%
Coralline Algae	16.509	12.540	75.96%	7.297	44.20%
Emergent Vegetation**	6.559	1.148	17.50%	0.000	0.00%
Macroalgae	457.837	311.575	68.05%	164.283	35.88%
Seagrass**	0.020	0.000	0.00%	0.000	0.00%
Turf**	393.145	118.509	30.14%	0.553	0.14%
Unclassified	17,147.706	581.626	3.39%	420.297	2.45%
Uncolonized	2,365.951	2,197.271	92.87%	2,077.446	87.81%
Unknown	8,586.359	7,190.044	83.74%	1,997.628	23.27%
Coral Reef Ecosystem*	1,301.042	702.83	54.02%	282.840	21.74%

* Coral Reef Ecosystem is defined as mapped coral, coralline algae, emergent vegetation, macroalgae, seagrass, and turf

** Data available for Main Hawaiian Islands only. Emergent Vegetation, Seagrass, and Turf benthic habitat types were not part of the classification scheme for the NW Hawaiian Islands benthic habitat data.

Hawaii: NW and Main Hawaiian Islands

Methods

The Coral Reef Habitat Assessment for U.S. Marine Protected Areas in Hawaii (NW and Main Hawaiian Islands) was conducted between August 2005 and August 2007 through the following actions:

1. *Created a Coral Jurisdiction MPA GIS Database utilizing the U.S. Marine Managed Areas Inventory*

   The Marine Managed Areas (MMA) Inventory contains information on more than 1,500 sites, and is the only such comprehensive dataset in the nation. The term "marine managed area," which was defined through a public comment process, generally refers broadly to an area of the marine environment with a marine resource conservation purpose. The MMA Inventory data collection is a joint collaboration between the National Oceanic and Atmospheric Administration (NOAA) and the Department of the Interior that began in 2001. Its purpose is to gather and make publicly available comprehensive information on place-based marine conservation efforts under U.S. federal, state, territorial, local, and tribal jurisdiction. For more information on the MMA Inventory, visit http://www.mpa.gov/helpful_resources/inventory.html.

2. *Identified which MPAs are No-Take Reserves utilizing the MPA Classification System*

   The National Marine Protected Areas Center has developed a Classification System that provides agencies and stakeholders with a straightforward means to describe MPAs in purely functional terms using five objective characteristics common to most MPAs:

   - Conservation Focus – legally established goals, conservation objectives and intended purpose(s).
   - Level of Protection – level and type of legal protections afforded to the site's natural and cultural resources and ecological processes.
   - Permanence of Protection – length of time protections remain in effect.
   - Constancy of Protection – year-round, seasonal or rotating.
   - Ecological Scale of Protection – range from entire ecosystems and their associated biophysical processes, to focal habitats, species, or other resources deemed to be of economic or ecological importance.

   For most MPAs in the U.S. and elsewhere, these five functional characteristics provide an accurate picture of why the site was established, what it is intended to protect, how it achieves that protection, and how it may affect local ecosystems and local human uses.

3. *Used GIS software to identify area of spatial overlap between benthic habitat data and Coral Jurisdiction MPA boundaries*

   The National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS) initiated a coral reef research program in 1999 to map, assess, inventory, and monitor U.S. coral reef ecosystems (Monaco et al. 2001). These activities were implemented in response to requirements outlined in the Mapping Implementation Plan developed by the Mapping and Information Synthesis Working Group (MISWG) of the Coral Reef Task Force (CRTF) (MISWG 1999). NOS's Biogeography Team was charged with the development and implementation of a plan to produce comprehensive digital coral-reef ecosystem maps for all U.S. States, Territories, and Commonwealths within five to seven years. In response to Executive Order 13089 and the Coral Reef Conservation Act of 2000, NOS is conducting research to digitally map biotic resources and coordinate a long-term monitoring program that can detect and predict change in U.S. coral reefs and their associated habitats and biological communities. For more information on benthic habitat data produced by the NOS Biogeography Team, visit http://ccma.nos.noaa.gov/about/biogeography/proj_theme.html.

4. *Calculated areal extent of benthic habitat data within Coral Jurisdiction MPA GIS boundaries*

   The areal extent of benthic habitat data within MPAs was calculated in the Eckert IV WGS84 projection, using the polygon area calculation operation in XTools Pro 3.2.0 extension for ArcMap™ 9.1 GIS software.

Hanauma Bay Marine Life Conservation District

Management Agency: HI HI Department of Land and Natural Resources

Overview

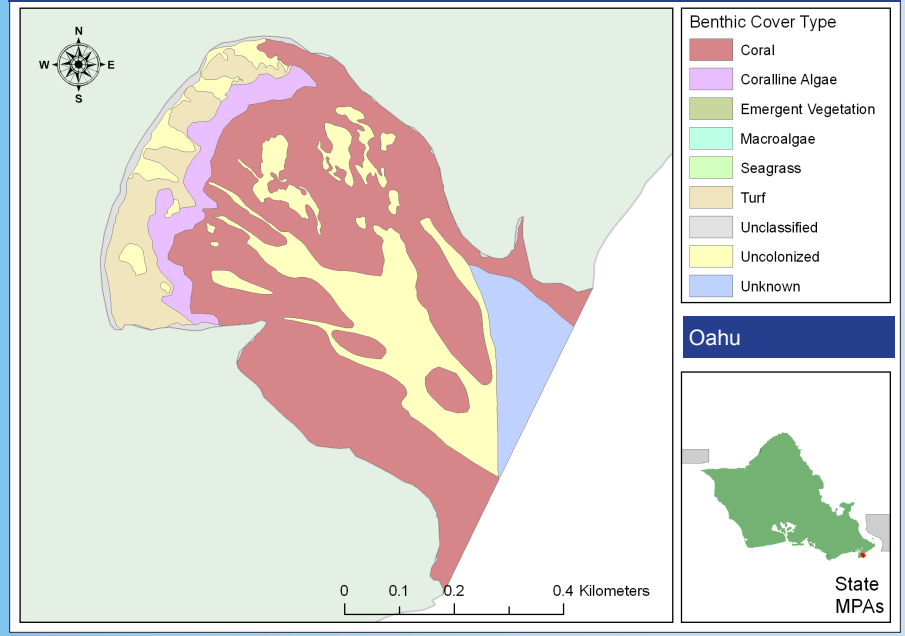
Located near Koko Head at the eastern end of Honolulu, Hanauma Bay is about 15 minutes from Waikiki. The MLCD extends from the highwater mark seaward to a line across the bay's mouth from Palea Point on the left to Paiʻoluʻolu Point on the right.

A shallow fringing reef lies just offshore, with depths up to about 10 feet. The reef flat extends about 100 yards offshore, and has several large sandy-bottomed areas. Fish are abundant along the reef edges surrounding these sandy areas. Visibility is usually best at low tide and early in the day, before sediment is kicked up by snorkelers.

Coral beds are found just outside the fringing reef. Numerous fishes, particularly schooling species, are found here. Turtles are also fairly common. Water depths range to about 30 feet, and visibility is generally good.

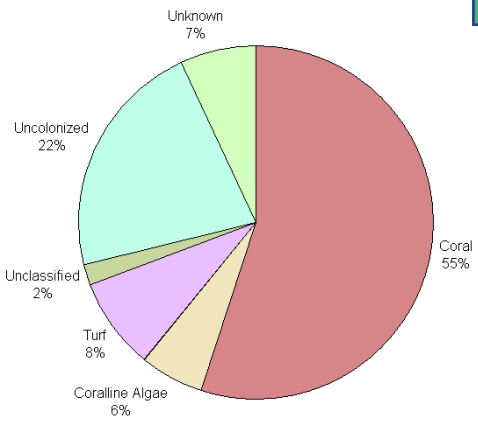
Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Hanauma Bay MLCD



Percent Benthic Cover

This site contains <0.1% of the total area of Hawaii MPAs



Honolua–Mokule'ia Bay Marine Life Conservation District

Management Agency: HI HI Department of Land and Natural Resources

Overview

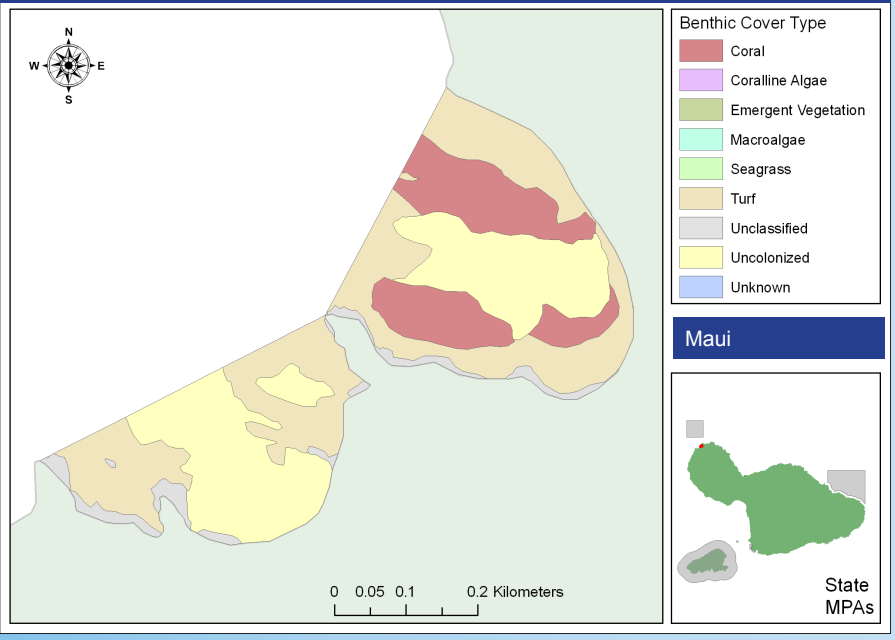
Honolua Bay is located on the northwestern coast of Maui, about 10 miles north of Lahaina. Mokule'ia Bay is southwest of, and adjacent to, Honolua. The Marine Life Conservation District (MLCD) extends from the highwater mark seaward to a line from 'Alaelae Point to Kalaepiha Point, then to the point at the northwestern corner of Honolua Bay.

Honolua Stream carries varying amounts of silt into Honolua Bay. As a result, inshore waters of the bay near the boat ramp area are usually very murky. The bottom here consists of small boulders and silt. Visibility improves as you swim farther out. The middle of the bay is a featureless sand channel, sloping gradually to a depth of about 60 feet at the bay's mouth.

The site was created to protect the area's abundant marine life from human impacts.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Honolua–Mokule'ia Bay MLCD



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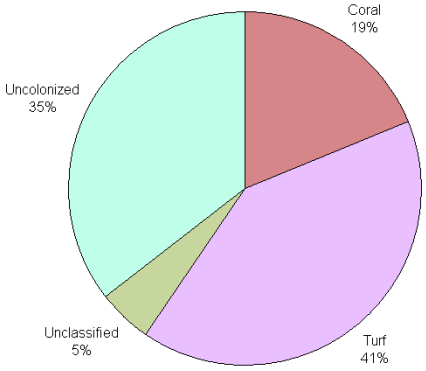


Kealakekua Bay Marine Life Conservation District

Management Agency: HI Department of Land and Natural Resources

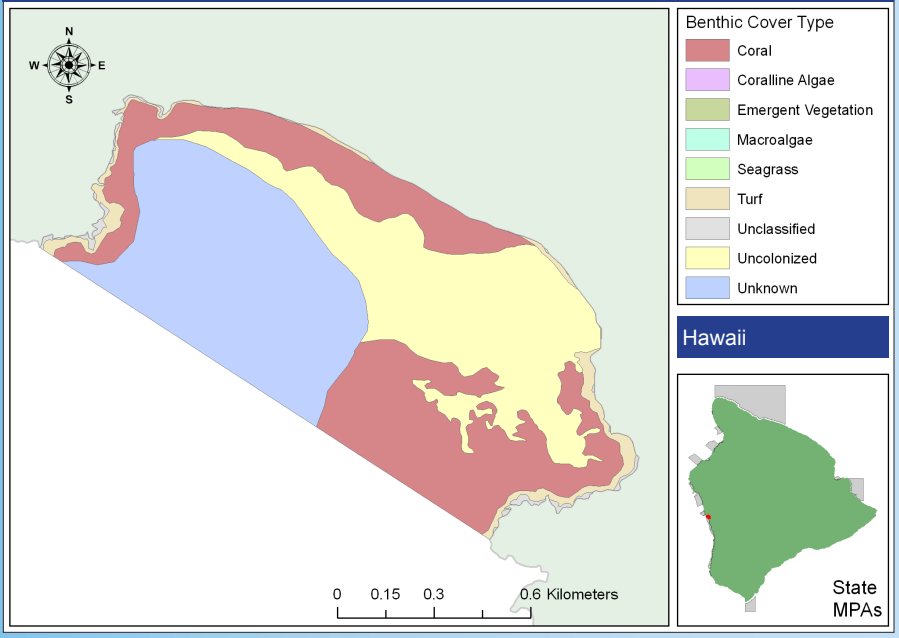
Overview

Located on the western coast of Hawaii near the village of Captain Cook, Kealakekua Bay is about 30 minutes south of Kailua-Kona.The Marine Life Conservation District (MLCD) extends from the highwater mark seaward to a line from Cook Point to Manini Beach Point. A line from Cook Point to the north end of Napo‘opo‘o Beach divides the district into Subzone A to the north and Subzone B to the south.

A University of Hawaii study by Maxwell Doty found the site still largely pristine with little evidence of visible human exploitation, but physical and biological characteristics made the bay extremely vulnerable to ecological change brought by human activity. In addition to the findings of the study, it was highly desirable to preserve and protect the marine resources and geological features of the bay for historical significance, aesthetic appeal, and academic and scientific study.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Kealakekua Bay MLCD



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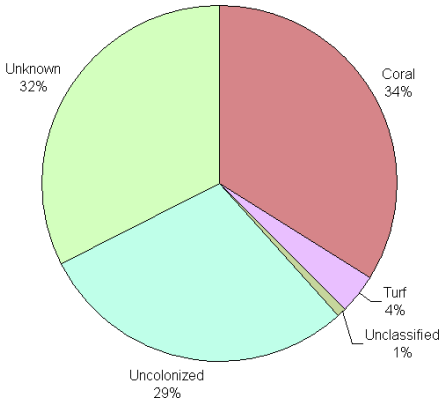


Lapakahi Marine Life Conservation District

Management Agency: HI Department of Land and Natural Resources

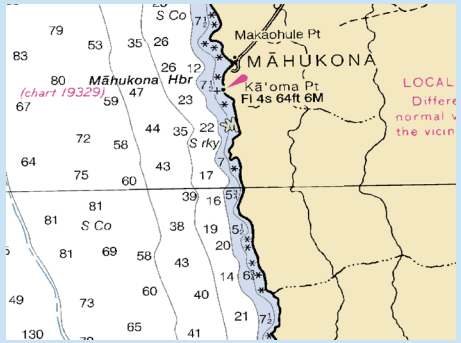
Overview

Located on the northwestern coast of Hawaii, Lapakahi is about 12 miles north of Kawaihae. Surveys by the HI Department of Land and Natural Resources found the offshore waters to be worthy of protection and ideal for establishment as a Marine Life Conservation District (MLCD). This MLCD was also established to complement the adjacent State historical park.

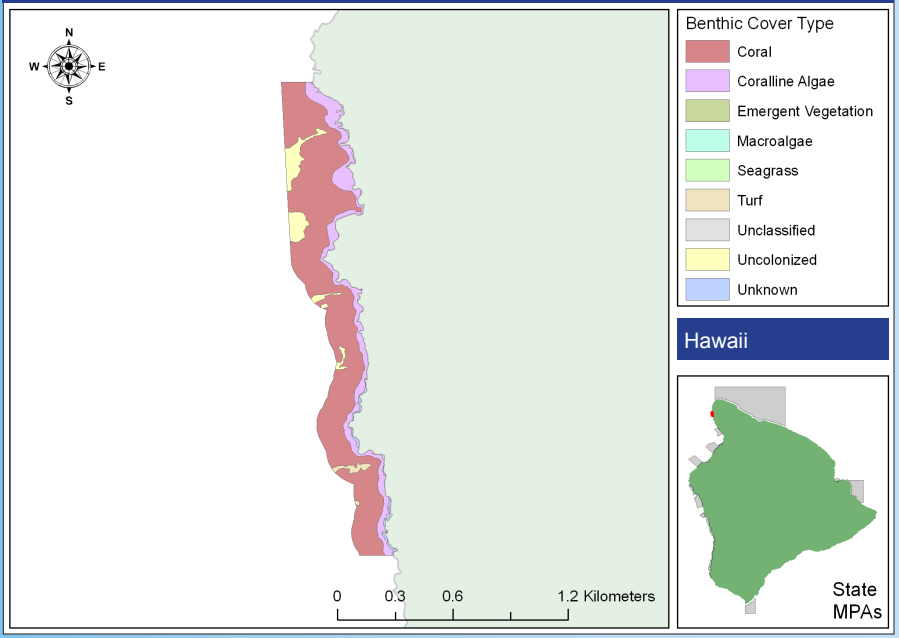
Within Koai'e Cove are two small beaches consisting of coral rubble (there is no sand beach). The nearshore bottom is mostly boulders and lava fingers with some coral. The cove's northern portion has some good coral growth close to shore, but coral and fish are most abundant in the southern portion. Considerable marine life is also found around the cove's rock outcroppings. During the winter, humpback whales are frequently spotted just offshore.

The reef in general becomes more dense as you swim farther out. Depths within the cove range gradually from about 5 to 30 feet. Approaching the seaward boundary of the MLCD, there is an abundance of coral and fishes at depths of about 60 to 80 feet.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Lapakahi MLCD



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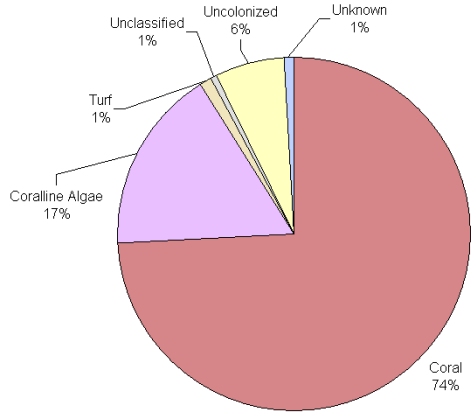


Manele-Hulopo'e Marine Life Conservation District

Management Agency: HI Department of Land and Natural Resources

Overview

The Manele-Hulopoe Marine Life Conservation District (MLCD) is located in the waters offshore of Palawai and Kamao on the southwestern coast of Lanai. Manele-Hulopo`e MLCD is divided into two subzones. Subzone A extends from the highwater mark seaward to a line from Kaluako'i Point to Flat Rock, then to Pu'u Pehe Rock. Subzone B extends from the highwater mark seaward to a line from Pu'u Pehe Rock to Kalaeokahano Point.

House Resolution 456 (1971) requested the site be designated as a MLCD. Increased charter boat operation and anchoring within Hulopo`e Bay was damaging the marine environment and causing water pollution from accumulation of garbage and waste. The charter boats were picking coral and spearing fish, while leaving feces, toliet paper, and garbage. The garbage and waste attracted sharks to the bay, creating a risk to recreational users. Hulopo`e Bay is the only white sand beach on Lana`i that offers swimming and picnic facilities for the island's population, and Lana`i residents wanted to keep boats out of the area.

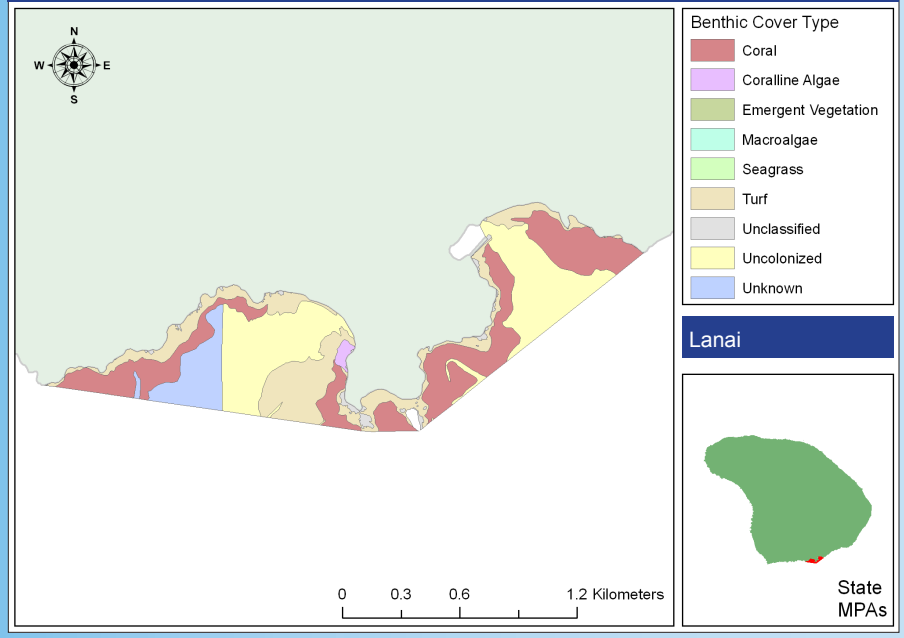
Within Manele Bay corals are most abundant along the sides of the bay near the cliffs, where the bottom slopes down to about 40 ft.

Hulopo'e Bay has large tidepools at its western point, and a shallow, offshore reef that provides excellent snorkeling opportunities.

Pu'u Pehe Cove has clear water and considerable marine life. Coral growth is interspersed with sand patches, and most coral is found away from the narrow beach in about 10 to 15 ft of water.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Manele-Hulopo'e MLCD



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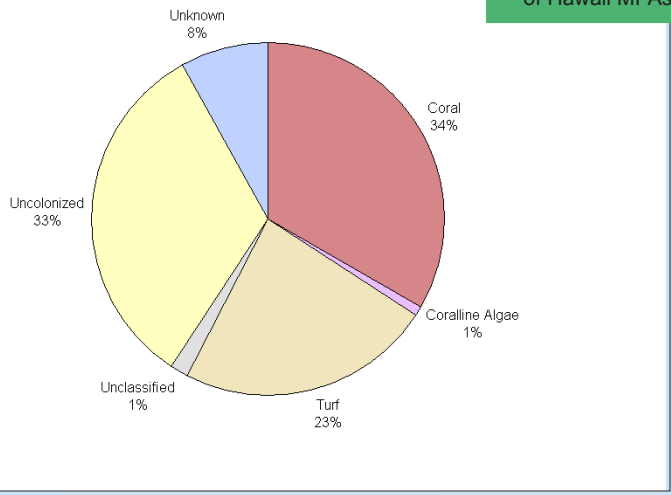


Molokini Shoal Marine Life Conservation District

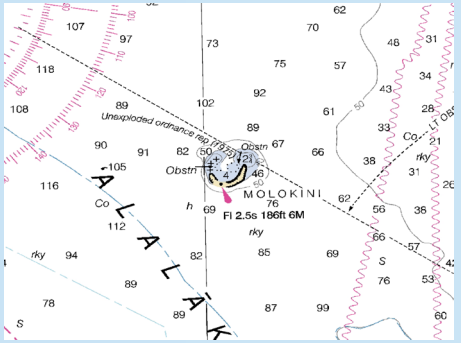
Management Agency: HI Department of Land and Natural Resources

Overview

Molokini is a crescent-shaped islet located in the ‘Alalakeiki Channel, about 3 miles off Maui’s southwestern coast. Molokini Shoal MLCD is divided into two subzones. Subzone A includes the cove, bounded by a line extending from the end of the submerged ridge off Lalilali Point to Pahe’e O Lono Point. Subzone B extends 100 yards seaward to the islet and subzone A.

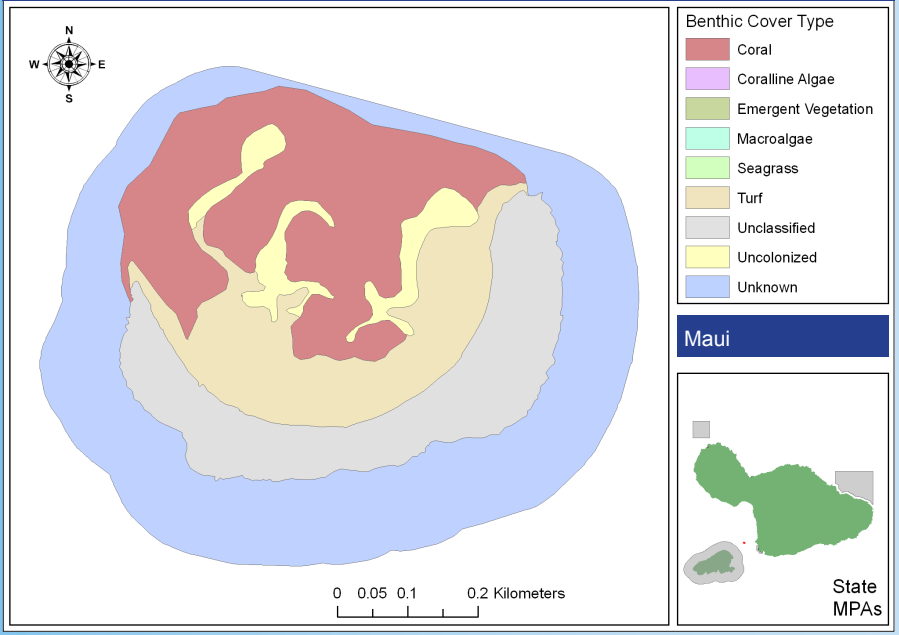
The waters surrounding Molokini island include one of the finest marine environments in the state. Many species found at Molokini are extremely rare or nonexistent in the rest of the state. This unique marine environment represents an educational and scientific resource of inestimable value to current and future generations. As such, this area was designated a Marine Life Conservation District in 1976.

Molokini islet is the southern rim of an extinct volcanic crater. The shallow, inner cove is the crater’s submerged floor. The cove area slopes off from the shoreline to a depth of about 100 feet before dropping precipitously into much deeper water. The bottom consists of sand patches, coral, and basaltic boulders. A shallow reef in less than thirty feet of water extends from the shoreline northward at the islet’s northwestern point. The diversity of fish and other marine life within the MLCD is among the most impressive in the state. Even humpback whales have been known to enter the cove.



Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA’s National Marine Protected Areas Center.

Molokini Shoal MLCD



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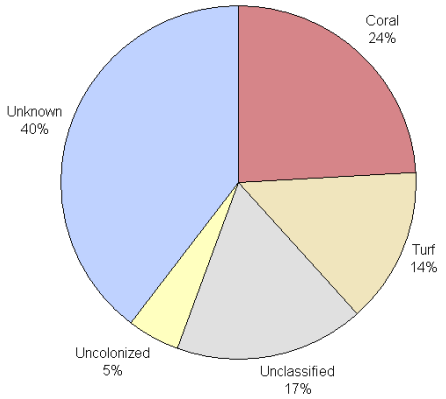


Old Kona Airport Marine Life Conservation District

Management Agency: HI Department of Land and Natural Resources

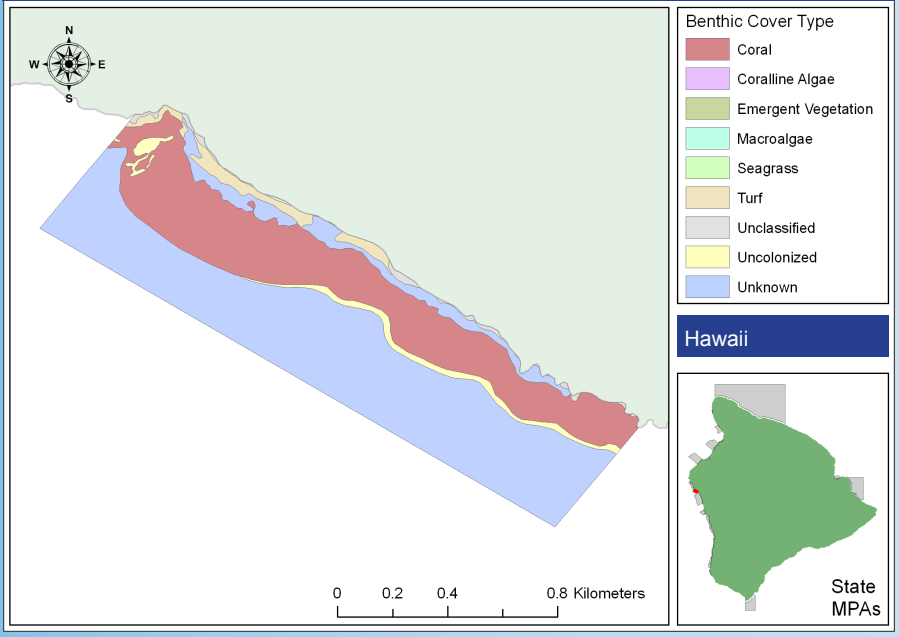
Overview

Old Kona Airport is located on the west coast of Hawaii just west of Kailua-Kona town. Old Kona Airport Marine Life Conservation District (MLCD) includes the waters offshore of the Old Kona Airport State Park and adjacent private properties. The MLCD is bound in the northwest by the point at Powai Bay, in the southeast by the Kailua Lighthouse, and has a seaward boundary 500 yards from shore.

A reef shelf east of "Shark Rock" provides a surfing break. The reef fronting the park consists of numerous low profile shallow fingers of lava, extending offshore to depths up to 50 feet. Beyond this depth the bottom drops off quickly into very deep water. Coral cover is substantial in the area, with a diverse population of reef fishes. Turtles and rays are often seen here. Snorkeling is good within about 50 yards of the shoreline.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Old Kona Airport MLCD



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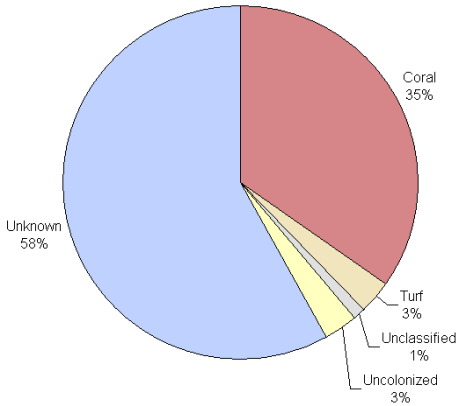


Pupukea-Waimea Marine Life Conservation District

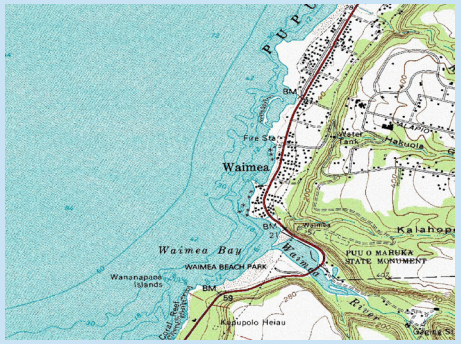
Management Agency: HI Department of Land and Natural Resources

Overview

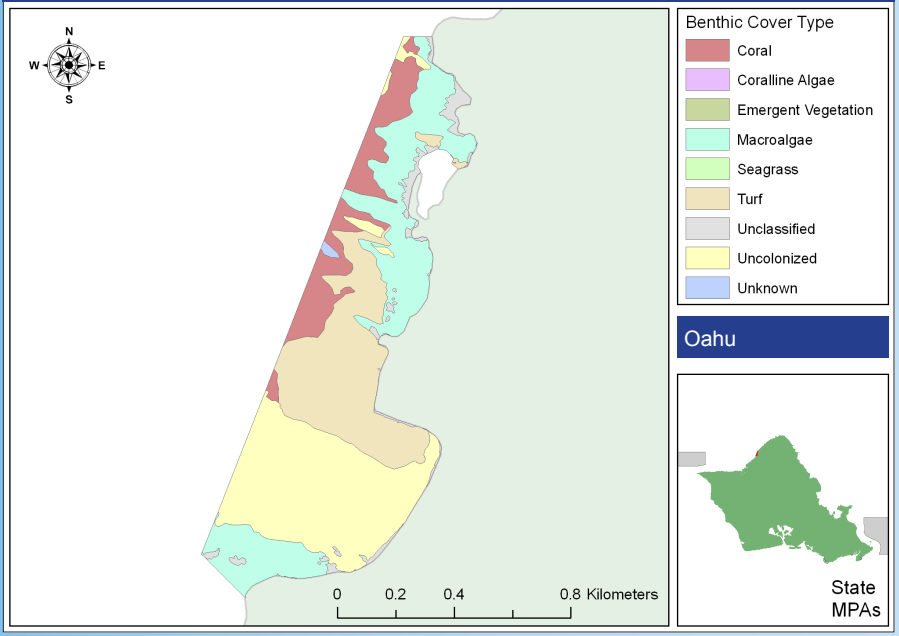
Located on the north shore of Oahu in a rural community, Pupukea Marine Life Conservation District extends from the highwater mark seaward 100 yards along a line extending due west of Kulalua Point at the north end of Pupukea Beach Park, then south to the most seaward exposed rock of the Wananapaoa Islets on the south side of Waimea Bay (including the islets), then due southeast to shore.

Marine surveys by the HI Department of Land and Natural Resources and a study by University of Hawaii [Kimmerer & Durbin (1975 Sea Grant)] recommended the area for Marine Life Conservation District (MLCD) designation because of evidence of resource exploitation. Commercial Scuba divers and spearfishermen were believed to be responsible for coral pieces and speared fish discarded in nearby trash cans. The regulations provide for traditional consumptive use of resources while affording resource management and protection.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Pupukea-Waimea MLCD



Percent Benthic Cover

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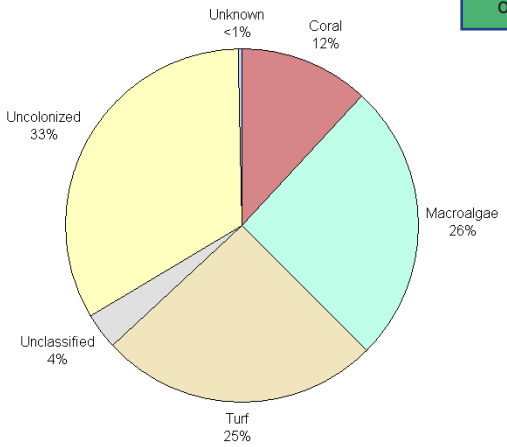


Waialea Bay Marine Life Conservation District

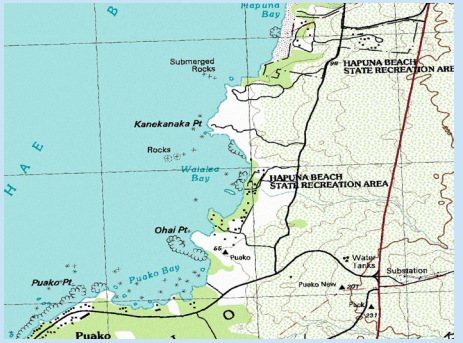
Management Agency: HI Department of Land and Natural Resources

Overview

Waialea Bay is located south of Kawaihae Bay, on the western coast of Hawai'i. The Marine Life Conservation District (MLCD) extends from the highwater mark seaward to a line from the point immediately north of Ohai Point to Kanekanaka Point.The MLCD was established to restore and manage the bay's fish resources.

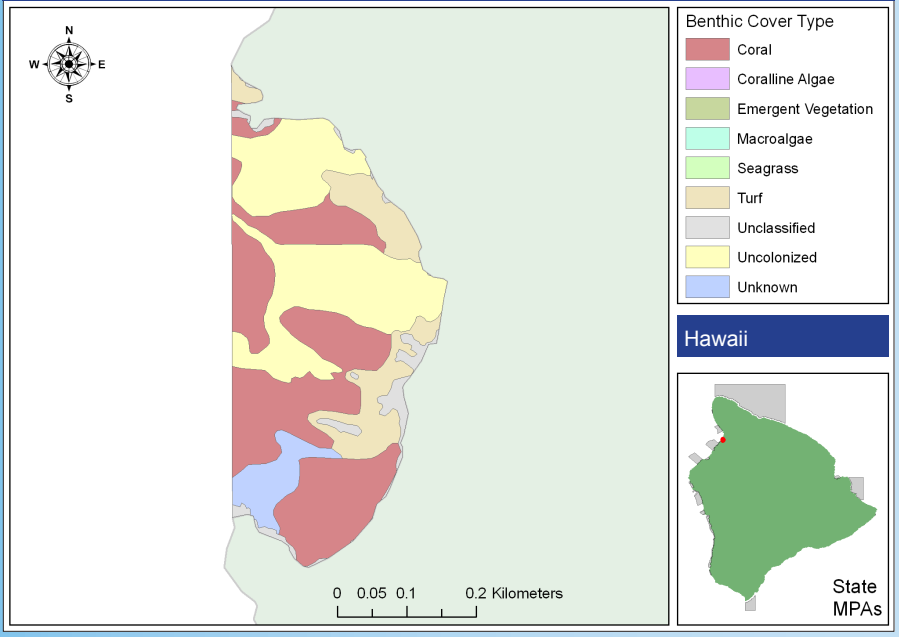
Although access to Waialea Bay is not particularly easy, the site is popular with many Big Island residents. The beach (known locally as Beach 69 because of the pole marker) erodes due to strong surf during winter months, but is pristine during the summer. The bay's bottom drops off gradually from the beach to depths of about 30 feet outside the bay's mouth. An intermittent stream enters the bay, and surface visibility is reduced during periods of freshwater intrusion.

The best reef is in the MLCD's southern portion, and extends out beyond the District's boundaries. Depths range from about 10 to 30 feet. Coral communities are also found around the rocky prominence inside the bay. The diversity of marine life in Waialea is among the best in all of the Kawaihae Bay area. Humpback whales are often seen outside the bay during winter.



Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Waialea Bay MLCD



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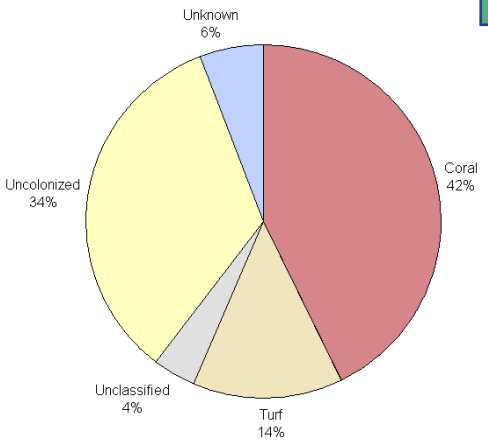


Waikiki Marine Life Conservation District

Management Agency: HI Department of Land and Natural Resources

Overview

The Waikiki Marine Life Conservation District (MLCD) is located at the Diamond Head end of Waikiki Beach in Oahu. It extends from the groin at the end of Kapahulu Avenue to the west wall of the Natatorium, from the highwater mark seaward a distance of 500 yards or to the edge of the fringing reef, whichever is greater. This site was designated to replenish the fish taken from the Waikiki-Diamond Head Fishery Management Area (FMA), and shorten the time required to restore fish density during the FMA closure.

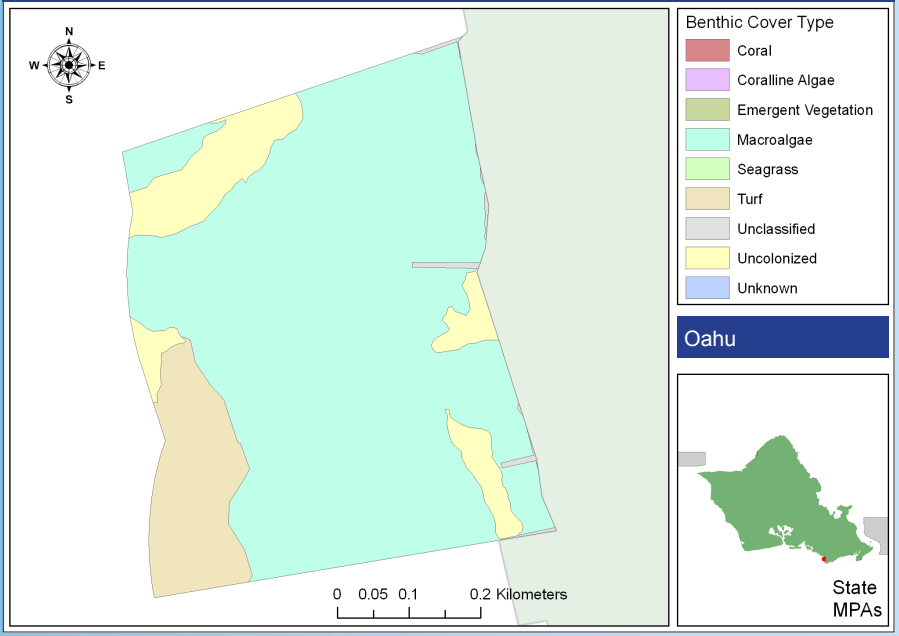
A reef flat extends out from the Waikiki Aquarium seawall a distance of about 35 yards to a dredged channel, then continues on the other side of the channel. Most fish in this area are found along the channel's shoreline side (which has a number of small caves), along the Natatorium wall, and near the exposed parts of the reef on the channel's seaward side. The channel itself is about 8 feet deep, and depths above the reef flat are generally less than 3 to 4 feet.

The reef flat throughout the MLCD consists mostly of rubble and coralline algae with some small patches of live coral. Sediment covers the bottom, so visibility is best when there is little or no wave action. Most of the reef flat has little bottom relief, and fish are more concentrated in areas where relief increases somewhat.

At the outer edge of the reef, the bottom drops off sharply to about 15 to 20 feet. Numerous arches, crevices, and other features are found here, along with an abundance of fish.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Waikiki MLCD



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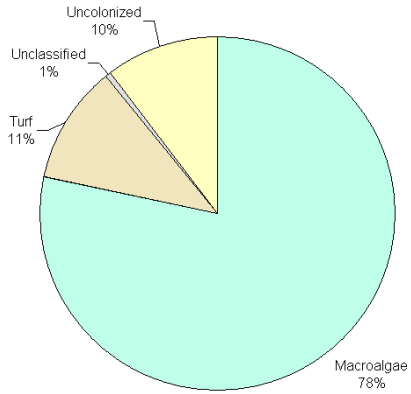


Wai'Opae Tidepools Marine Life Conservation District

Management Agency: HI Department of Land and Natural Resources

Overview

Located on the southeastern coast of the island of Hawaii, the Waiopae Tidepools Marine Life Conservation District (MLCD) consists of the portion of submerged lands and overlying waters of the area known as the Wai'opae tidepools beginning at the highwater mark of the shoreline.

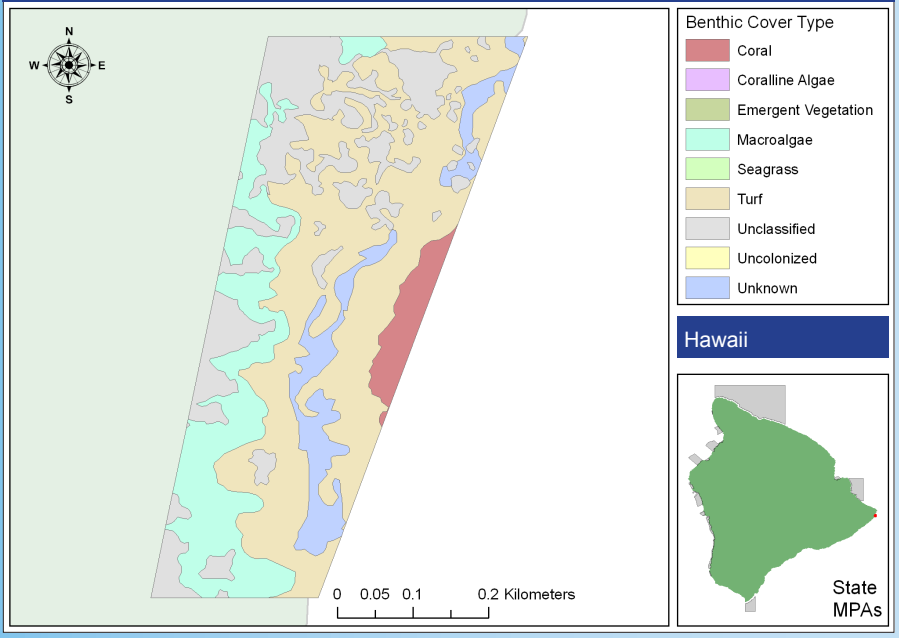
Local residents worked with the HI Department of Land and Natural Resources (DLNR) since 1988 to increase the protection of marine resources in the tide pools due to observed declines in reef fish, sea urchins, sea cucumbers, lobsters, and shrimp.

There is healthy coral growth in the tidepools, as well as a high diversity of coral species. Also, the tidepools support an unusually high abundance of juvenile fishes, which makes the area an important nursery for fishes.

The tidepools are easily accessible and can be entered under most weather conditions except major storms. The nearshore bottom is pahoehoe lava with coral growth increasing as you swim farther out. Snorkelers will find excellent viewing in the inner and middle tidepools, with visibility decreasing seaward into the surf. The MLCD's maximum depth is about 12 feet and is not recommended for SCUBA. Kayaking is discouraged to avoid breaking coral in shallow water.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Wai'Opae Tidepools MLCD



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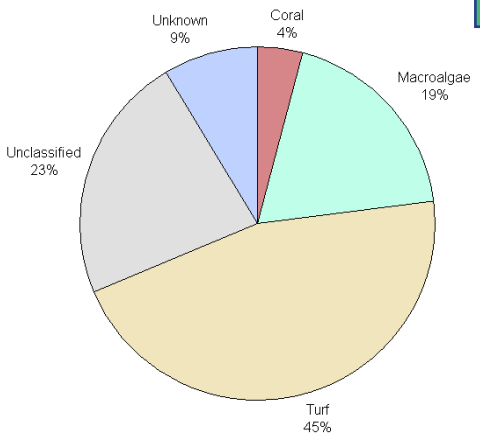


Hilo Bay, Wailoa River, and Wailuku River FMA

Management Agency: HI Department of Land and Natural Resources

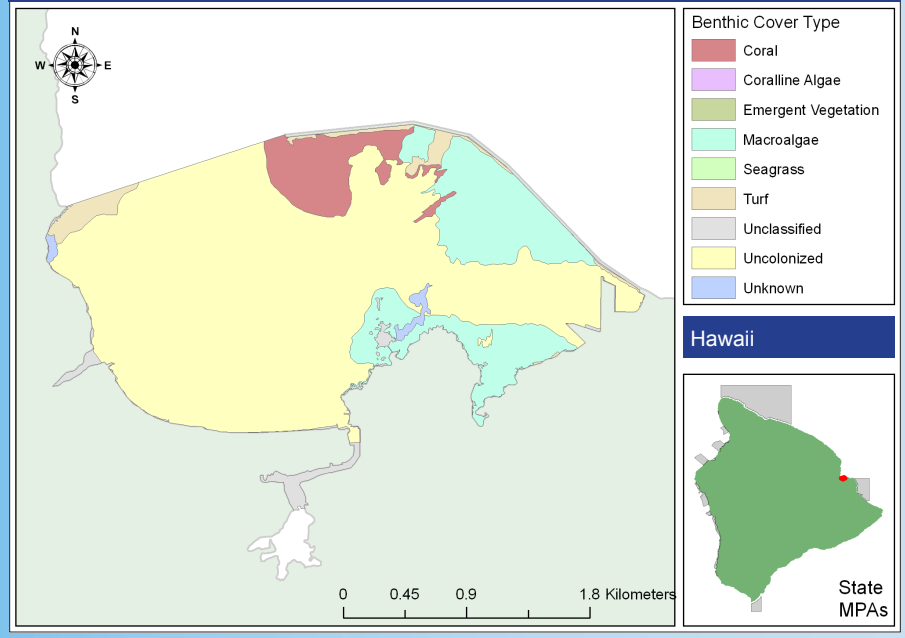
Overview

Located on the northeastern side of the island of Hawaii, the Hilo Bay, Wailoa River, and Wailuku River Fishery Management Area includes the waters of Hilo Bay bounded by the breakwater and a line from the tip of the breakwater southwestward to Alealea Point, then along the shoreline to the inshore end of the breakwater; the waters of Wailoa River bounded by a straight line drawn across the mouth of the river and the foot bridge at the mouth of Waiakea pond, including the Waiolama canal upstream to the highest wash of the tidal water; and the waters of Wailuku River between the Mamalahoa Hwy Bridge and the Wainaku Ave Bridge.

This site was created to resolve conflicts between net, pole-and-line, and spear fishermen, and to distribute more equitably the resources in heavily utilized areas. Wailoa River was included to act as a buffer between angling and thrownetting activities to prevent further conflict. Gillnetters use to block Hilo Bay, causing major conflicts. But then it was shown that Hilo Bay was a nursery habitat, with lots of juvenile gamefish, and gillnetting was stopped.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Hilo Bay, Wailoa River, and Wailuku River FMA



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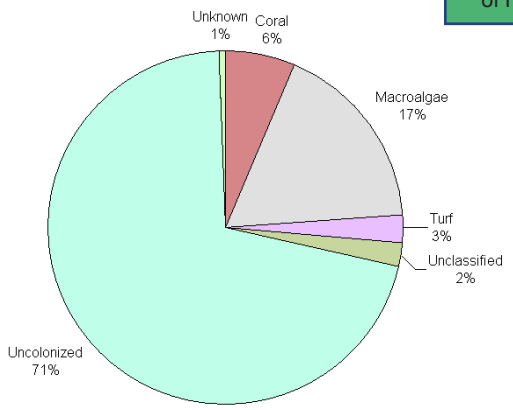


Kahului Harbor FMA

Management Agency: HI Department of Land and Natural Resources

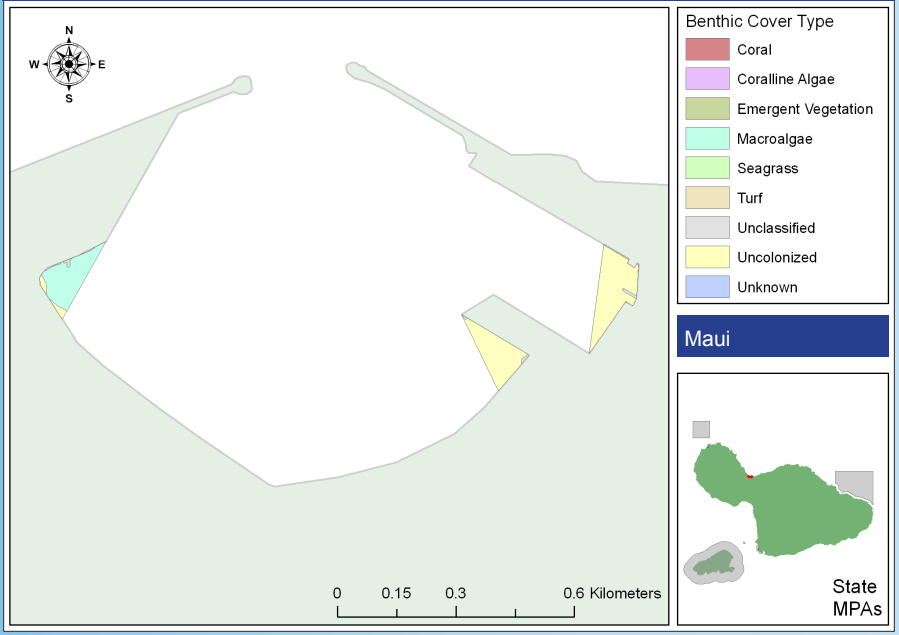
Overview

Kahului Harbor is primarily a commercial harbor, located on the south side of Kahului Bay, on the north shore of Maui. This site was created to resolve conflicts between net and pole-and-line fishermen who compete for hahalalu (young akule) during seasonal runs, as well as to conserve natural resources.

The Kahului Harbor Fishery Management Area contains three subareas. “Area 1” is bound by the highwater mark between Kahului Harbor piers 1 and 2 across to the southernmost corner of the building on Kahului Harbor pier 1. “Area 2” is bound by the highwater mark along the southeastern portion of Kahului Harbor pier 2, and a seaward boundary delineated by a straight line from the northwesternmost corner of Kahului Harbor pier 2 to the shoreline at the Puunene Ave extension. “Area 3” is bound by the high-water mark along the southern portion of the Kahului Harbor park adjacent to the boat launching ramp and the highwater mark along Kahului Beach Road, and a seaward boundary delineated by a straight line from the northern portion of the eastern shoreline of the Kahului Harbor park to the shoreline along Kahului Beach Road.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA’s National Marine Protected Areas Center.

Kahului Harbor FMA



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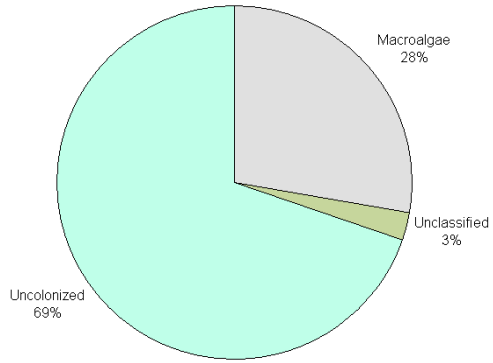


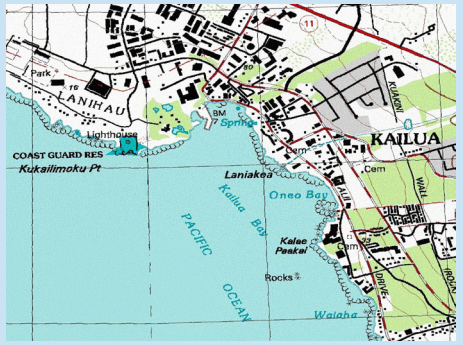
Kailua Bay FMA

Management Agency: HI Department of Land and Natural Resources

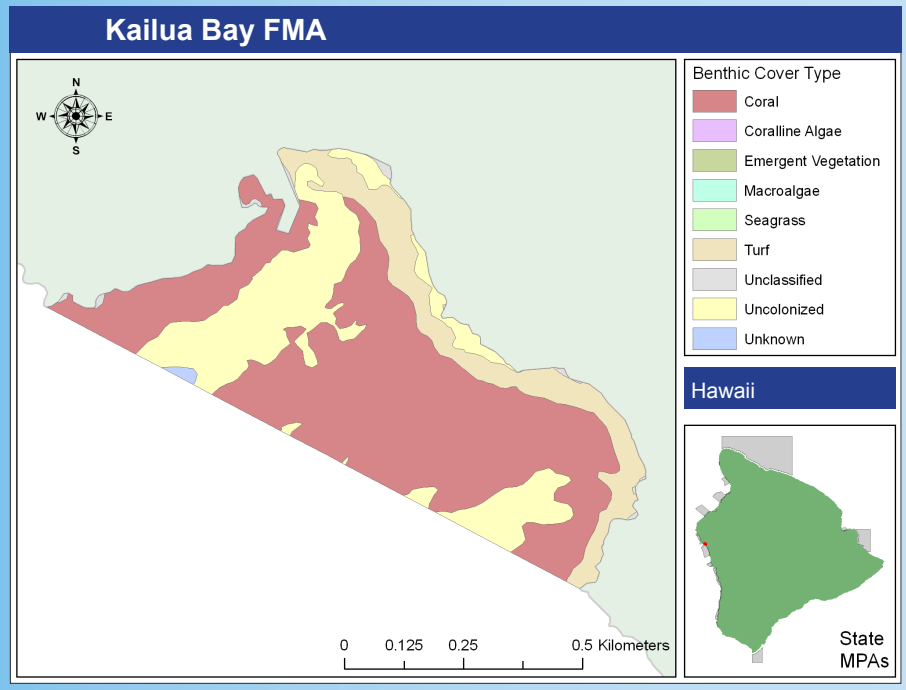
Overview

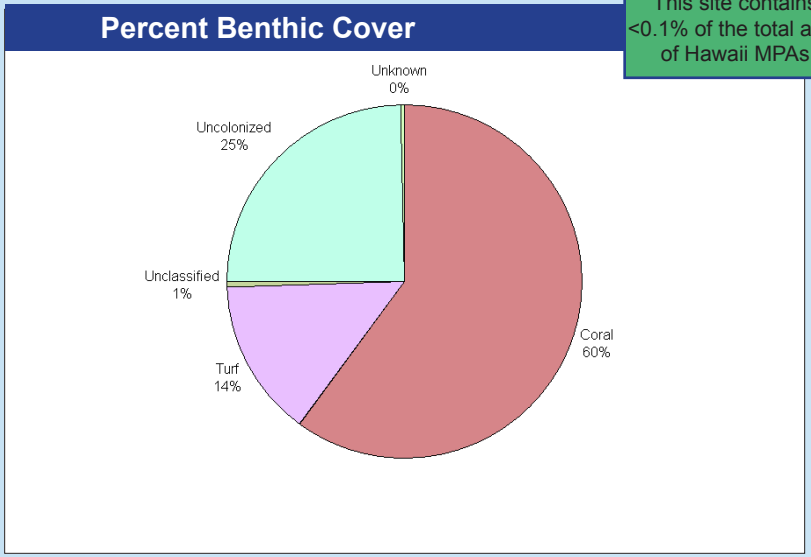
The Kailua Bay Fisheries Management Area includes the portion of Kailua Bay enclosed by a straight line drawn from Kukaili-moku Point to the sea-wall of the Royal Kona Resort. A line from the northern edge of the channel at Thurston Point to the corner (Wiha Point) south of Hulihee Palace and north of the former Kona Inn Hotel separates “Zone A” in the northwestern portion of the FMA from the seaward “Zone B”, as shown. The site is mostly sandy bottom with some patch reefs.

This site was set aside to resolve conflicts between net and pole-and-line fishermen who compete for hahalalu (young akule) during seasonal runs, and to conserve natural resources. The regulations separated the recreational pole-and-line fishermen hooking hahalulu from the seawall along Alii Drive from net fishermen in the bay. Prior to the regulations, net fishermen had been known to take entire schools of hahalalu, leaving nothing for the recreational fishermen. In the mid 1990s, the larger akule were schooling along the shoreline at times in the “no netting” areas. Since the regulations were intended to resolve the conflict over haha-lalu, a 1995 amendment allowed the harvest of akule for commercial purposes in the “no netting” areas.



Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA’s National Marine Protected Areas Center.





This site contains <0.1% of the total area of Hawaii MPAs

Keauhou Bay FMA

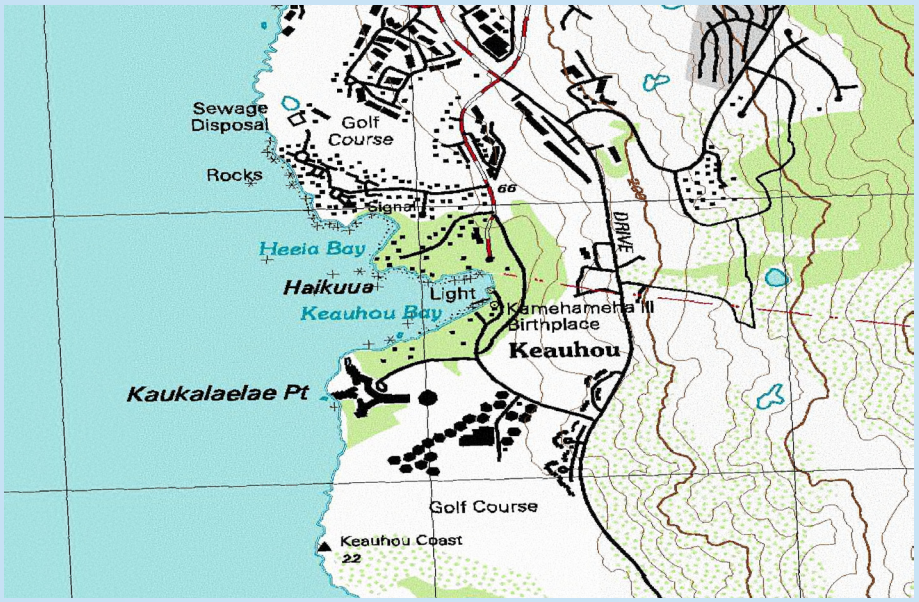
Management Agency: HI Department of Land and Natural Resources

Overview

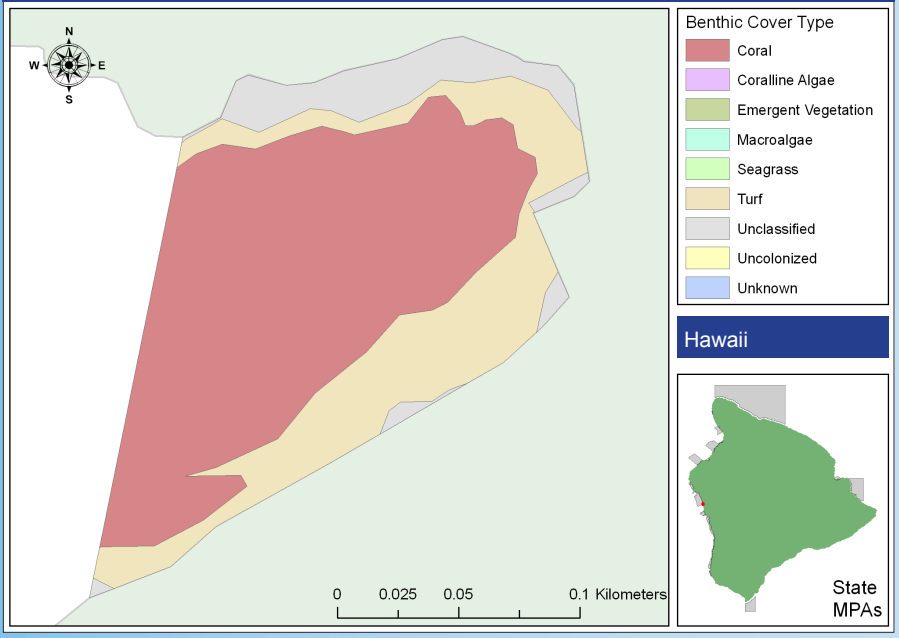
Located in North Kona on the west coast of Hawaii, the Keauhou Bay Fishery Management Area includes the portion of Keauhou Bay bound by a straight line drawn from Kaukalaelae Point to Haiku'ua Pt.

The site was created to resolve conflicts between net and pole-and-line fishermen who compete for hahalalu (young akule), and oama (young goatfish) during seasonal runs, and to conserve natural resources. The small boat harbor at Keauhou Bay is a shelter for hahalalu during their annual recruitment into nearshore waters.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Keauhou Bay FMA



Percent Benthic Cover

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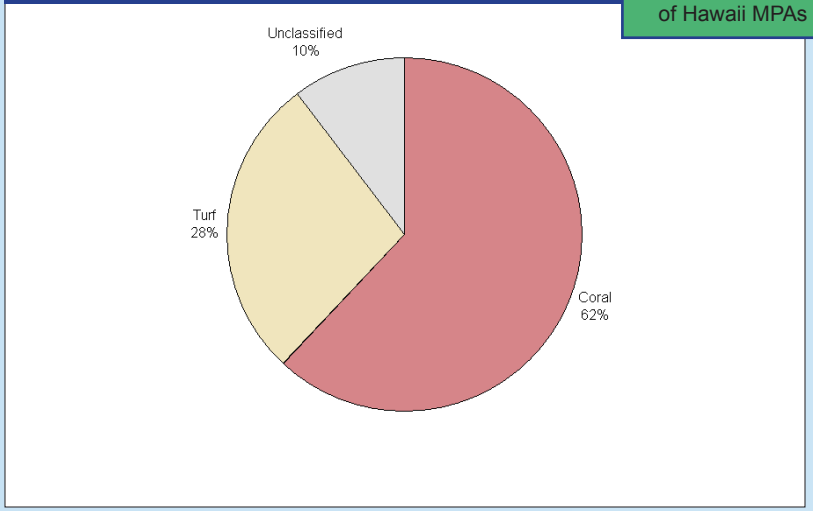


Kiholo Bay FMA

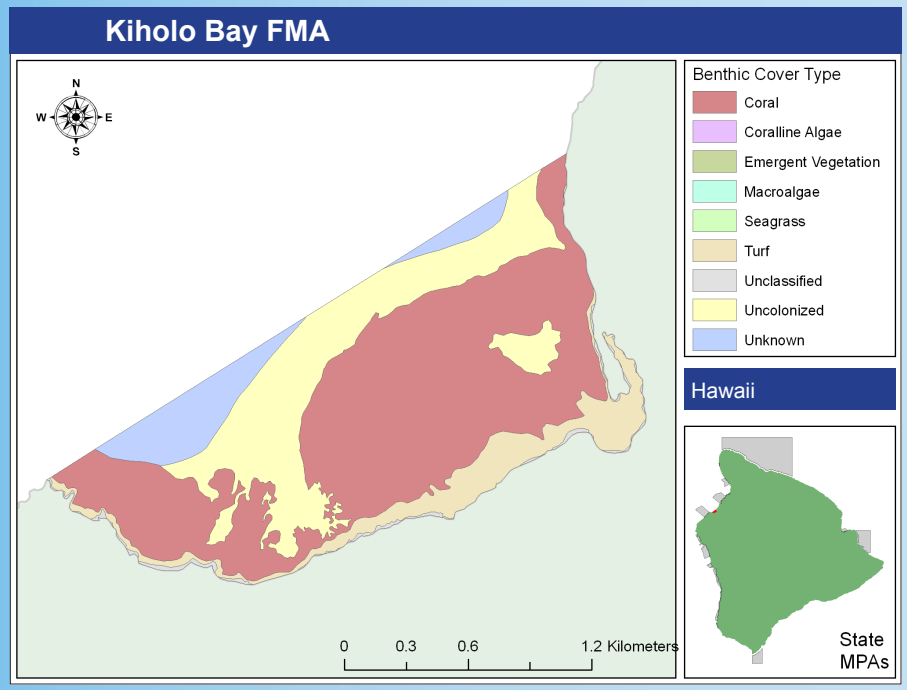
Management Agency: HI Department of Land and Natural Resources

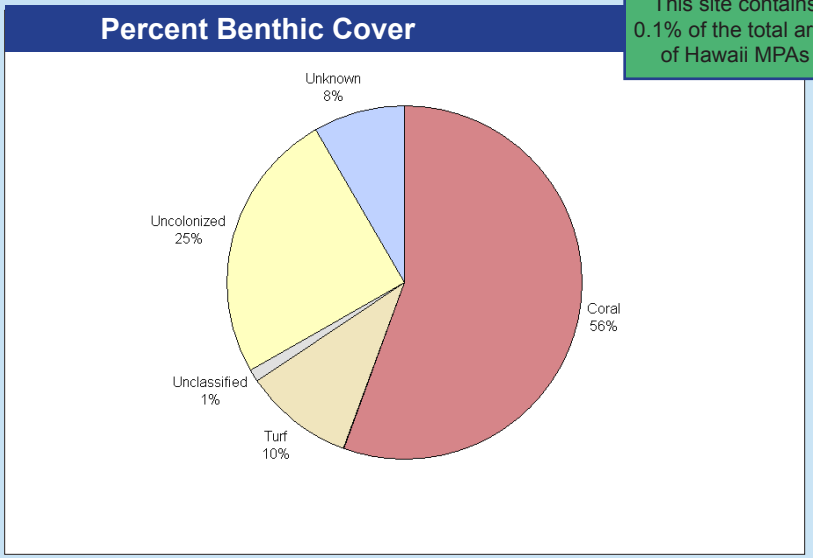
Overview

Located on the western side of the island of Hawaii, the Kiholo Bay Fishery Management Area includes the portion of Kiholo Bay from the highwater mark seaward to a line drawn between a sign posted at Hou Point and a sign posted at Nawaikulua Point, including Wainanali'I Pond, but not Lauhinewai Pond.

The purpose of this site is to protect a large population of green sea turtles (100–300 turtles) that reside in the bay. Gill nets can drown turtles when they become entangled, thus their use in the management area is prohibited. Kiholo Bay FMA regulations do not address pole-and-line, thrownet, or spearing because these activities do not pose a threat to the turtles.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.





This site contains 0.1% of the total area of Hawaii MPAs

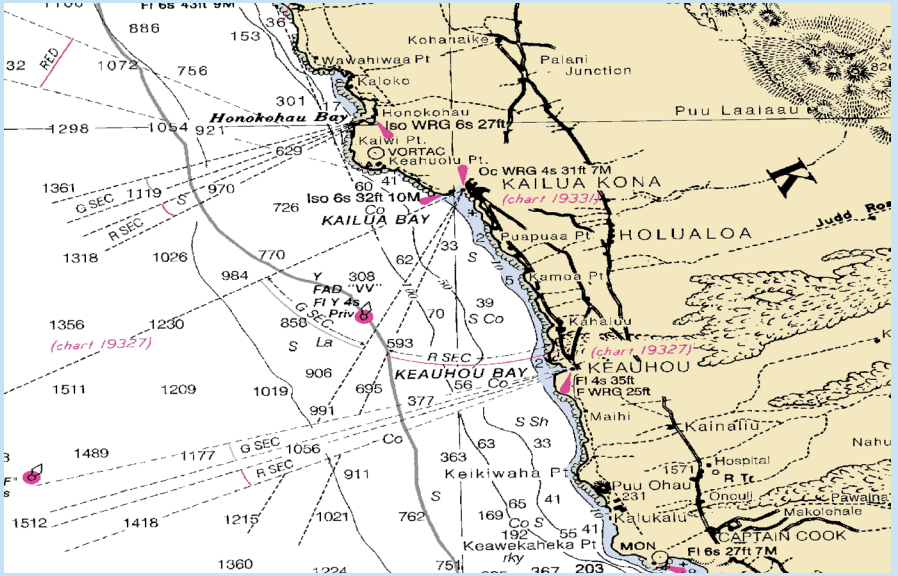
Kona Coast FMA

Management Agency: HI Department of Land and Natural Resources

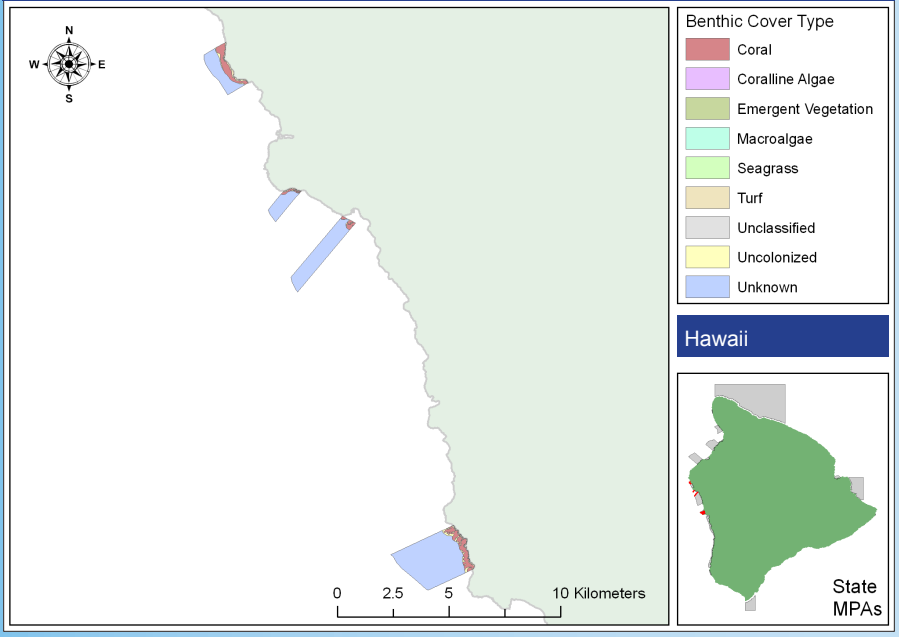
Overview

Kona Coast refers to the following four Fishery Management Area Zones on the southwest coast of Hawaii, each bound by two lines extending seaward at right angles from shore and marked by signs on shore: (a) the “Wawaloli Zone”, from south of Wawaloli Beach to south of Wawahi-waa Point; (b) the “Papawai Bay Zone”, from Keahuolu Point to the northwestern end of the runway of the Old Kona Airport; (c) the “Kailua Bay Zone”, from Kukailimoku Point near the Kailua lighthouse, to the former swimming pool at the Kona Inn Shopping Village; and (d) the “Red Hill Zone”, from Puu Ohau (“Red Hill”) to Onouli. The seaward boundary is at a depth of 100 fathoms (600 ft).

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA’s National Marine Protected Areas Center.



Kona Coast FMA



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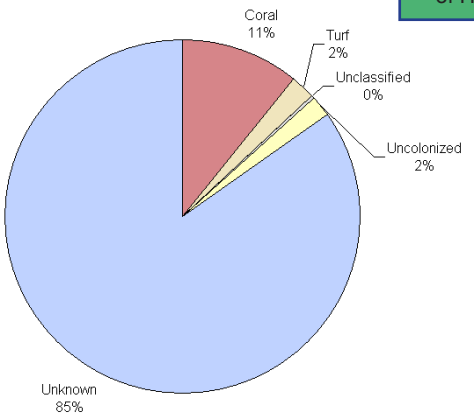


Nawiliwili Harbor FMA

Management Agency: HI Department of Land and Natural Resources

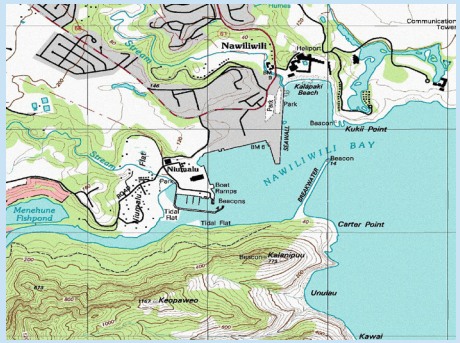
Overview

Nawiliwili Harbor is located at the mouth of the Hule'ia Stream in Kauai, which creates a natural channel for large ships. Nawiliwili Harbor Fishery Management Area includes the portion of Nawiliwili Harbor bound by an imaginary straight line drawn from the southernmost tip of the western pier northeastward to the corner formed where pier 1 meets the eastern pier.

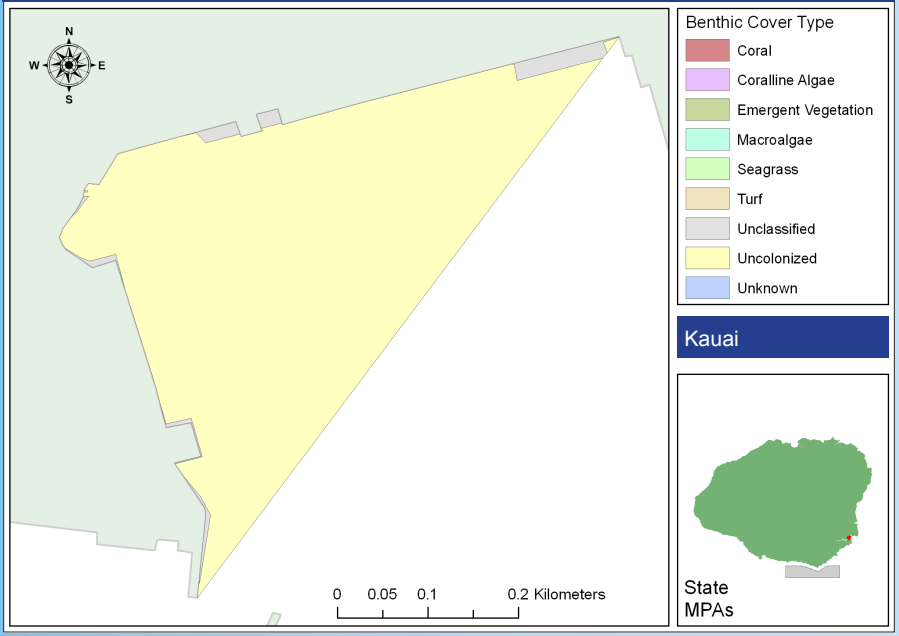
This FMA was established to resolve conflicts between net and pole-and-line fishermen who compete for hahalalu (young akule) during seasonal runs, and to conserve natural resources. Voluntary agreements between recreational and commercial fishermen were not working.

There is significant coverage by reef corals on all sides of the island offshore to depths of 60 ft. Reefs along the Kauai coast are dominated by the corals *Porites lobata* and *Pocillopora meandrina*, with other common species that include *Montipora patula*, *Montipora flabellata*, *Leptastrea purpurea* and *Montipora verrucosa*. Coastal waters around Kauai show higher fish abundance and diversity than those around Oahu, Maui, and Hawaii.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Nawiliwili Harbor FMA



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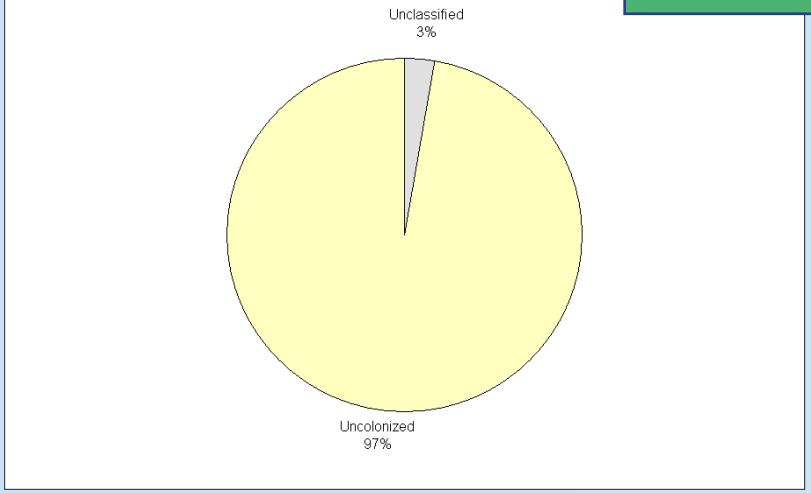


Puako Bay and Puako Reef FMA

Management Agency: HI Department of Land and Natural Resources

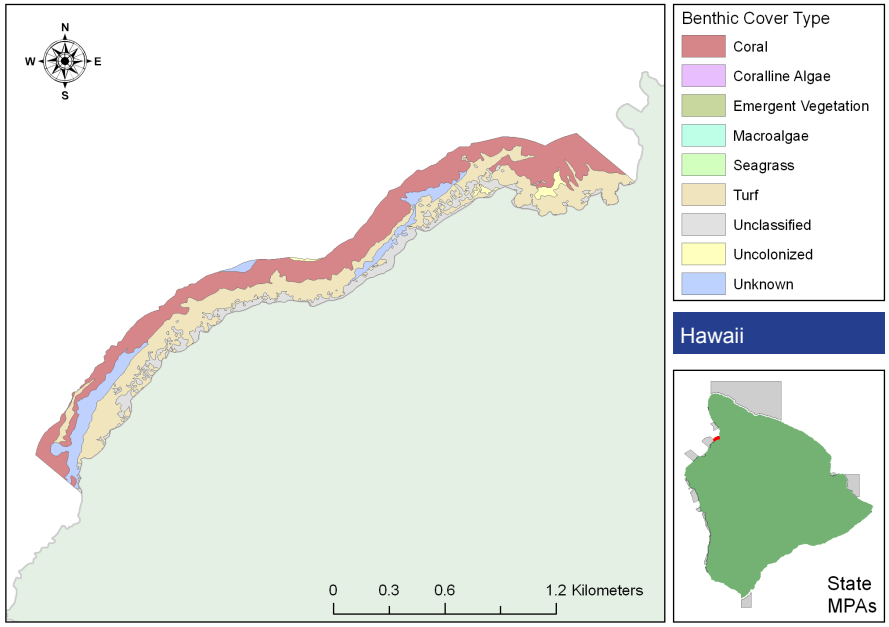
Overview

Located on the northwestern side of the island of Hawaii, the Puako Bay and Puako Reef FMA includes the reef from the shoreline at the westernmost edge of the boat ramp, along a line drawn parallel with the ramp seaward to the edge of the fringing reef, then southwestward a minimum seaward distance of 250 yards or to the edge of the fringing reef if one occurs beyond 250 yards, to a line due west of the small cove at the southern end of Puako Beach Road.

The site was created because constant fishing pressure, especially by gill-netters, depleted fishing resources. Stocks along the Puako coastline had been depleted for approximately 50 years prior to Fishery Management Area designation. Fishery Management Area designation was intended to restore and manage the fishing resources of the bay and the reef. The Hawai`i Cooperative Fishery Research Unit at the University of Hawaii studied Puako, and the findings of the study led the Puako Community Association to vote unanimously in favor of banning net fishing completely.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Puako Bay and Puako Reef FMA



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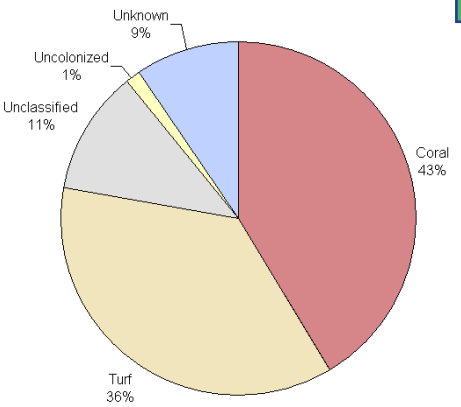


South Kona (Miloli'i) FMA

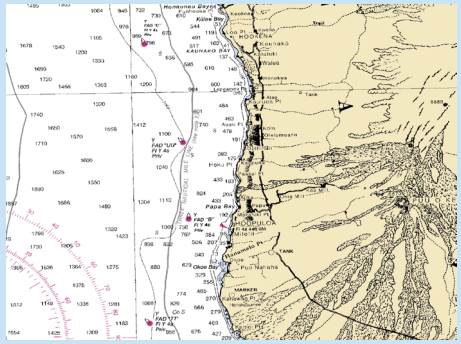
Management Agency: HI Department of Land and Natural Resources

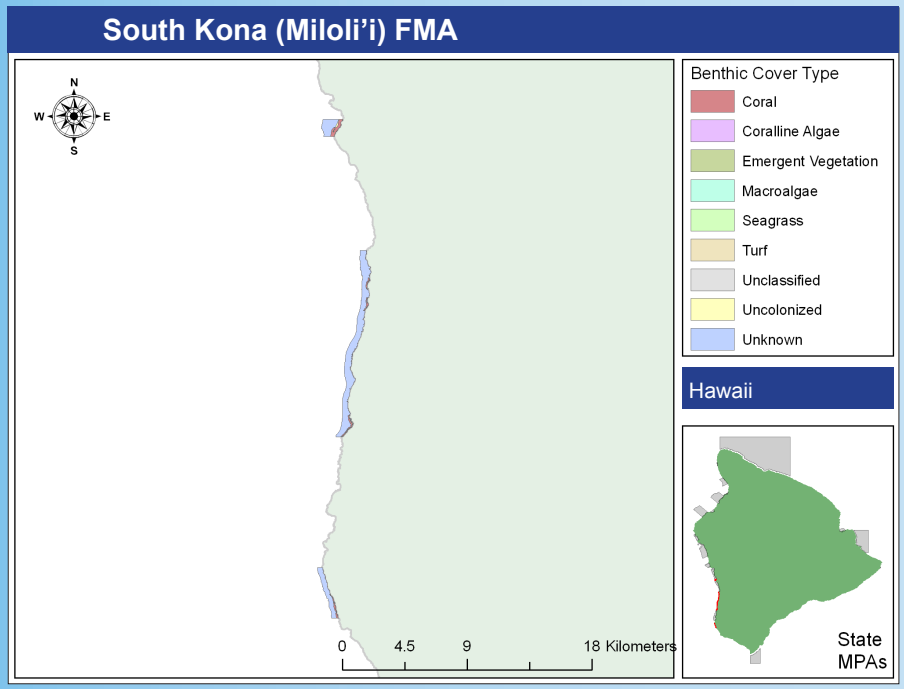
Overview

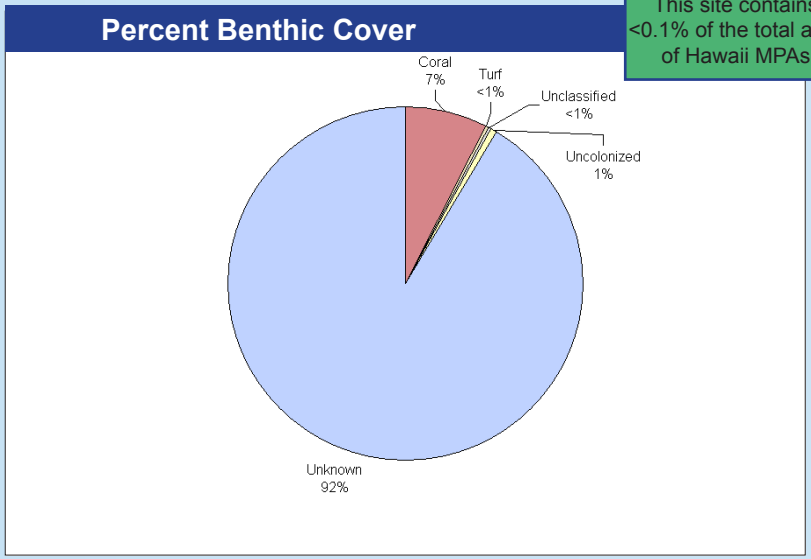
Located in the coastal waters off of South Kona between the Ki'ilae-Keokea boundary and the Kapua-Kaulanamauna boundary, this site covers the entire extent of the existing West Hawaii Regional Fishery replenishment Area.

The site was designated for the purpose of reaffirming and protecting fishing practices (fishing for 'opelu) customarily and traditionally exercised for purposes of native Hawaiian subistence, culture, and religion. The community also started a community watch program, as long time residents were concerned about the depletion of their fishery and the lack of enforcement in Hawaiian waters. The Coast Watch Program, a volunteer community watch program, started because people were simply "taking more than they need to eat," and the fishery was declining. They began a program where the community could articulate its own goals for marine resource management and share the results with state agencies and neighboring communities.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.







This site contains <0.1% of the total area of Hawaii MPAs

Waikiki–Diamond Head FMA

Management Agency: HI Department of Land and Natural Resources

Overview

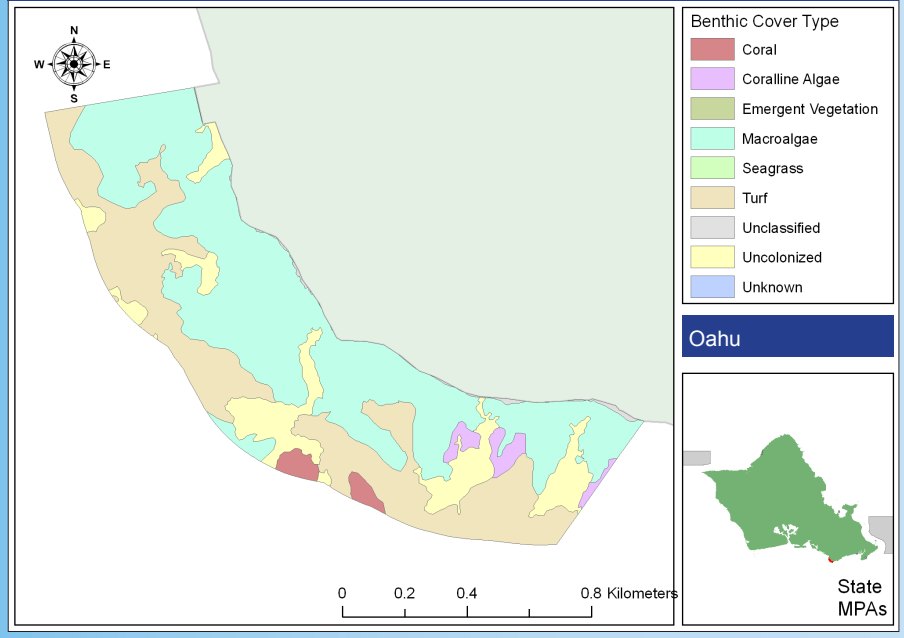
The Waikiki–Diamond Head Shoreline Fishery Management Area extends from the sea wall of the Waikiki War Memorial Natatorium to the Diamond Head Lighthouse, from the highwater mark out to a minimum seaward distance of 500 yards, or to the seaward edge of the fringing reef if one occurs beyond 500 yards.

Waikiki was chosen as the first site in the "Kapuku Plan" beacuse marine resources had been greatly reduced, particularly by netting. The kapuku ("to restore life") plan was comprehensive in scope and centered around protecting an entire habitat (not species specific). Areas in the kapuku plan would be closed to consumptive activities for the time necessary for fish stocks to return to healthy levels. The initial plan was to create 8 zones around the island of Oahu. At any given time, 50% of the island would be closed to consumptive activities. Questions about the effectiveness of the plan and public opinion that this system was too extreme inhibited the creation of any additional sites under the kapuku plan.

Prior to the Fishery Management Area's initial closure, the area contained less than 200 lbs of fish per acre. After the first two-year closure, fish stocks recovered to 600 lbs/acre, but fell back to below 200 lbs/acre after reopening for two years. The FMA originally was opened and closed on two year cycles, but when the Waikiki Marine Life Conservation District (MLCD) was designated in 1988, the FMA was opened and closed on a one year cycle. Surveys showed that 69% of the fish catch was by gillnetters, so the practice of gillnetting was banned.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Waikiki-Diamond Head FMA



Percent Benthic Cover

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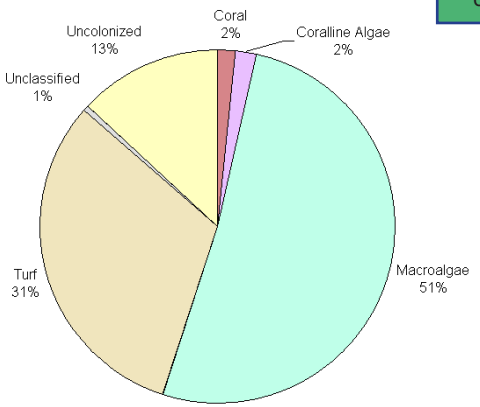


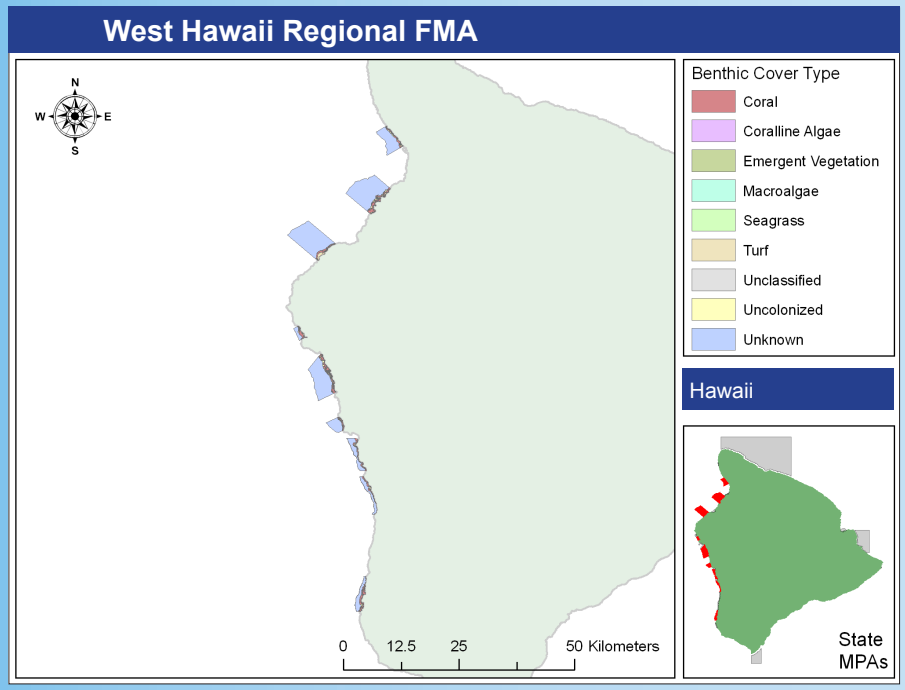
West Hawaii Regional FMA

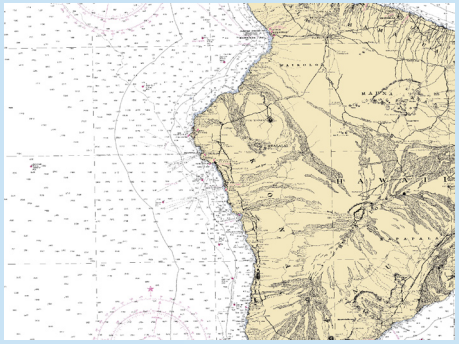
Management Agency: HI Department of Land and Natural Resources

Overview

The West Hawaii Regional Fishery Management Area consists of nine individual fishery management areas (FMAs). Except as otherwise indicated, the FMAs extend from the highwater mark on shore to a depth of 600 ft.

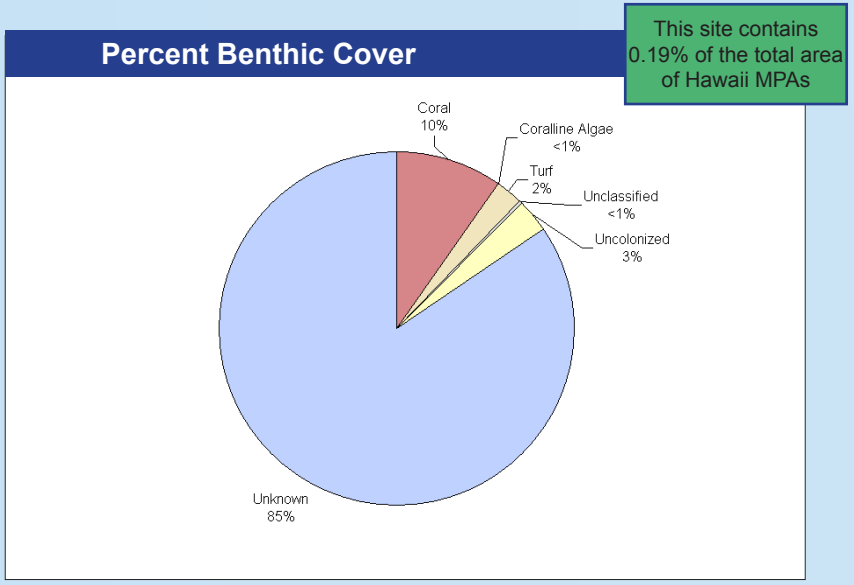
1. North Kohala: Kamilo Gulch south to Kawaihae lighthouse;
2. Puako-ʻAnaehoʻomalu: South end of Puako FMA to Kapalaoa
3. Kaʻupulehu: Pohaku ʻO Kahae to Kukiʻo Bay
4: Kaloko-Honokohau: South boundary of Wawaloli FMA to Noio Pt.
5. Kailua-Keauhou: South bondary of Kailua Bay “Kona Coast” FMA to north boundary of Keauhou FMA
6. Red Hill: Nenue Pt. to north boundary of Red Hill FMA, and south boundary of Red Hill FMA to Keawehakeka Pt.
7. Napoʻopoʻo-Honaunau: Manini Pt. to Kiʻilae Bay
8. Hoʻokena: Loa Pt. south to Kaʻuloa Pt.
9. Miloliʻi: Makahiki Pt. south to Kakio Pt.





Unregulated, aquarium fish collection had reduced the numbers of ornamental fish off western Hawaii, and conflicts had arisen among commercial tour operators, recreational users, and aquarium fish collectors. The purpose of designation was (1) to effectively manage fishery activities to ensure sustainability, (2) to enhance nearshore natural resources, and (3) to minimize conflicts of use. A 31-member Community Council identified nine marine areas to be designated as Fishery Replenishment Areas. The West Hawaii Fishery Management Area comprises approximately 30% of West Hawaii coastline.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Bottomfish Restricted Fishing Area: Site A

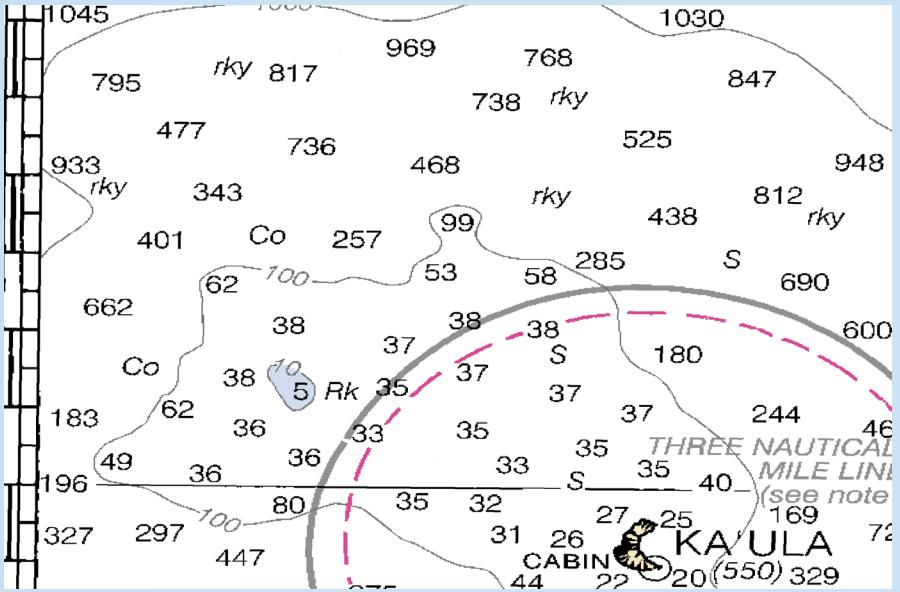
Management Agency: HI Department of Land and Natural Resources

Overview

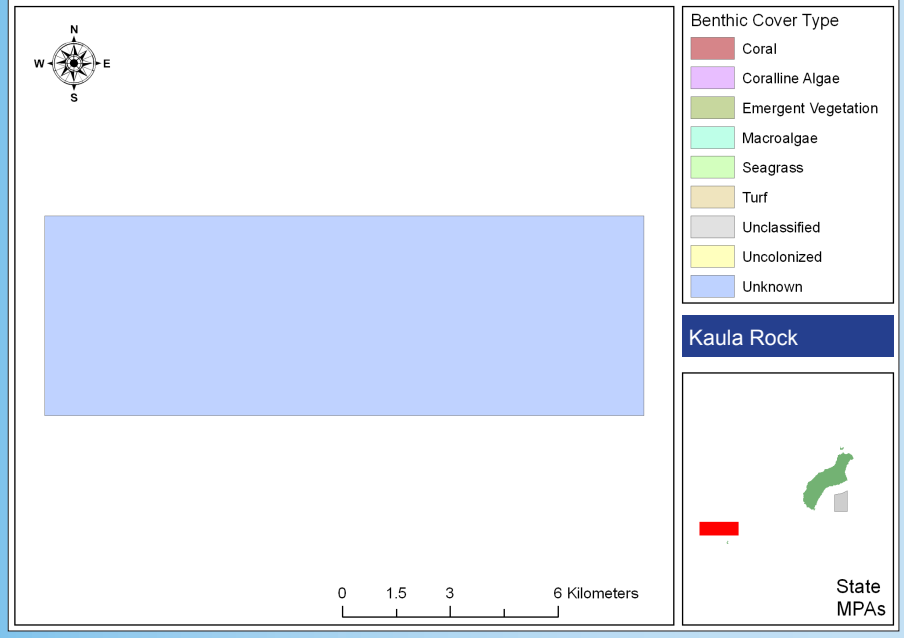
Site A is located 1.25 miles north of Kaula Rock, east of the island of Niihau.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

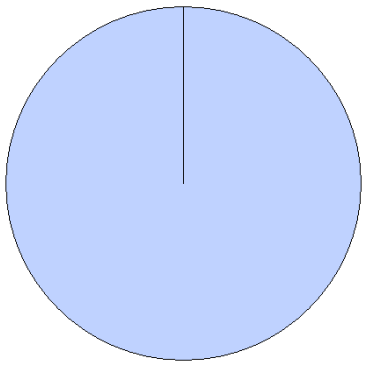


Site A



Percent Benthic Cover

This site contains 0.11% of the total area of Hawaii MPAs



Bottomfish Restricted Fishing Area: Site B

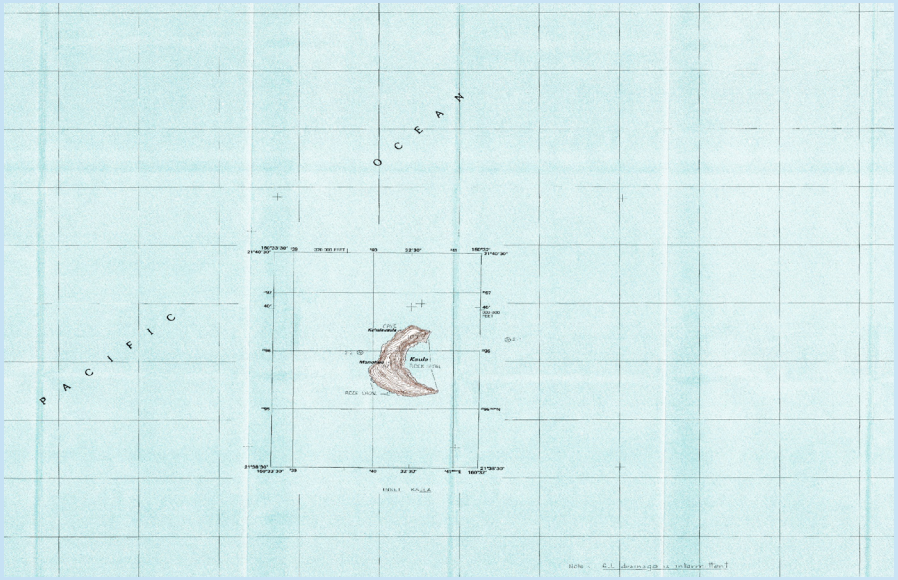
Management Agency: HI Department of Land and Natural Resources

Overview

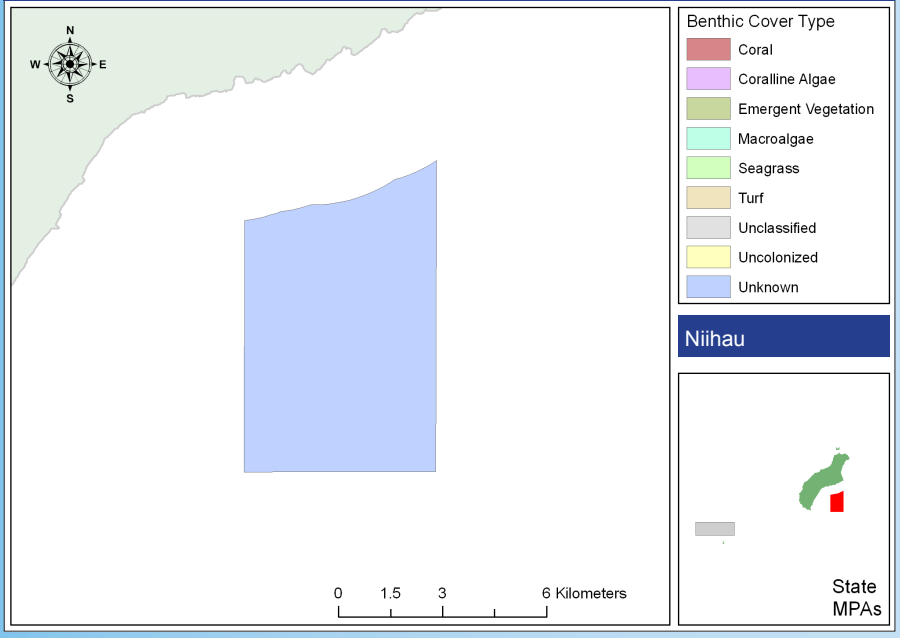
Site B is located 2 nautical miles off the southeastern shore of the island of Niihau.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Site B



Percent Benthic Cover

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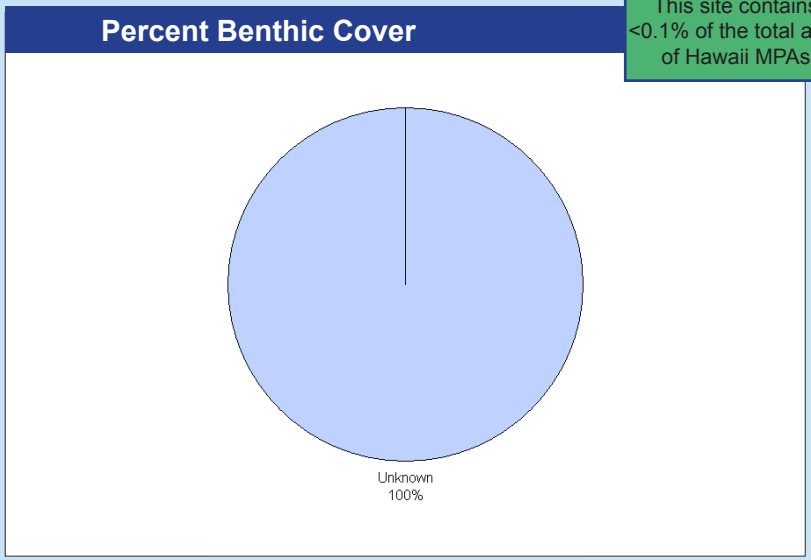


Bottomfish Restricted Fishing Area: Site C

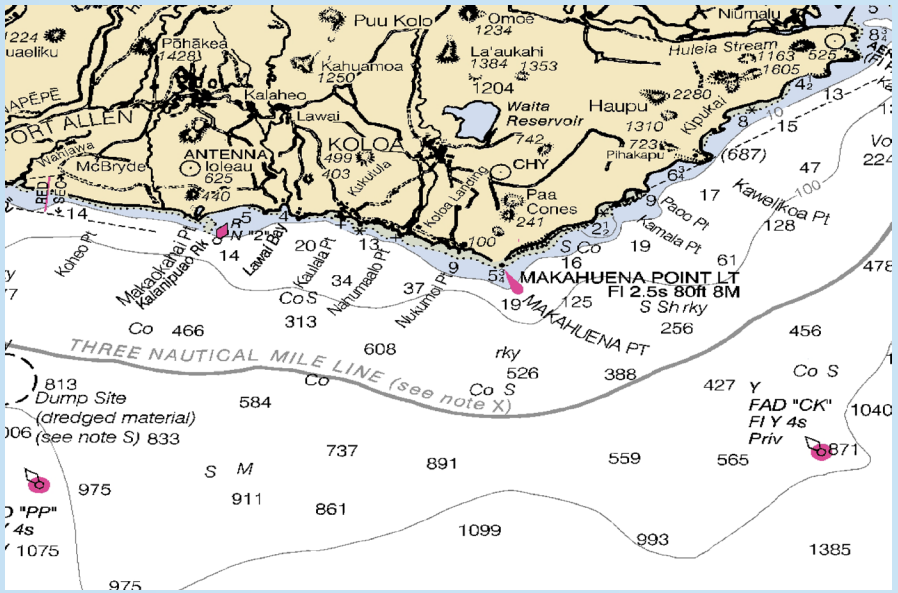
Management Agency: HI Department of Land and Natural Resources

Overview

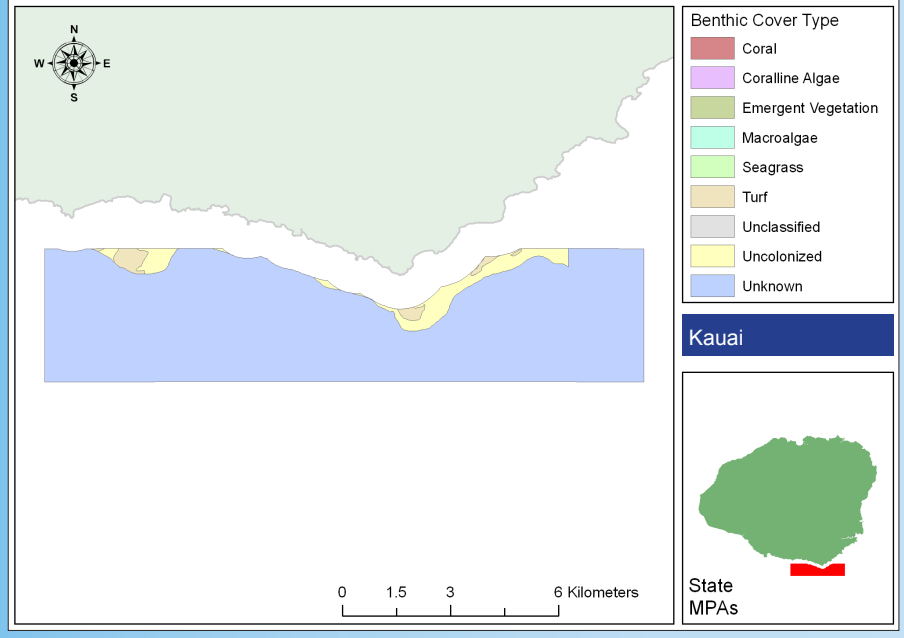
Site C is located along the southern coast of the island of Kauai.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

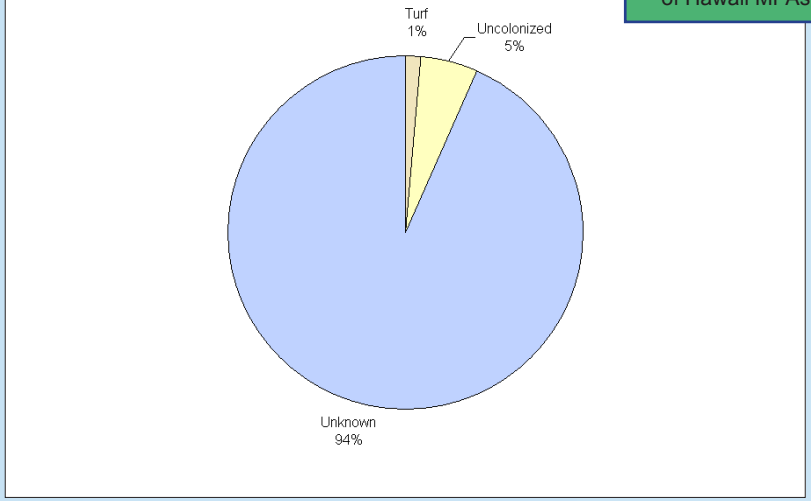
Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Site C



Percent Benthic Cover



This site contains <0.1% of the total area of Hawaii MPAs

Bottomfish Restricted Fishing Area: Site D

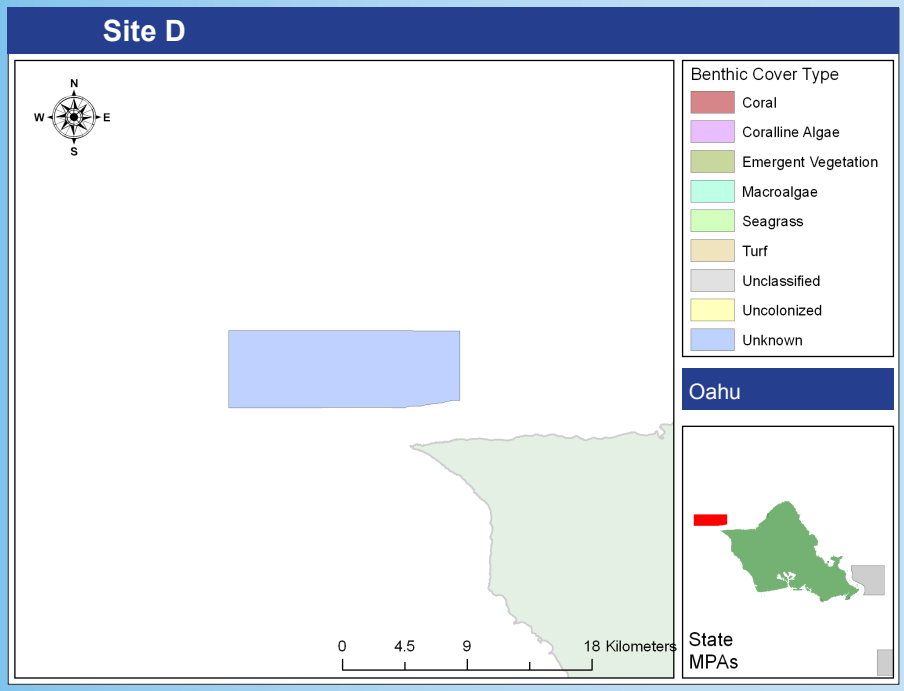
Management Agency: HI Department of Land and Natural Resources

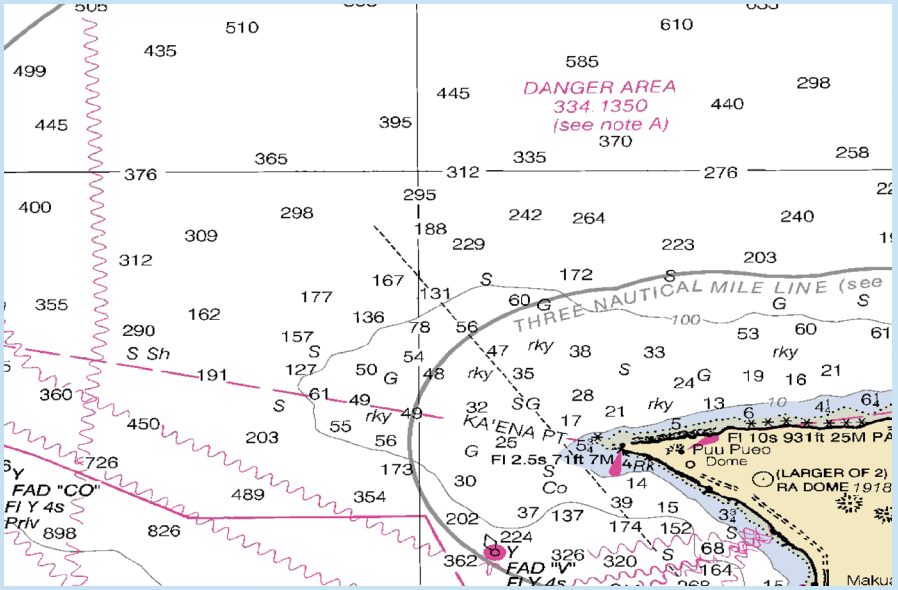
Overview

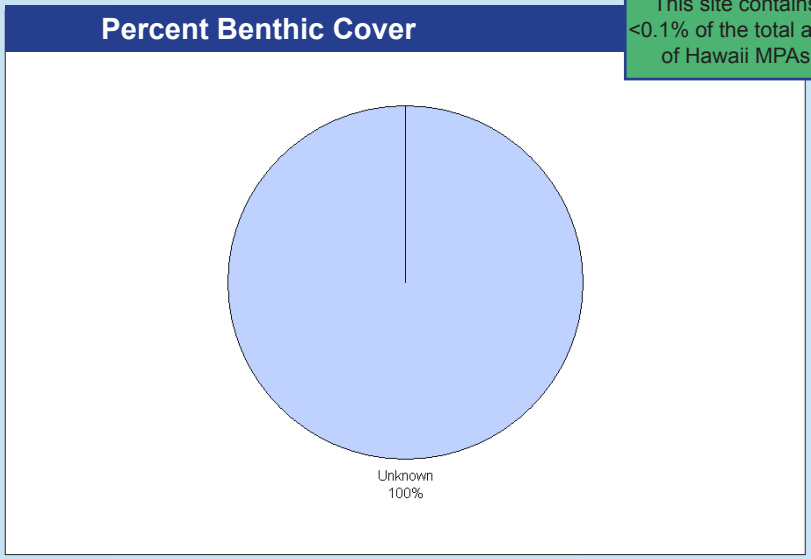
Site D is located 1.5 nautical miles off the northeastern shore of the island of Oahu.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.







This site contains <0.1% of the total area of Hawaii MPAs

Bottomfish Restricted Fishing Area: Site E

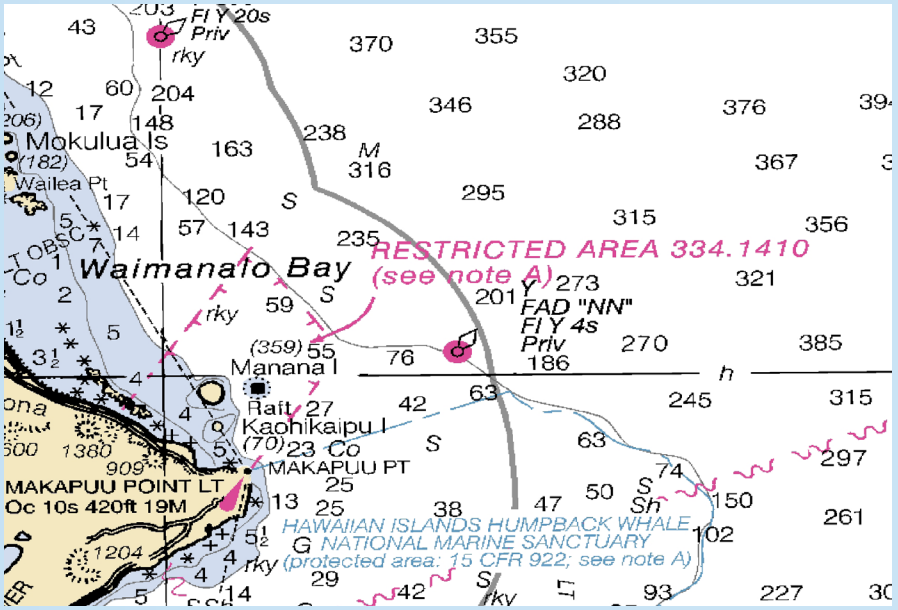
Management Agency: HI Department of Land and Natural Resources

Overview

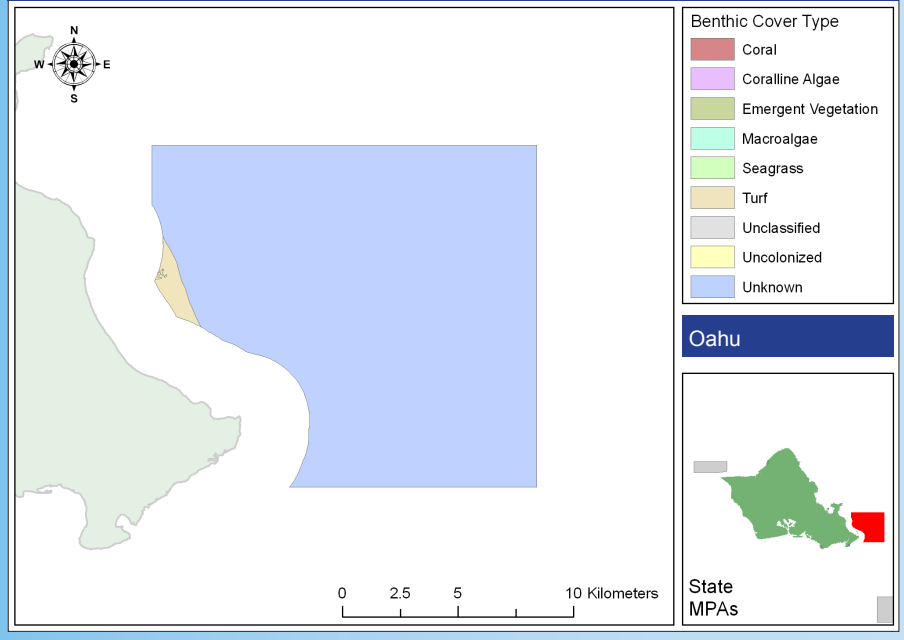
Site E is located 1.5 nautical miles off the southeastern coast of the island of Oahu.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

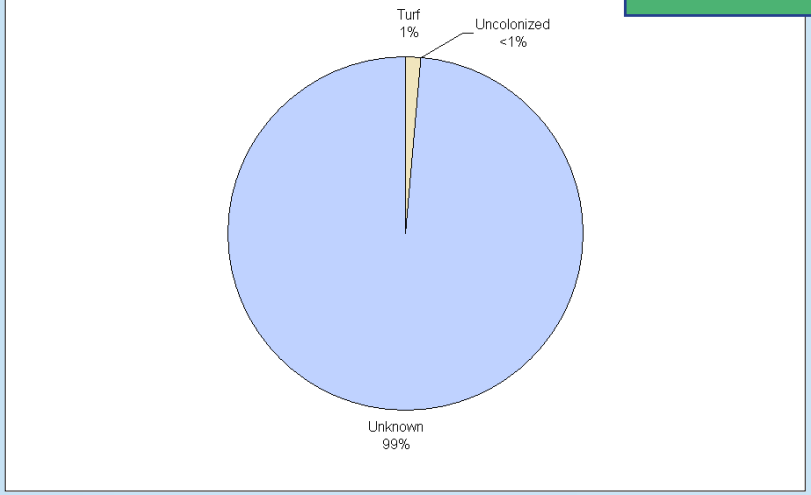
Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Site E



Percent Benthic Cover



This site contains <0.1% of the total area of Hawaii MPAs

Bottomfish Restricted Fishing Area: Site F

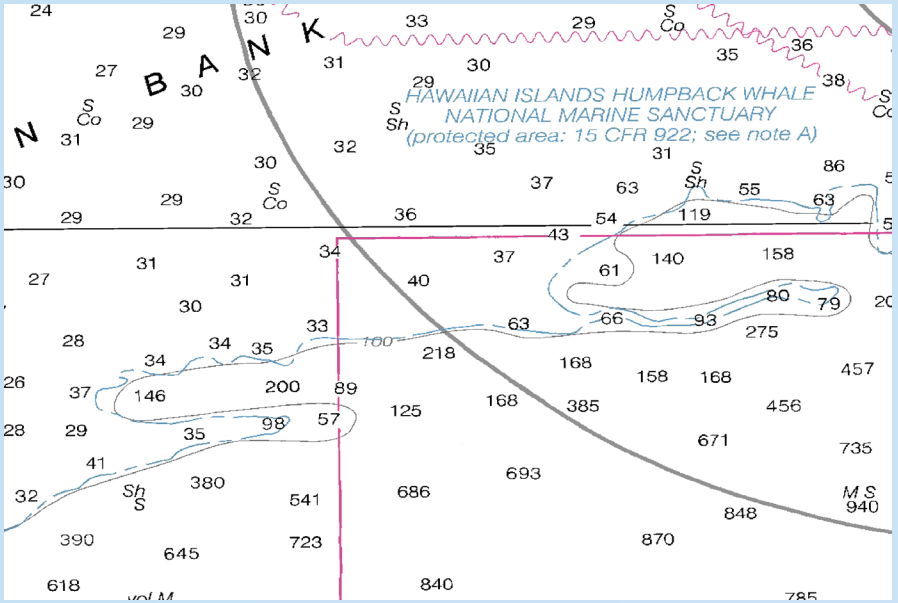
Management Agency: HI Department of Land and Natural Resources

Overview

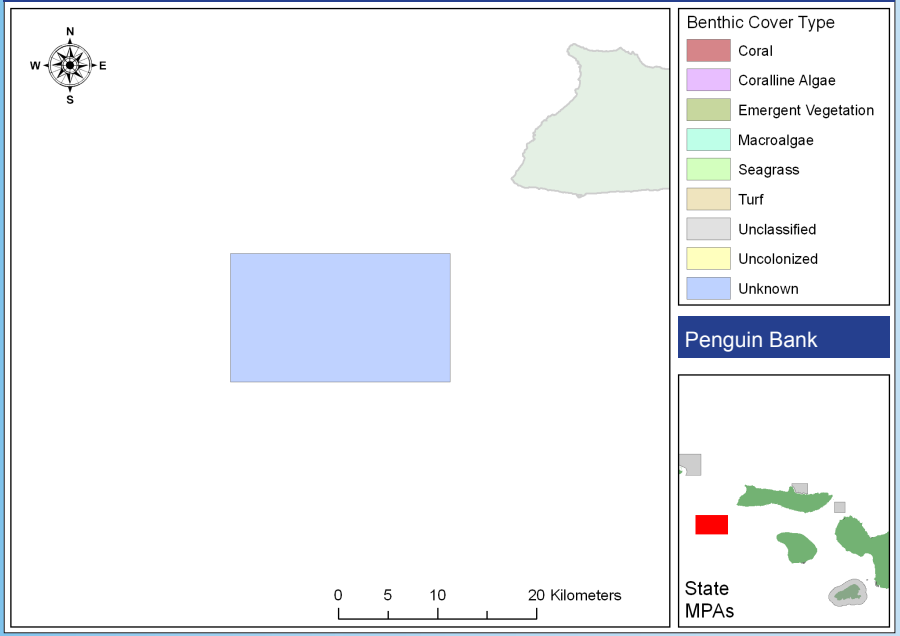
Site F is located on Penguin Bank, 5 nautical miles to the southwest of the island of Molokai.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Site F



Percent Benthic Cover

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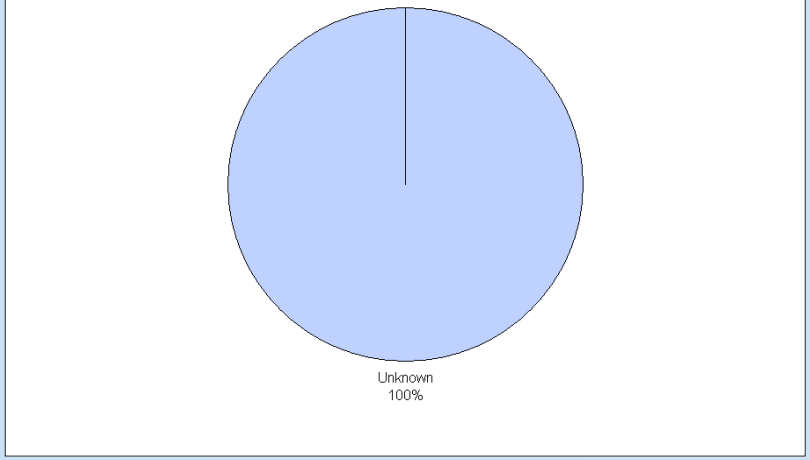


Bottomfish Restricted Fishing Area: Site G

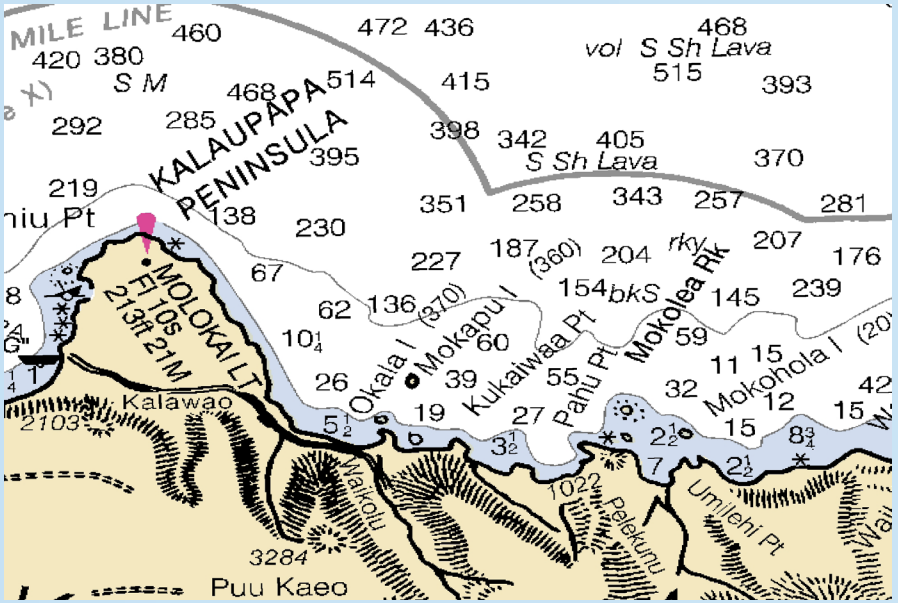
Management Agency: HI Department of Land and Natural Resources

Overview

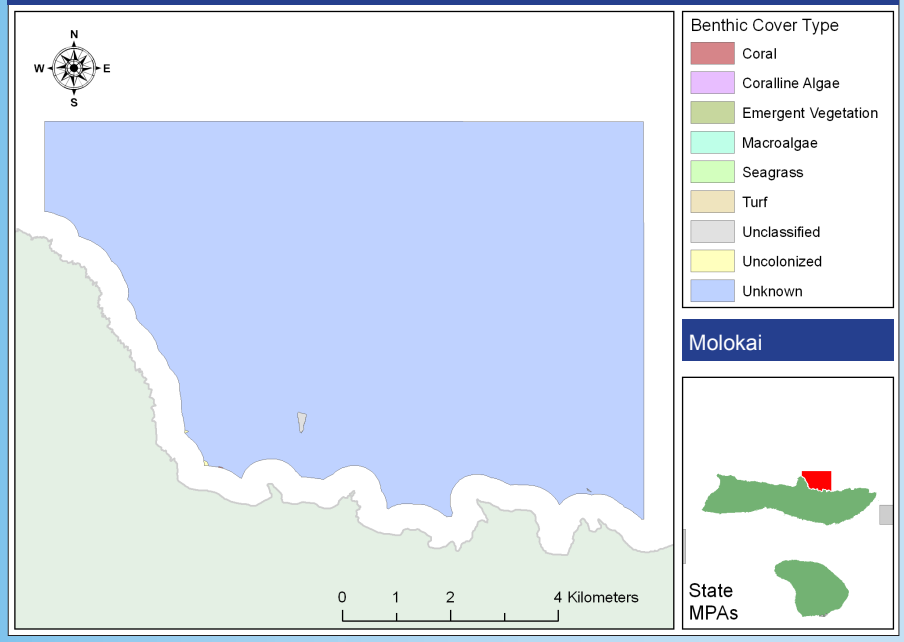
Site G is located along the central northern coast of the island of Molokai.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

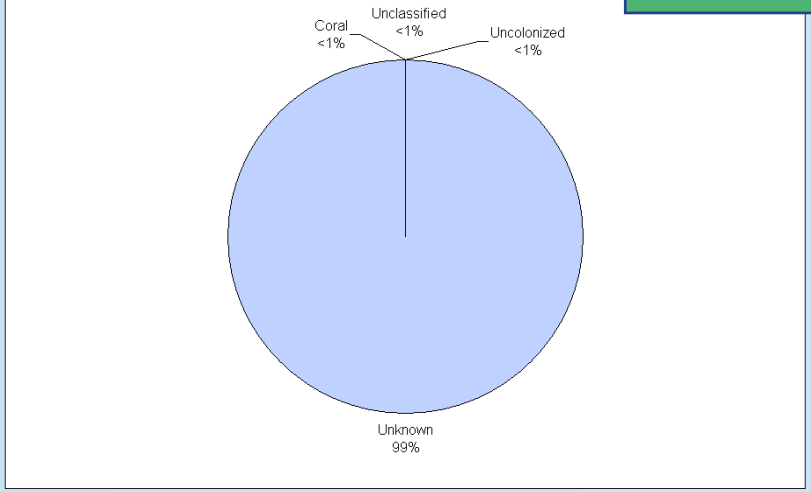
Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Site G



Percent Benthic Cover



This site contains <0.1% of the total area of Hawaii MPAs

Bottomfish Restricted Fishing Area: Site H

Management Agency: HI Department of Land and Natural Resources

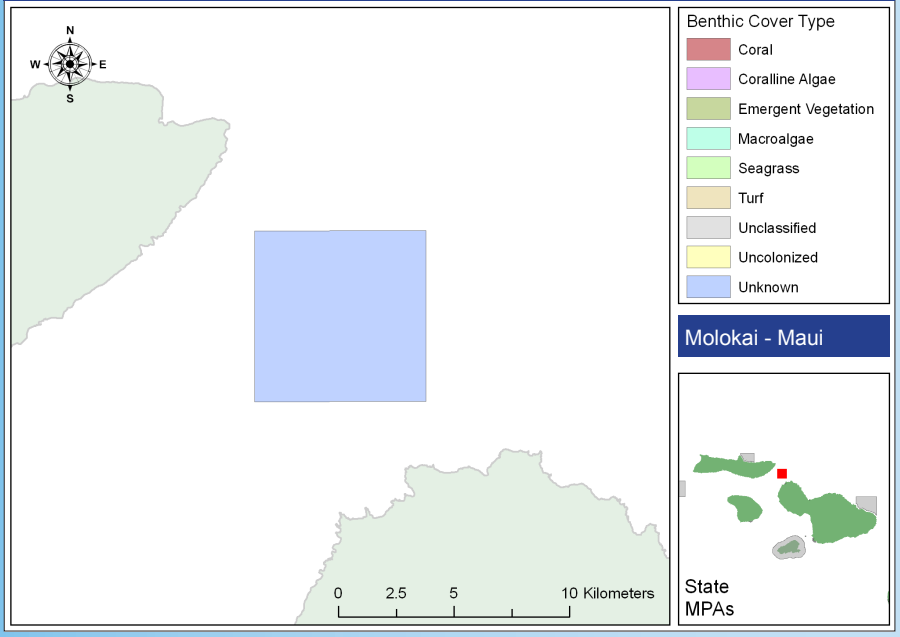
Overview

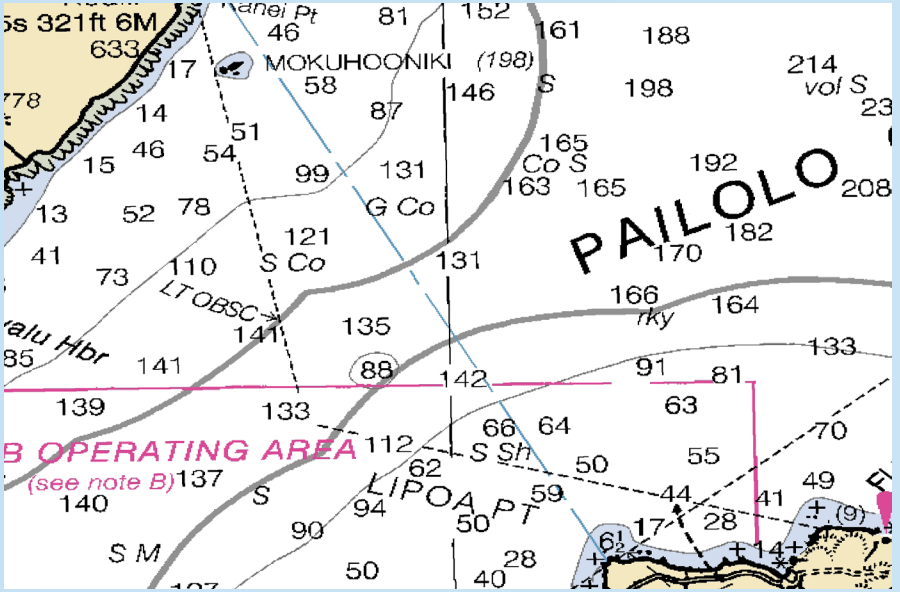
Site H is located in the waters between the islands of Molokai and Maui, 1.5 nautical miles from each island.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Site H





Percent Benthic Cover

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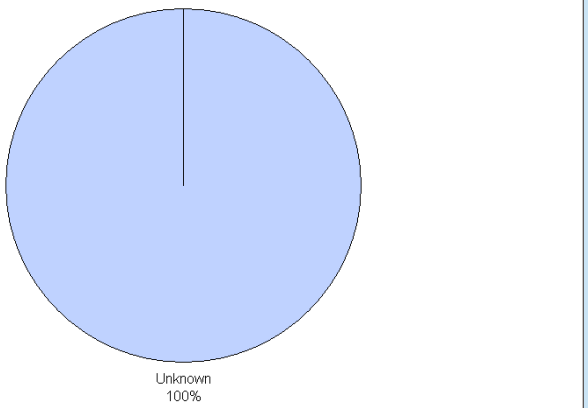


Bottomfish Restricted Fishing Area: Site J

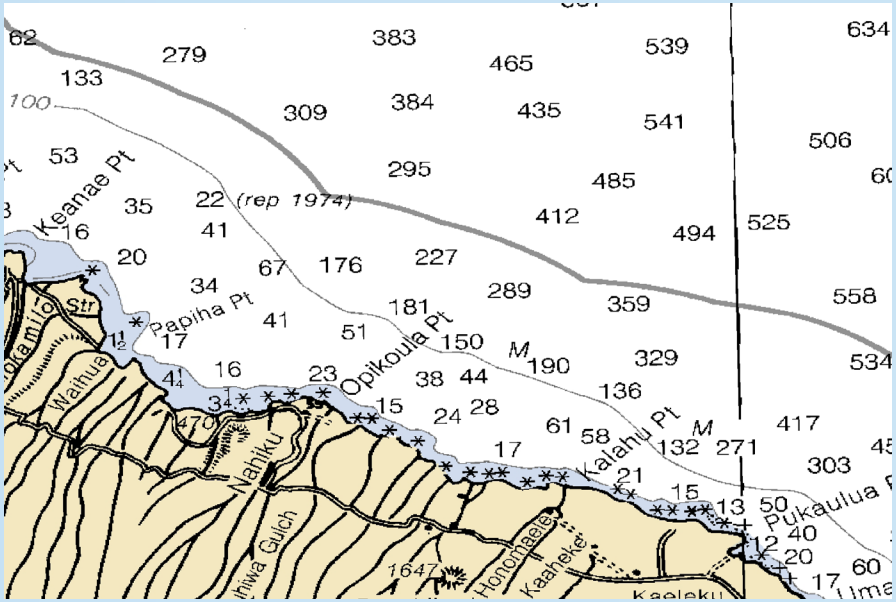
Management Agency: HI Department of Land and Natural Resources

Overview

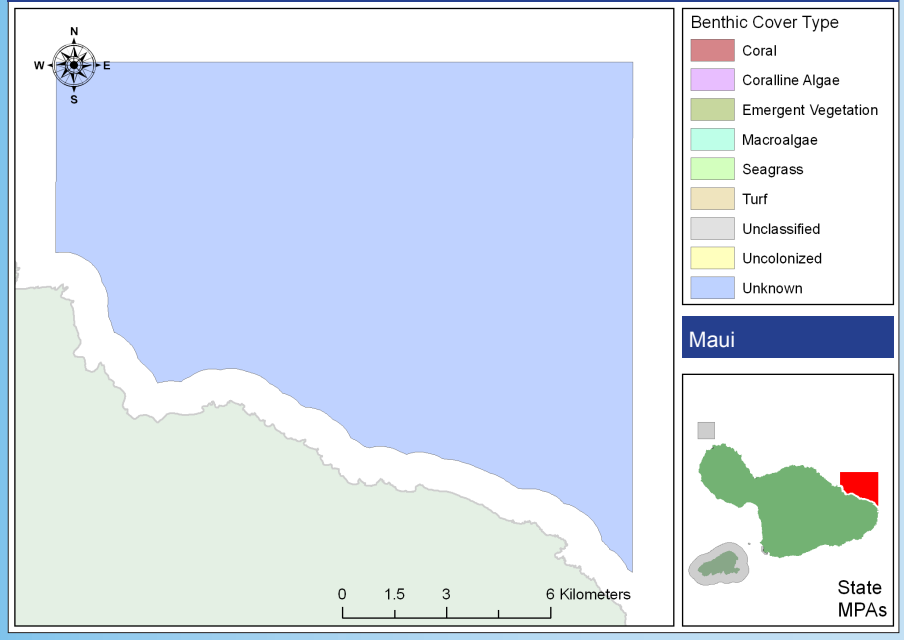
Site J is located along the northeastern coast of the island of Maui.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.



Site J



Percent Benthic Cover

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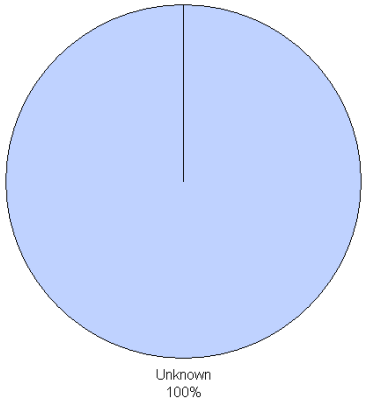


Bottomfish Restricted Fishing Area: Site K

Management Agency: HI Department of Land and Natural Resources

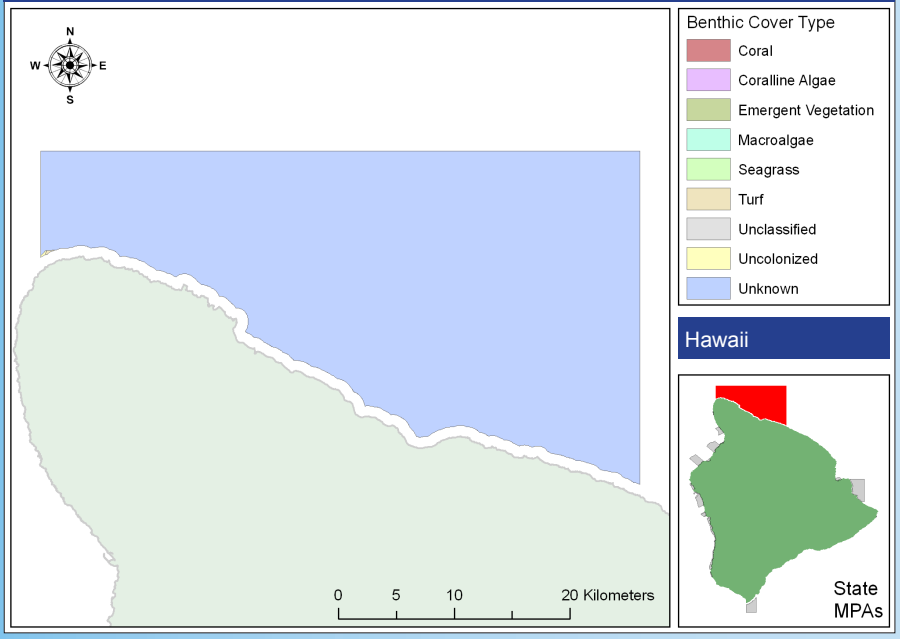
Overview

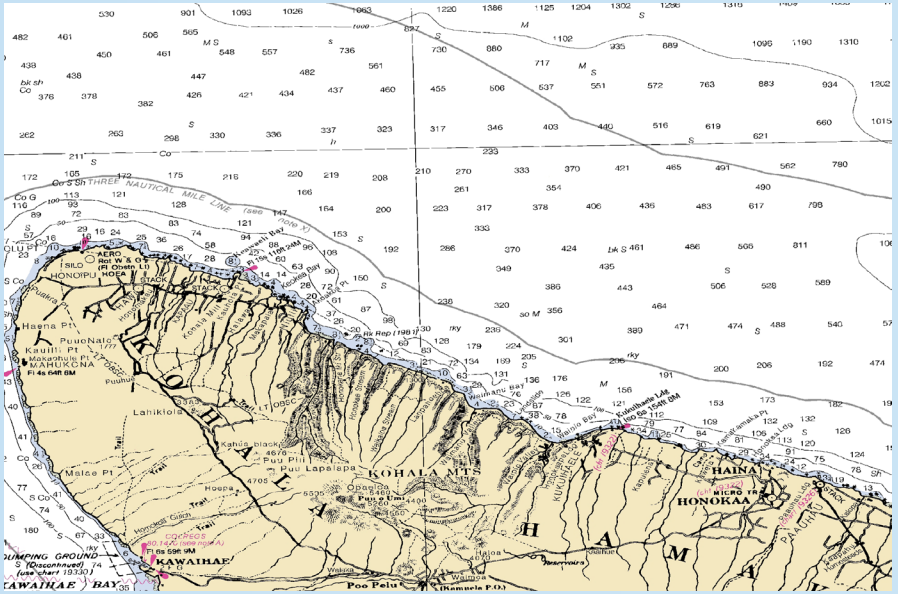
Site K is located along the northern coast on the island of Hawaii, from Upolu Point to Mahiki Point.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Site K





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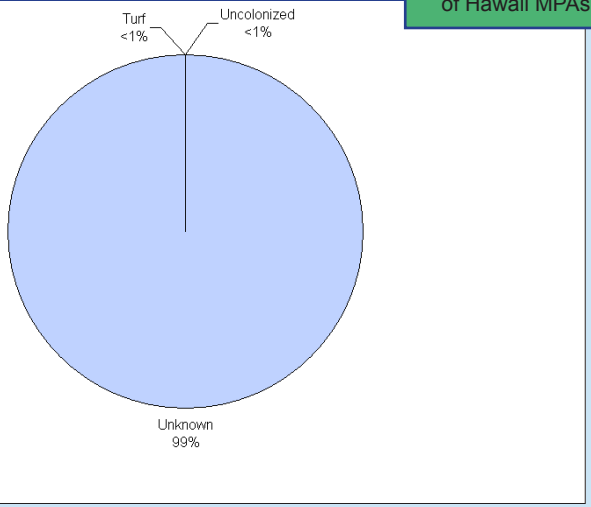


This site contains 0.11% of the total area of Hawaii MPAs

Bottomfish Restricted Fishing Area: Site L

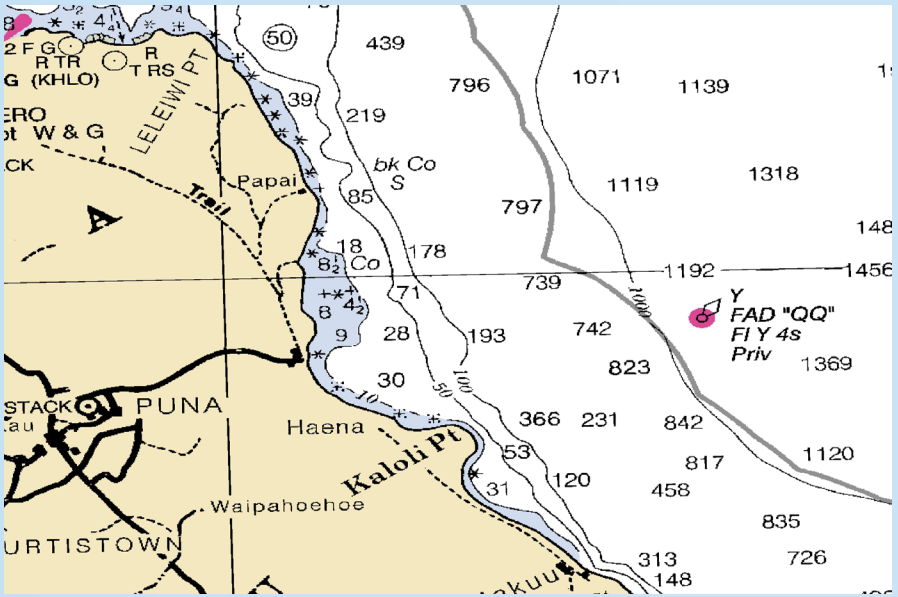
Management Agency: HI Department of Land and Natural Resources

Overview

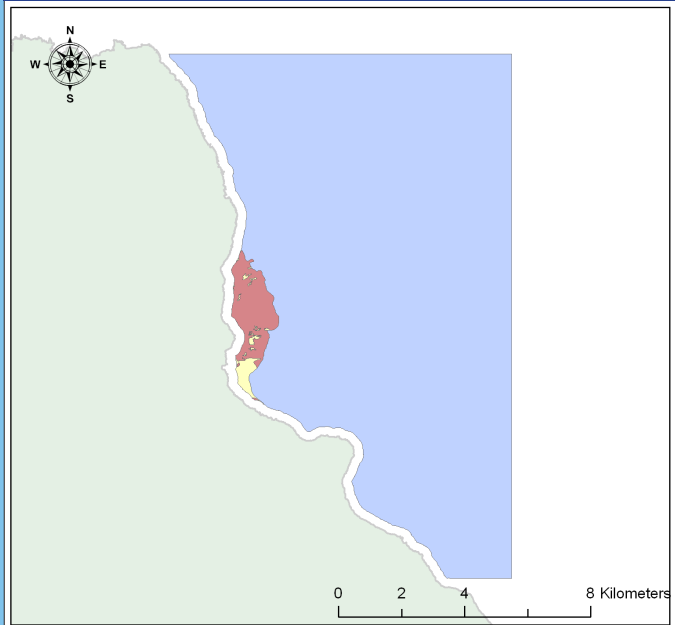
Site L is located along the central eastern coast of the island of Hawaii, from Leleiwi Point to Opihi Rock.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

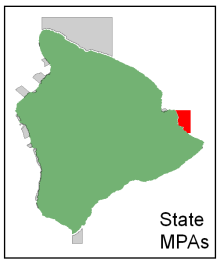


Site L

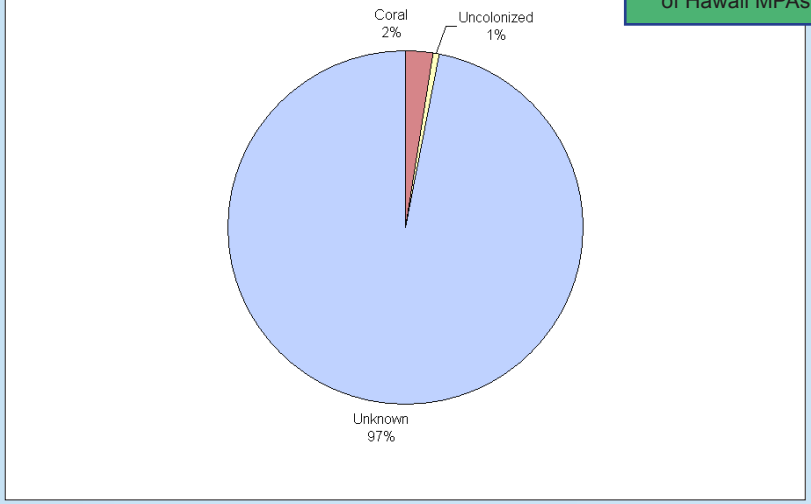


Benthic Cover Type
- Coral
- Coralline Algae
- Emergent Vegetation
- Macroalgae
- Seagrass
- Turf
- Unclassified
- Uncolonized
- Unknown

Hawaii



Percent Benthic Cover



This site contains <0.1% of the total area of Hawaii MPAs

Bottomfish Restricted Fishing Area: Site M

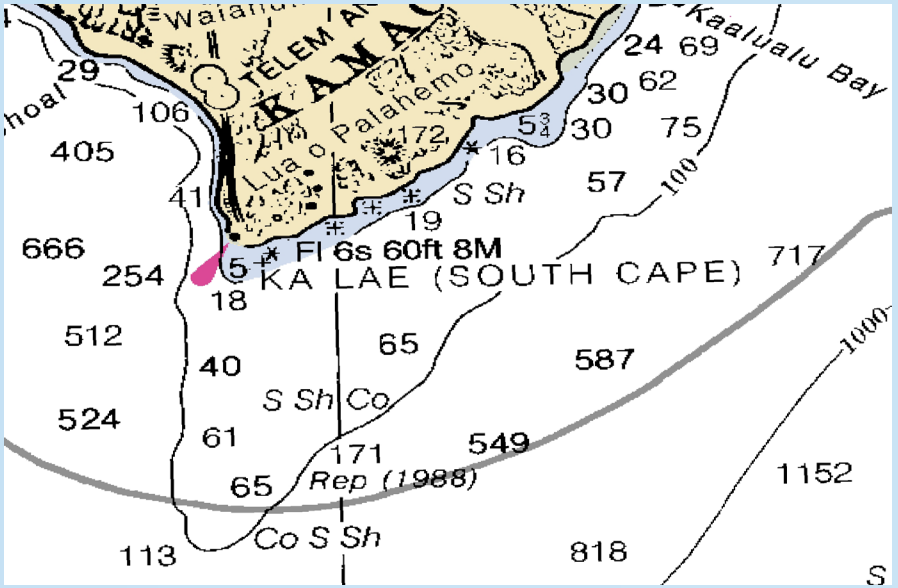
Management Agency: HI Department of Land and Natural Resources

Overview

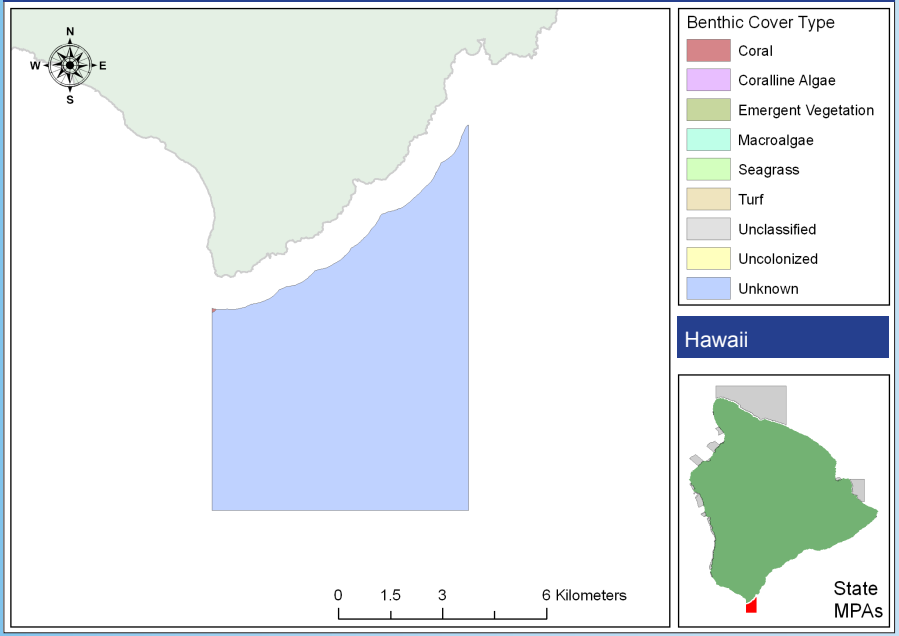
Site M is located at the southern point of the island of Hawaii.

It is unlawful for any person to take or possess bottomfish while in a vessel that is drifting or anchored within any bottomfish restricted fishing area as indicated on this map, except in times of emergency. Bottomfish species covered by these rules include flame snapper (*Etelis coruscans*), ruby snapper (*Etelis carbunculus*), oblique-banded snapper (*Pristipomoides zonatus*), lavender jobfish (*Pristipomoides sieboldii*), crimson jobfish (*Pristipomoides filamentosus*), rusty jobfish (*Aphareus rutilans*), and hawaiian grouper (*Epinephelus quernus*).

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

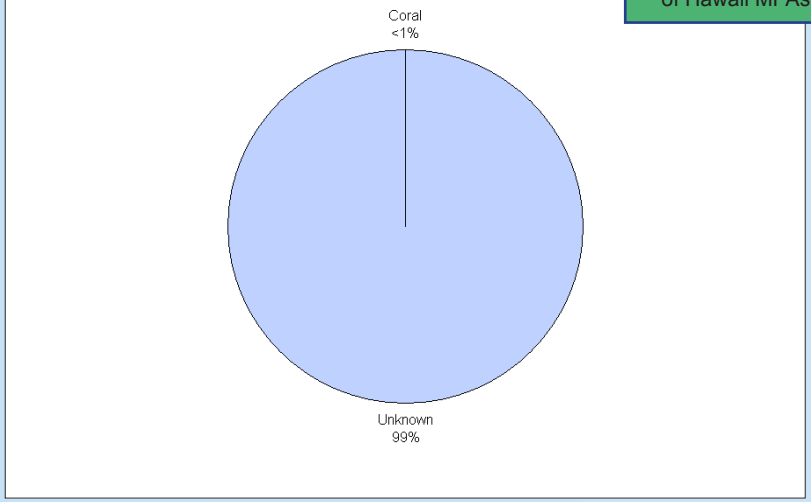


Site M



Percent Benthic Cover

This site contains <0.1% of the total area of Hawaii MPAs



Ahihi Kina'u Natural Area Reserve

Management Agency: HI Department of Land and Natural Resources

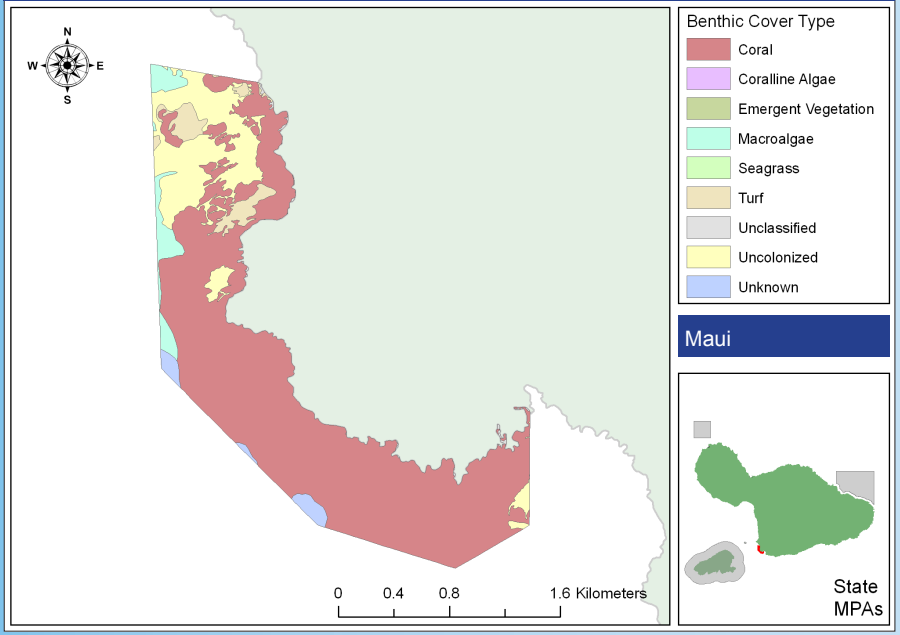
Overview

The Ahihi-Kinau Natural Area Reserve (NAR) is located in Makena on the island of Maui, and is the only reserve in DLNR's system that includes a marine section as well as a land section. It is one of only two areas on Maui where fishing is restricted.

Ahihi-Kinau is a fine example of an inshore marine environment in the state, and designation as a NAR was necessary to retain its high quality. The site contains pristine inshore marine ecosystems containing diverse flora and fauna, and anchialine pools with unique invertebrates and environmental character. Ahihi-Kinau contains the greatest diversity of corals for such a limited area within the state—23 species of stony corals are found in the southern end of Ahihi Bay. DLNR surveyed the site (08/02/72) and recorded 95 different species of fish present. The reserve contains an entire lava flow, from source vent to undersea extension, and additionally contains the remains of Moanakala, a historic fishing village. The site had been increasingly used in the five years before NAR designation, because Southern Maui (Wailea and Makena) was being developed. An unofficial reason for NAR designation was to curb development of the Makena/Ahihi-Kinau areas.

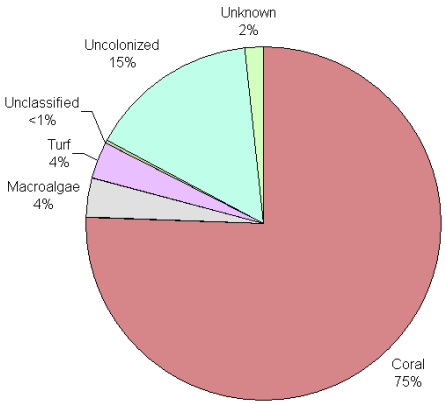
Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

Ahihi Kina'u



Percent Benthic Cover

This site contains <0.1% of the total area of Hawaii MPAs



Kahoolawe Island Reserve

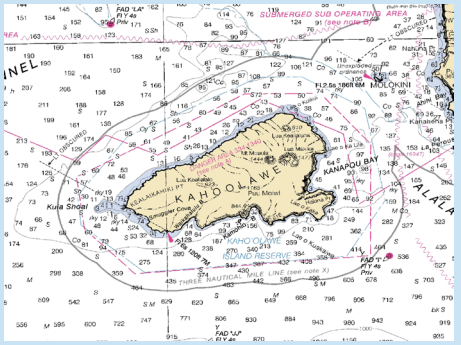
Management Agency: HI Department of Land and Natural Resources

Overview

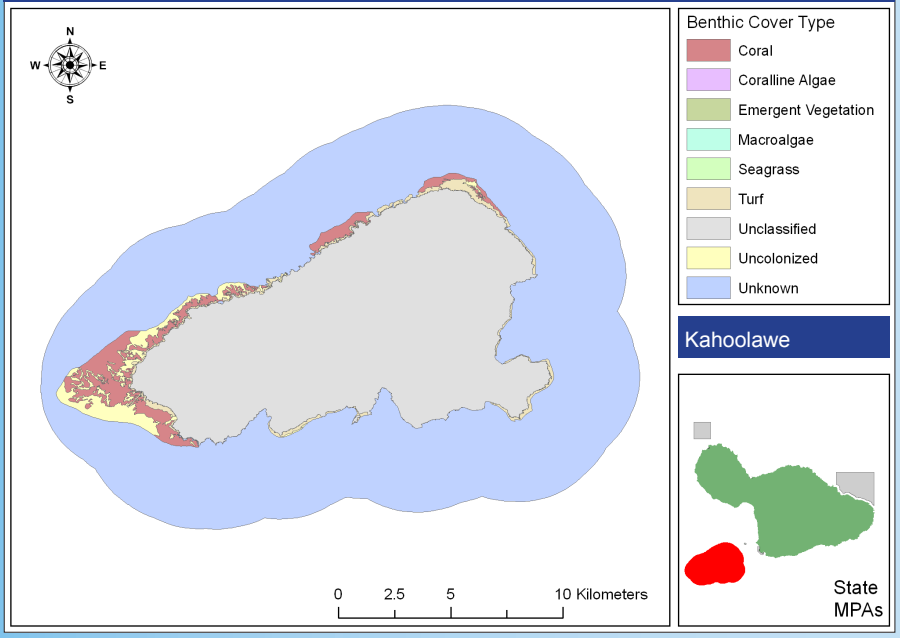
The Kahoolawe Island Reserve includes the island of Kahoolawe and surrounding waters seaward to a distance of two nautical miles. Kahoolawe is approximately 11 mi. long and 7 mi. wide and 45 mi² in area, the smallest of the eight main Hawaiian Islands.

There is an imminent peril to public health and safety from the presence of unexploded ordnance on the island and in the surrounding waters. Furthermore, there are sensitive archaeological, cultural, and historic sites; and native and endangered flora and fauna. In response, the island reserve was created solely for the purposes of preserving traditional native Hawaiian culture and religion; for education; and for the rehabilitation, restoration, preservation, and protection of the environmental, archaeological, and historical resources of the island. The Kahoolawe Island Reserve Commission oversees the area for the HI Department of Land and Natural Resources in the administration and enforcement of policies set by the commission.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

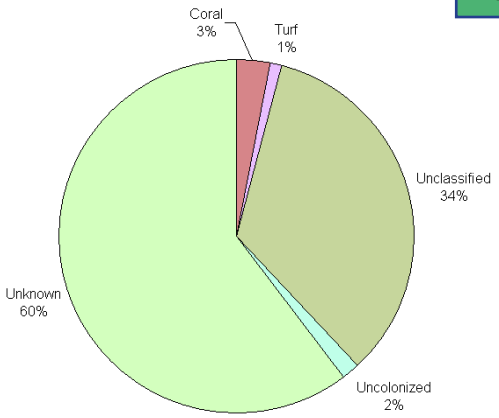


Kahoolawe Island Reserve



Percent Benthic Cover

This site contains <0.1% of the total area of Hawaii MPAs



Paiko Lagoon Wildlife Sanctuary

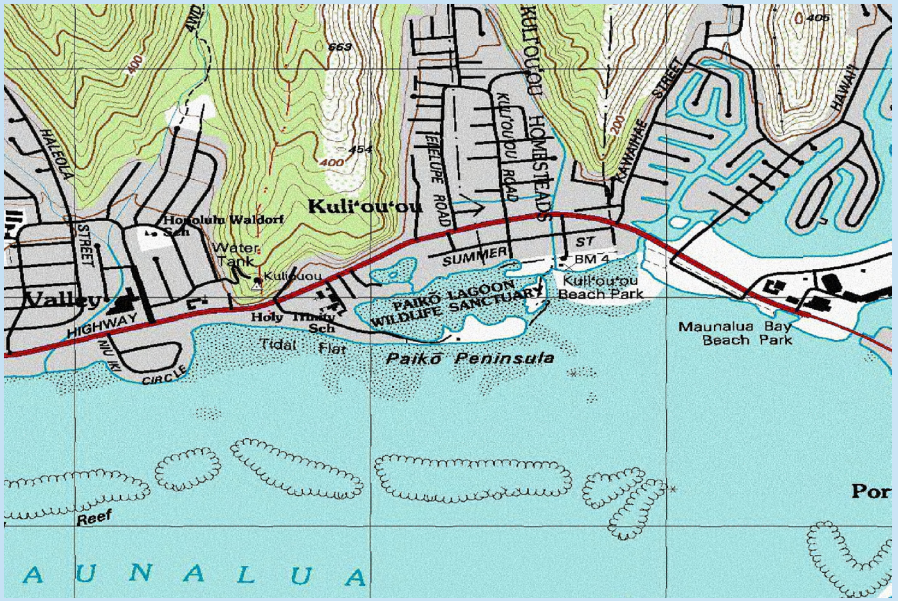
Management Agency: HI Department of Land and Natural Resources

Overview

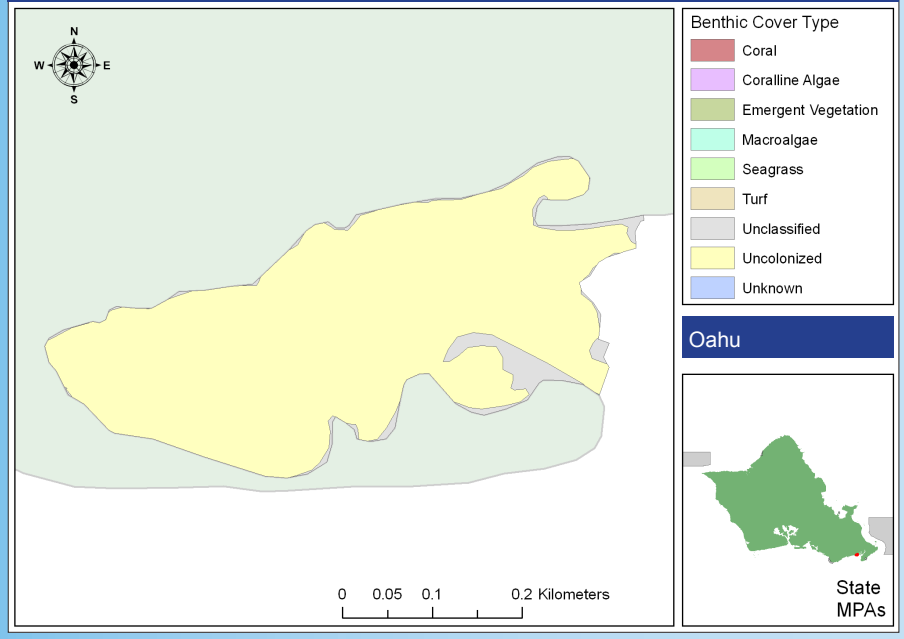
The Paiko Lagoon Wildlife Sanctuary is located on the eastern side of the island of Oahu. It includes all of the state-owned land areas adjacent to Paiko Lagoon, and water areas within Paiko Lagoon. Paiko Lagoon, formerly a coastal fishpond, is fed by a freshwater spring and Kuliouou Stream. The lagoon's water level varies with the tides and occasionally exposes the saline mudflats. This wildlife sanctuary provides habitat to the endangered Hawaiian Stilt as well as other migratory waterbirds. The proximity of residential uses may threaten the sanctuary due to intrusions by humans and domesticated animals.

The site was designated as a bird sanctuary on March 30, 1974. The Lagoon is an important resting and nesting site of the Hawaiian stilt and other native shorebirds.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

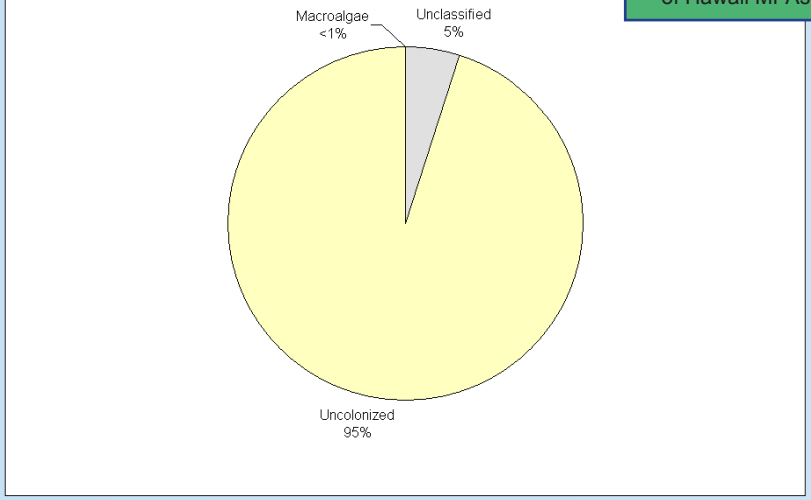


Paiko Lagoon Wildlife Sanctuary



Percent Benthic Cover

This site contains <0.1% of the total area of Hawaii MPAs



Moku O Lo'e Island Marine Laboratory Refuge

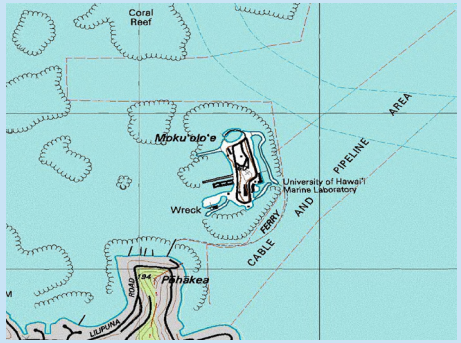
Management Agency: HI Department of Land and Natural Resources

Overview

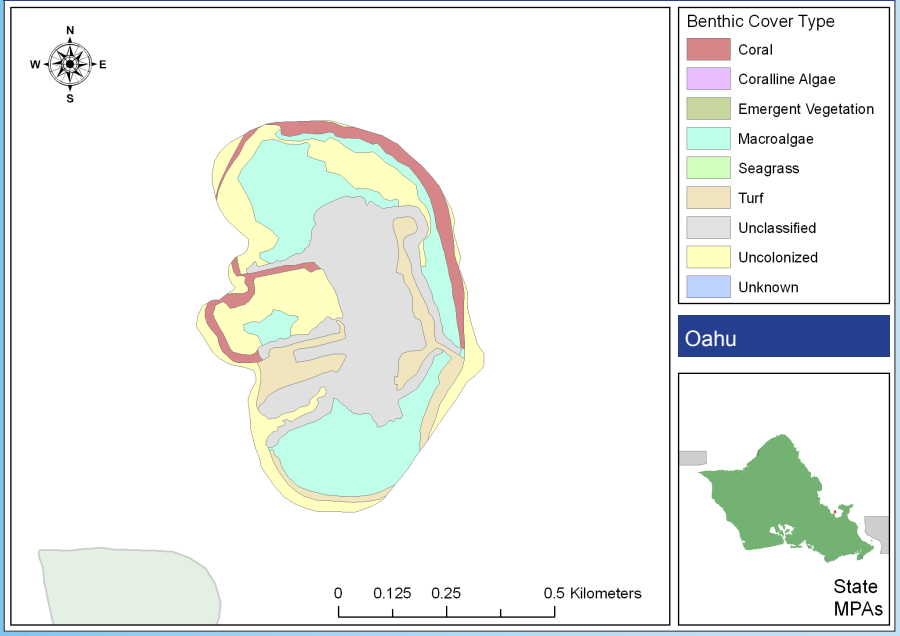
Moku-o-lo'e Island Marine Laboratory Refuge consists of the reefs and bay waters surrounding Coconut (Moku-o-lo'e) Island located in Kaneohe Bay, from the highwater mark on the island seaward to twenty-five feet beyond the outer edges of the reefs. Patch reefs and reef flats abound in the islands's nearshore waters and intertidal zone, respectively.

Experimental tuna, which were used for testing artificial bait substances, had been captured and transferred to the ponds of the Marine Laboratory at Coconut Island and kept alive at a substantial cost. The captive tuna were speared out of the ponds and stolen, in part, because fishermen were allowed to fish on the reef in close proximity to the tuna ponds. The refuge was established to regulate reef fishing around the island, and create a protective area around the laboratory.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

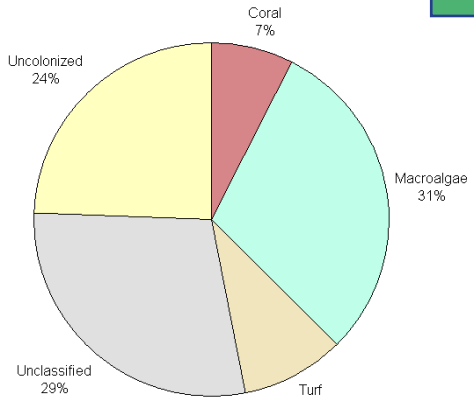


Moku O Lo'e Island Marine Laboratory Refuge



Percent Benthic Cover

This site contains <0.1% of the total area of Hawaii MPAs



Hawaiian Islands Humpback Whale National Marine Sanctuary

Management Agency: National Oceanic & Atmospheric Administration

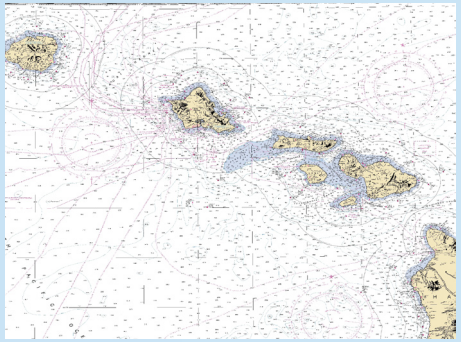
Overview

The Hawaiian Islands Humpback Whale National Marine Sanctuary is located in nearshore areas adjacent to six of the main Hawaiian Islands.

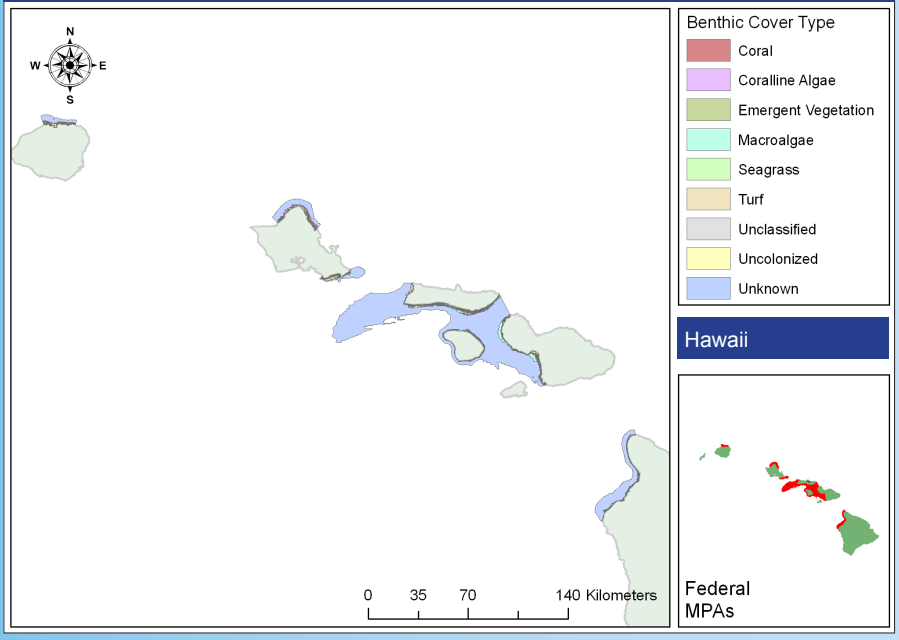
The shallow, warm waters surrounding the main Hawaiian Islands constitute one of the world's most important humpback whale habitats. Scientists estimate that two-thirds of the entire North Pacific humpback whale population migrate to Hawaiian waters each winter to engage in breeding, calving, and nursing activities.

The purposes of the Sanctuary are (1) to protect humpback whales and their habitat; (2) to educate and interpret for the public the relationship of humpback whales to the Hawaiian Islands marine environment; (3) to manage human uses of the Sanctuary consistent with the Sanctuary's designation and the National Marine Sanctuaries Act; and (4) to provide for the identification of marine resources and ecosystems of national significance for possible inclusion in the Sanctuary.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

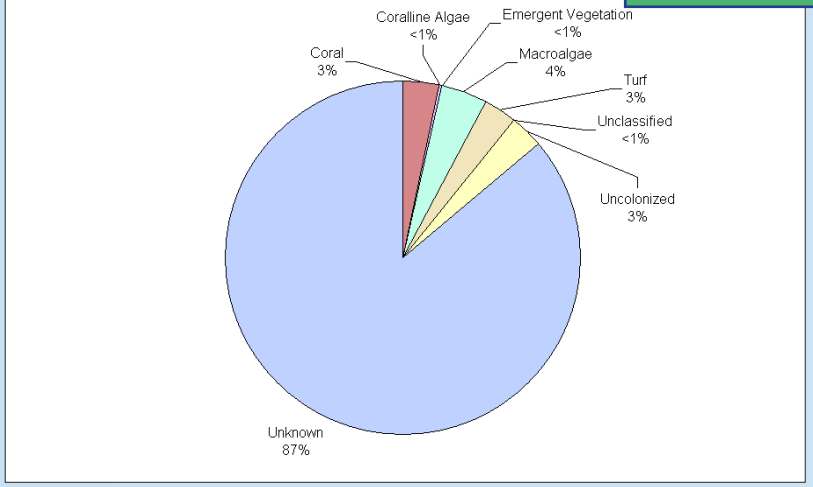


Hawaiian Islands Humpback Whale National Marine Sanctuary



Percent Benthic Cover

This site contains 0.43% of the total area of Hawaii MPAs



Kalaupapa National Historic Park

Management Agency: National Park Service

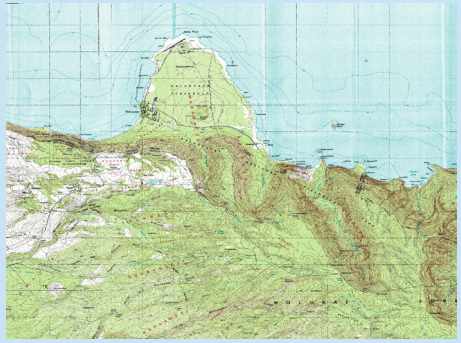
Overview

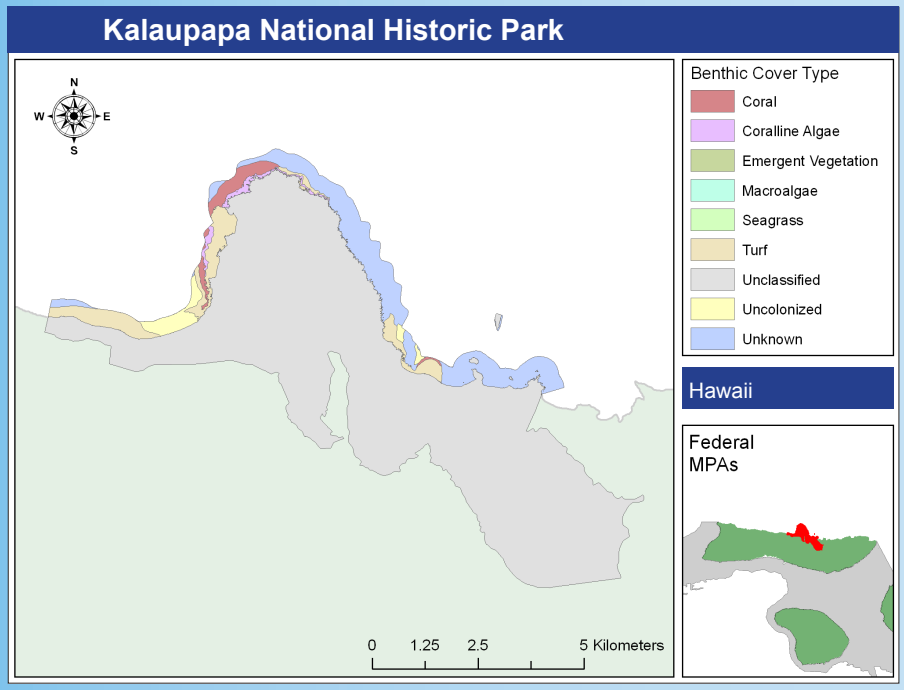
This site is located on the north shore of the island of Molokai. The park contains the Kalaupapa Peninsula, adjacent cliffs and valleys, and submerged lands and waters out to 1/4 mile from shore. Hawaiian people inhabited the peninsula and valleys for hundreds of years prior to the establishment of the isolation settlement at Kalawao in 1866.

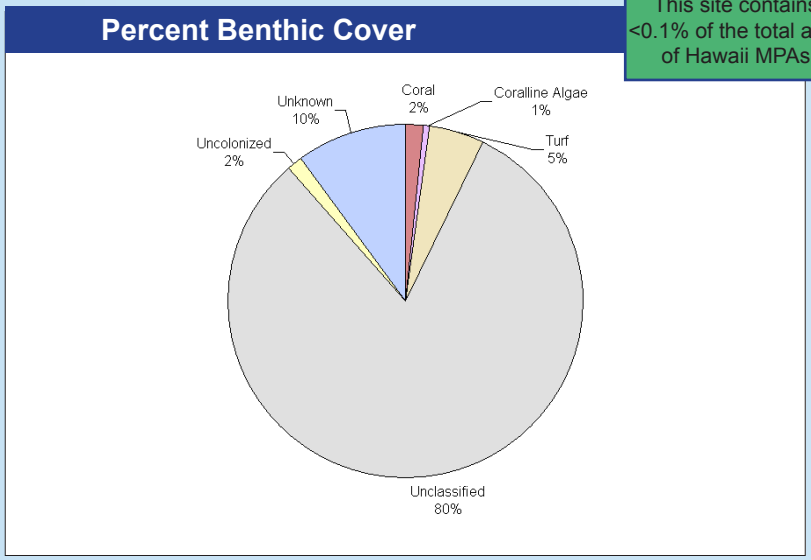
This site was set aside “in order to provide for the preservation of the unique nationally and internationally significant cultural, historic, educational, and scenic resources of the Kalaupapa settlement on the island of Molokai in the State of Hawaii.”

Hawaiian Monk seal pups have been born on Kalaupapa’s beaches. These endangered mammals require solitude, and Kalaupapa’s physical isolation provides perfect habitat to support the rearing of Monk seals. This national park is also home to rare plants like pua`ala and loulu palms.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA’s National Marine Protected Areas Center.







This site contains <0.1% of the total area of Hawaii MPAs

Kaloko-Honokohau National Historic Park

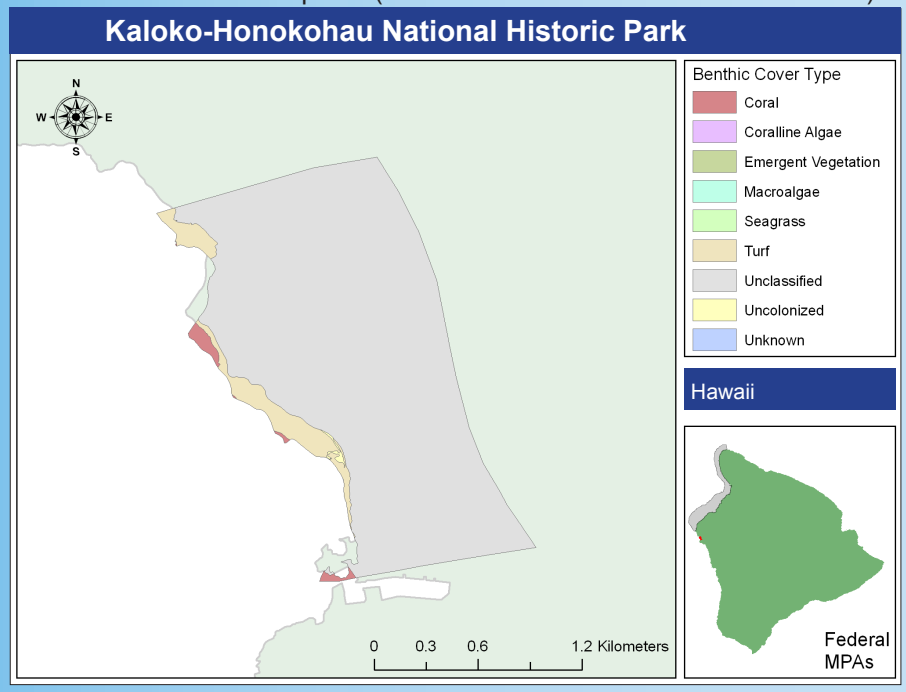
Management Agency: National Park Service

Overview

Kaloko-Honokohau NHP is composed of 630 acres of land and approximately 500 acres of offshore waters. The park has extensive archeological and biotic features and is located at the base of Hualālai Volcano, along the Kona coast of the island of Hawaii, three miles north of Kailua-Kona. This portion of the Kona Coast consists of flat open areas with scattered grasses among the convolutions of rugged lava.

This site was set aside to "provide a center for the preservation, interpretation, and perpetuation of traditional native Hawaiian activities and culture, and to demonstrate historic land use patterns as well as to provide a needed resource for the education, enjoyment, and appreciation of such traditional native Hawaiian activities and culture by local residents and visitors."

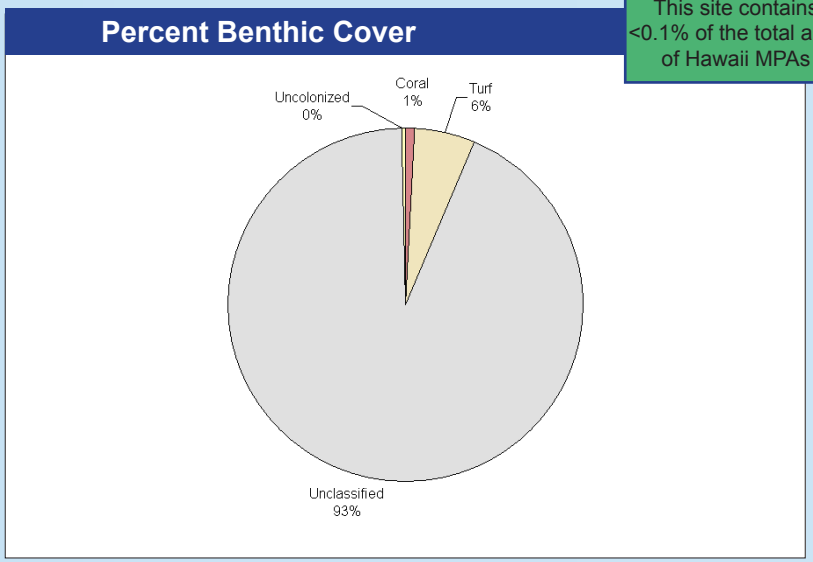
It is the site of an ancient Hawaiian settlement that encompasses portions of four different ahupua'a (traditional sea-to-mountain land divisions).



Resources include fishponds, kahua (house site platforms), ki'i pohaku (petroglyphs), holua (stone slide), and heiau (religious site). The middle fishpond, Aimakapa, is also an important wetland and an important migrant trap where many unusual and unexpected birds have turned up. The ocean and reef are an important Marine Area Reserve. Green sea turtles regualrly haul in to bask on the beach. Marine portions of the park have sparkling clear waters, and are a popular diving location. The park waters are closed to taking marine life and specimens for the aquarium trade. The resources of Kaloko-Honokohau possess aesthetic, cultural, historic, economic, scientific, and emotional values for the Hawaiian people.

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.

This site contains <0.1% of the total area of Hawaii MPAs



Papahānaumokuākea Marine National Monument

Management Agency: National Oceanic & Atmospheric Administration, and U.S. Fish & Wildlife Service

Overview

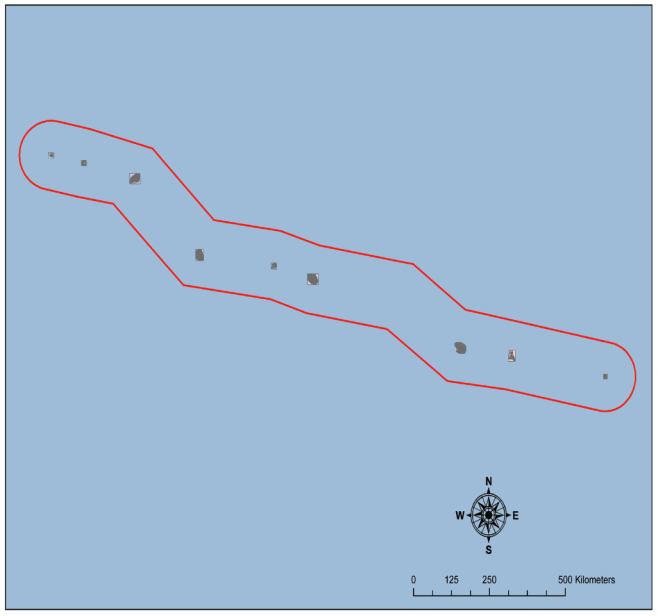
The Papahānaumokuākea Marine National Monument is the single largest conservation area in the United States, and one of the largest marine conservation areas in the world. Created by Presidential proclamation on June 15, 2006, the Monument is dedicated to the conservation of the Northwestern Hawaiian Islands, a 1,200-mile-long island chain located northwest of the main Hawaiian Islands from Nihoa Island to Kure Atoll. The Monument covers nearly 140,000 square miles of the Pacific Ocean—an area larger than all of the country's national parks combined.

The extensive coral reefs found in Papahānaumokuākea are home to over 7,000 marine species, one quarter of which are found only in the Hawaiian Archipelago. Many of the islands and shallow-water environments are important habitats for rare species such as the threatened green sea turtle and the endangered Hawaiian monk seal (pictured at right).

Papahānaumokuākea also holds great cultural and spiritual significance for Native Hawaiians with important cultural sites found on the islands of Nihoa and Mokumanamana.

Source of Overview: NOAA's Office of Marine Sanctuaries (http://sanctuaries.noaa.gov)

Papahānaumokuākea Marine National Monument

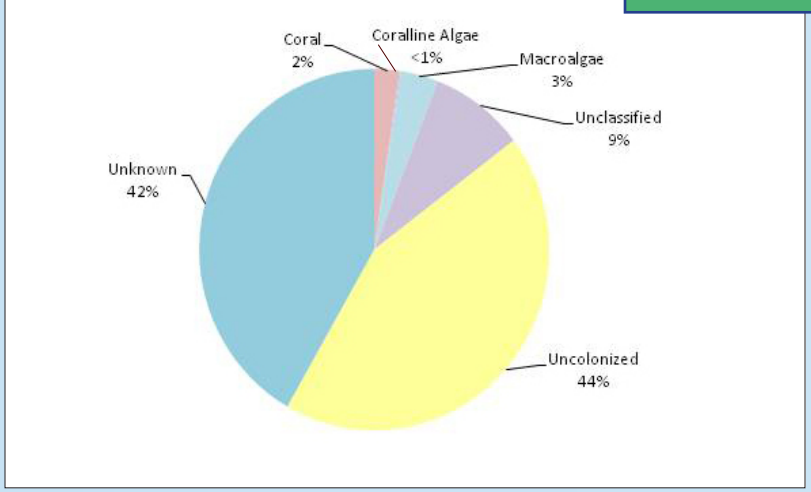


Benthic cover types are not visible at this scale. Therefore, the cover types legend is not displayed here.

State of Hawaii

Percent Benthic Cover

This site contains 99.3% of the total area of Hawaii MPAs



Puukohola Heiau National Historic Site

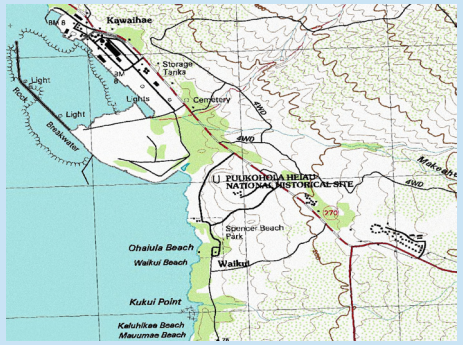
Management Agency: National Park Service

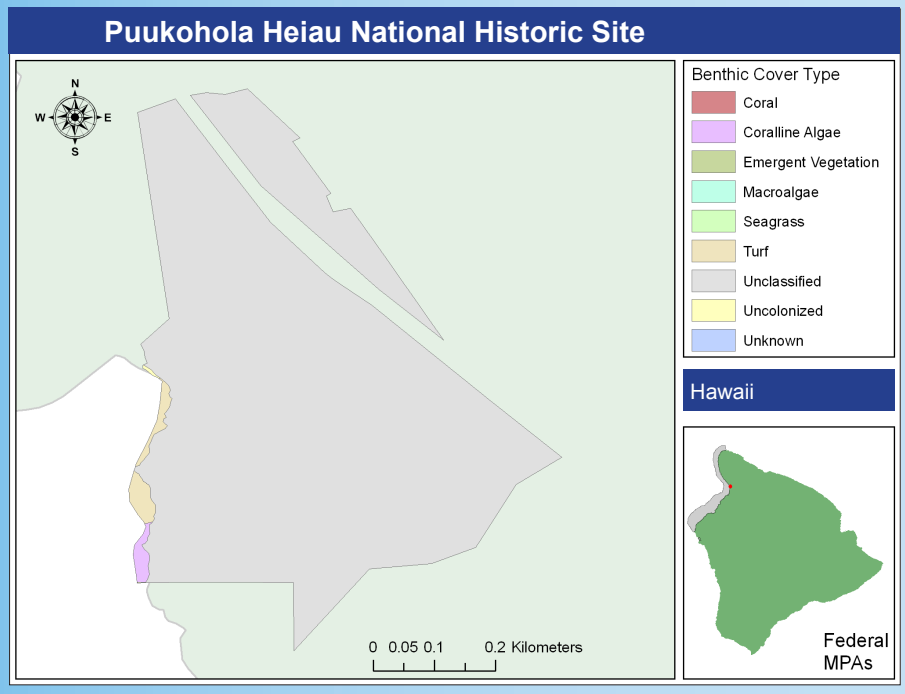
Overview

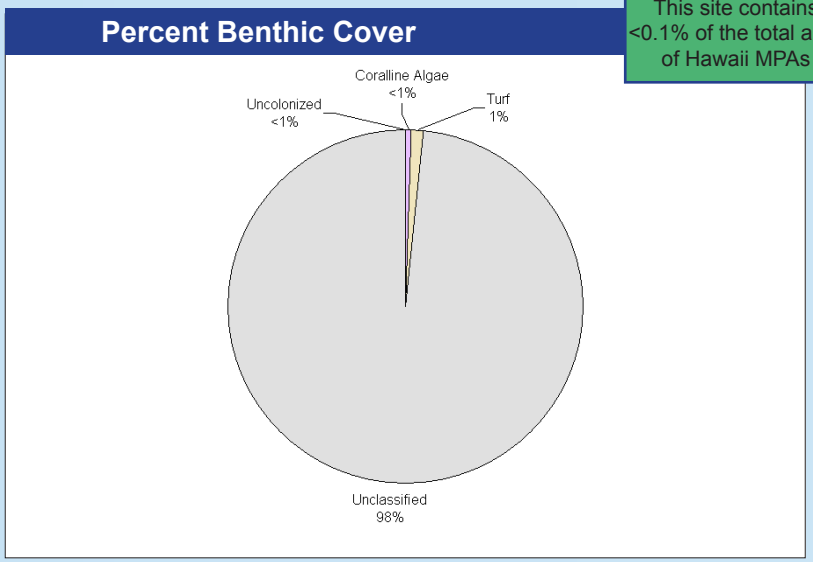
Puukohola Heiau NHS is a coastal park located on a bluff overlooking Kawaihae Harbor in South Kohala on the island of Hawaii. This area lies on the western, leeward side of the island which tends to be relatively low in precipitation. The terraces of Pu'ukohola Heiau dominate the side of a prominent hill overlooking Kawaihae Bay. In both prehistoric and historic times, its spacious natural harbor has distinguished it from the other coastal settlements of leeward Kohala, making it not only the safest mooring spot in that district, but also one of the best anchorages on the island of Hawaii.

The site was established to preserve "in public ownership the historically significant temple associated with Kamehameha the Great and the property of John Young who fought for Kamehameha the Great during the period of his ascendancy to power."

Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.







This site contains <0.1% of the total area of Hawaii MPAs

Pearl Harbor National Wildlife Refuge

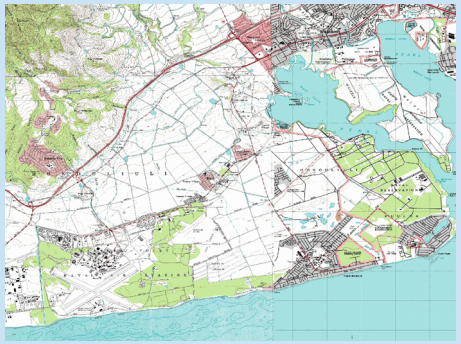
Management Agency: U.S. Fish & Wildlife Service

Overview

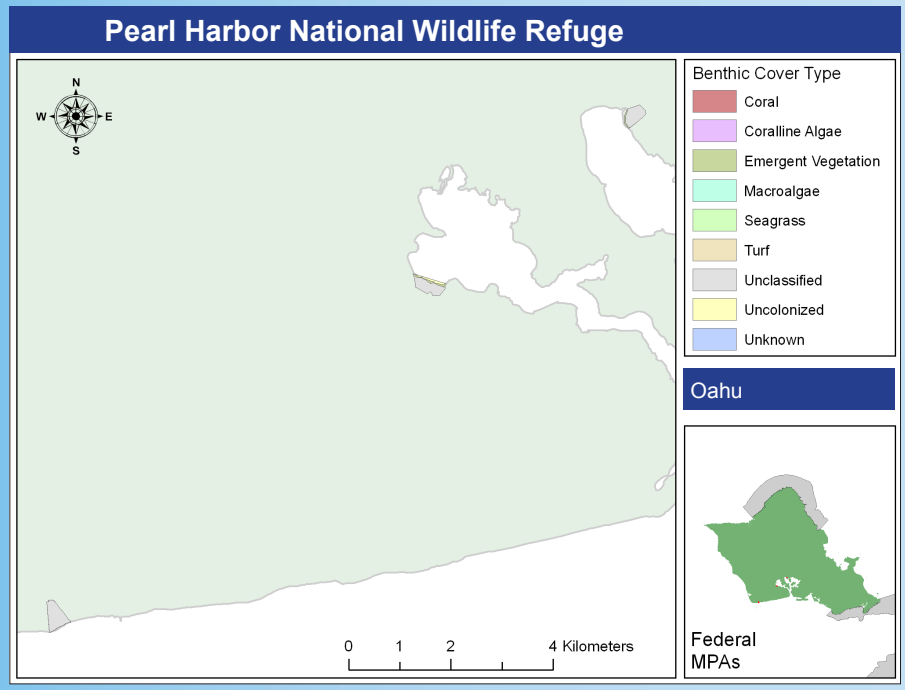
Located on the south side of the island of Oahu, this refuge contains 3 sites. The Waiawa Unit (24.5 acres) is located on the Middle Loch of Pearl Harbor, the Honouliuli Unit (36.5 acres) is located on the West Loch of Pearl Harbor, and the Kalaeloa Unit (37.4 acres) is located on the leeward side of the island.

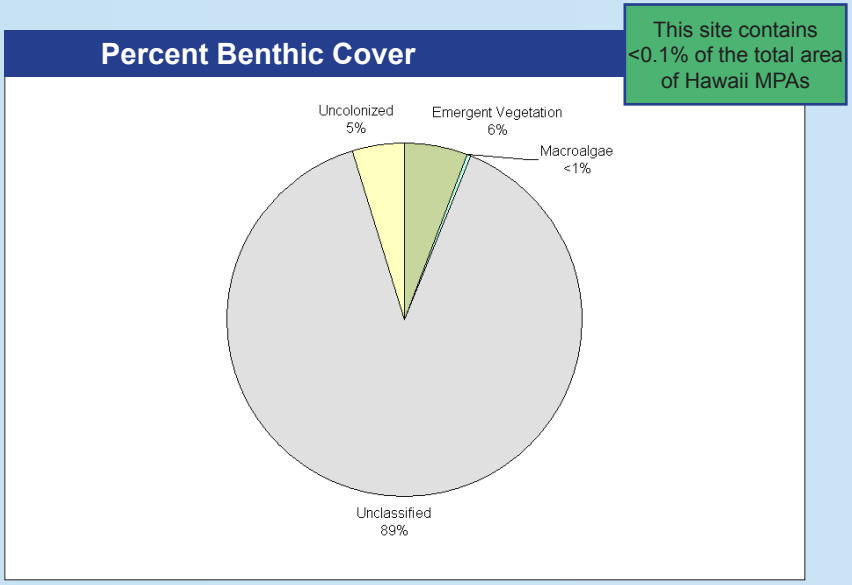
Waiawa is composed of two ponds with man-made nesting islands for Hawaiian stilts. Water is pumped into Waiawa from a nearby spring with outlets to the adjacent Pearl Harbor. Honouliuli also has two impoundments with nesting islands; its water comes from a fresh water well. The Kalaeloa Unit has, and is managed for, the largest native remnant stand of the endangered *Achyranthes* plant and contains other native coastal plants.

The purpose of the site is to support recovery and perpetuation of Federally listed endangered and threatened species, notably, four species of endangered Hawaiian waterbirds (Hawaiian Stilt, Hawaiian Coot, Hawaiian Moorhen, and Hawaiian duck). This is accomplished by providing an adequate quantity and quality of freshwater to maximize habitat value for migrant, endangered, and resident waterbirds.



Source of Overview: U.S. Marine Managed Areas Inventory (2006a), NOAA's National Marine Protected Areas Center.





Appendix A: National MPA Classification System

The National Classification System was developed by the National MPA Center in an effort to develop a "straightforward and consistent language to accurately describe the many types of MPAs occurring in our waters and to understand their effects on ecosystems and the people that use them" (NOAA National MPA Center, 2006b). A full description of the classification system is available at www.mpa.gov. The system describes MPAs in purely functional terms using five objective characteristics common to most MPAs:

1) Conservation Focus – each site was assigned one or more of the following three attributes:
   a. *Natural Heritage* – established and managed to sustain, conserve, restore and understand the biodiversity, populations, communities, habitats, ecosystems, processes and services of an MPA or MPA zone
   b. *Cultural Heritage* – established and managed to protect and under stand submerged cultural resources
   c. *Sustainable Production* – established and managed to support the continued extraction of renewable living resources

2) Level of Protection Afforded – each site was assigned one of the following six attributes:
   a. *Uniform Multiple-Use* – Consistent level of protection and allowable activities throughout the MPA
   b. *Zoned Multiple-Use* – Some extractive activities allowed throughout entire site, but use marine zoning to allocate specific uses to compatible places or times
   c. *Zoned Multiple-Use with No-Take Areas* – Multiple-use MPAs that contain one or more zones where resource extraction is prohibited
   d. *No-Take* – MPA sites that allow human access but prohibit resource extraction throughout the area
   e. *No Impact* – MPAs that allow human access but prohibit all activities that could harm the site's resources or disrupt the service they provide
   f. *No Access* – MPAs that restrict all human access to the area unless specifically permitted for designated special uses

3) Permanence of Protection – each site was assigned one of the following three attributes:
   a. *Permanent* – MPAs whose legal authorities provide protection in perpetuity
   b. *Conditional* – MPAs that have the potential to persist over time but whose legal authority has a finite duration and must be actively renewed
   c. *Temporary* – MPAs that are designed to address relatively short-term conservation and management needs by protecting a specific habitat or species for a finite duration with no expectation or mechanism for renewal

4) Constancy of Protection – each site was assigned one of the following three attributes:
   a. *Year-round* – MPAs that provide constant protection throughout the year
   b. *Seasonal* – MPAs that protected specific habitats and resources during fixed seasons or periods
   c. *Rotating* – MPAs that cycle among a set of fixed geographic areas in order to meet short-term conservation and management goals

5) Ecological Scale of Protection – each site was assigned one of the following two attributes:
   a. *Ecosystem* – MPAs whose legal authorities and management measures are intended to protect all of the components and processes of the ecosystem(s) within its boundaries
   b. *Focal Resource* – MPAs whose legal authorities and management measures specifically target a particular habitat, species complex, or single resource

Appendix B: Hawaiian Islands MPA Classification

Site Name	Conservation Goal	Level of Protection	Permanence of Protection	Constancy of Protection	Scale of Protection	Management Plan
Hanauma Bay MLCD*	Natural Heritage	No-Take	Permanent	Year Round	Ecosystem	No
Honolua–Mokuleʻia Bay MLCD*	Natural Heritage	No-Take	Permanent	Year Round	Ecosystem	No
Kealakekua Bay MLCD*	Natural Heritage	Zoned Multiple Use w/ No-Take Areas	Permanent	Year Round	Ecosystem	No
Lapakahi MLCD*	Natural Heritage	Zoned Multiple Use w/ No-Take Areas	Permanent	Year Round	Ecosystem	No
Manele-Hulopoʻe MLCD*	Natural Heritage	Zoned Multiple Use	Permanent	Year Round	Ecosystem	No
Molokini Shoal MLCD*	Natural Heritage	Zoned Multiple Use w/ No-Take Areas	Permanent	Year Round	Ecosystem	No
Old Kona Airport MLCD*	Natural Heritage	Uniform Multiple Use	Permanent	Year Round	Ecosystem	No
Pupukea-Waimea MLCD*	Natural Heritage	Zoned Multiple Use w/ No-Take Areas	Permanent	Year Round	Ecosystem	No
Waialea Bay MLCD*	Natural Heritage	Uniform Multiple-Use	Permanent	Year Round	Ecosystem	No
Waikiki MLCD*	Natural Heritage	No-Take	Permanent	Year Round	Ecosystem	No
Waiʻ Opae Tidepools MLCD*	Natural Heritage	No-Take	Permanent	Year Round	Ecosystem	No
Hilo Bay, Wailoa River, and Wailuku River FMA*	Sustainable Production	Uniform Multiple-Use	Permanent	Seasonal	Focal Resource	No
Kahului Harbor FMA*	Sustainable Production	Uniform Multiple-Use	Permanent	Year Round	Focal Resource	No
Kailua Bay FMA*	Sustainable Production	Zoned Multiple-Use	Permanent	Year Round	Focal Resource	No
Keauhou Bay FMA*	Sustainable Production	Zoned Multiple-Use	Permanent	Year Round	Focal Resource	No
Kiholo Bay FMA*	Sustainable Production	Uniform Multiple-Use	Permanent	Year Round	Focal Resource	No
Kona Coast FMA*	Sustainable Production	Zoned Multiple-Use	Permanent	Year Round	Focal Resource	No

Appendix B: Hawaiian Islands MPA Classification

Site Name	Conservation Goal	Level of Protection	Permanence of Protection	Constancy of Protection	Scale of Protection	Management Plan
Nawiliwili Harbor FMA*	Sustainable Production	Uniform Multiple-Use	Permanent	Year Round	Focal Resource	No
Puako Bay and Puako Reef FMA*	Sustainable Production	Uniform Multiple-Use	Permanent	Year Round	Focal Resource	No
South Kona (Miloli‘i) FMA*	Sustainable Production	Uniform Multiple-Use	Permanent	Year Round	Focal Resource	No
Waikiki–Diamond Head FMA*	Sustainable Production	Zoned Multiple-Use	Permanent	Seasonal	Ecosystem	No
West Hawaii Regional FMA*	Sustainable Production	Zoned Multiple-Use	Permanent	Year Round	Focal Resource	Yes
Site A*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site B*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site C*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site D*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site E*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site F*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site G*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site H*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site J*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site K*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site L*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Site M*	Sustainable Production	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	No
Ahihi Kina‘u NAR*	Natural Heritage	No Impact	Permanent	Year Round	Ecosystem	No

Appendix B: Hawaiian Islands MPA Classification

Site Name	Conservation Goal	Level of Protection	Permanence of Protection	Constancy of Protection	Scale of Protection	Management Plan
Kahoolawe Island Reserve*	Cultural Heritage	Zoned Multiple-Use	Permanent	Year Round	Ecosystem	Yes
Paiko Lagoon Wildlife Sanctuary*	Natural Heritage	No-Take	Permanent	Year Round	Ecosystem	Yes
Moku O Loʻe Island Marine Laboratory Refuge*	Natural Heritage	No Access	Permanent	Year Round	Ecosystem	No
Hawaiian Islands Humpback Whale National Marine Sanctuary**	Natural Heritage & Cultural Heritage	Uniform Multiple-Use	Conditional	Year Round	Focal Resource	Yes
Kalaupapa National Historic Park**	Natural Heritage & Cultural Heritage	Zoned Multiple Use w/ No-Take Areas	Permanent	Year Round	Ecosystem	Yes
Kaloko-Honokohau National Historical Park**	Natural Heritage & Cultural Heritage	No Take	Permanent	Year Round	Ecosystem	Yes
Papahānaumokuākea Marine National Monument**	Natural Heritage & Cultural Heritage	No Take	Permanent	Year Round	Ecosystem	In Draft
Puukohola Heiau National Historic Site**	Natural Heritage & Cultural Heritage	Uniform Multiple-Use	Permanent	Year Round	Ecosystem	Yes
Pearl Harbor National Wildlife Refuge**	Natural Heritage	Uniform Multiple-Use	Permanent	Year Round	Ecosystem	Yes

* State Site
** Federal Site

Appendix C: Benthic Cover (km^2) by Site

	Coral	Coralline Algae	Emergent Vegetation	Macroalgae	Seagrass	Turf	Unclassified	Uncolonized	Unknown	Total
Hanauma Bay MLCD*	0.225	0.024	0.000	0.000	0.000	0.034	0.008	0.090	0.029	0.410
Honolua–Mokuleʻia Bay MLCD*	0.034	0.000	0.000	0.000	0.000	0.075	0.009	0.065	0.000	0.183
Kealakekua Bay MLCD*	0.421	0.000	0.000	0.000	0.000	0.044	0.010	0.363	0.402	1.240
Lapakahi MLCD*	0.072	0.043	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.118
Manele-Hulopoʻe MLCD*	0.376	0.008	0.000	0.000	0.000	0.264	0.016	0.369	0.091	1.123
Molokini Shoal MLCD*	0.106	0.000	0.000	0.000	0.000	0.063	0.076	0.020	0.175	0.440
Old Kona Airport MLCD*	0.370	0.000	0.000	0.000	0.000	0.031	0.011	0.034	0.616	1.062
Pupukea-Waimea MLCD*	0.086	0.000	0.000	0.182	0.000	0.181	0.025	0.238	0.002	0.714
Waialea Bay MLCD*	0.061	0.000	0.000	0.000	0.000	0.019	0.006	0.048	0.008	0.142
Waikiki MLCD*	0.000	0.000	0.000	0.247	0.000	0.034	0.002	0.033	0.000	0.316
Waiʻopae Tidepools MLCD*	0.008	0.000	0.000	0.037	0.000	0.091	0.046	0.000	0.017	0.200
Hilo Bay, Wailoa River, and Wailuku River FMA*	0.393	0.000	0.000	1.076	0.000	0.168	0.126	4.373	0.040	6.176
Kahului Harbor FMA*	0.000	0.000	0.000	0.011	0.000	0.000	0.001	0.027	0.000	0.038
Kailua Bay FMA*	0.264	0.000	0.000	0.000	0.000	0.063	0.003	0.109	0.001	0.440
Keauhou Bay FMA*	0.016	0.000	0.000	0.000	0.000	0.007	0.003	0.000	0.000	0.026
Kiholo Bay FMA*	1.481	0.000	0.000	0.000	0.000	0.264	0.030	0.668	0.221	2.665
Kona Coast FMA*	1.182	0.000	0.000	0.000	0.000	0.215	0.030	0.234	9.138	10.799
Nawiliwili Harbor FMA*	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.132	0.000	0.135
Puako Bay and Puako Reef FMA*	0.395	0.000	0.000	0.000	0.000	0.346	0.109	0.013	0.089	0.952
South Kona (Miloliʻi) FMA*	0.688	0.000	0.000	0.000	0.000	0.034	0.021	0.054	8.395	9.191
Waikiki–Diamond Head FMA*	0.016	0.020	0.000	0.501	0.000	0.305	0.005	0.128	0.000	0.974
West Hawaii Regional FMA*	15.595	0.011	0.000	0.000	0.000	3.934	0.367	5.100	135.451	160.457
Site A*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	86.344	86.344
Site B*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	40.974	40.974
Site C*	0.000	0.000	0.000	0.000	0.000	0.764	0.000	2.612	47.703	51.078
Site D*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	85.356	85.356

Appendix C: Benthic Cover (km^2) by Site

	Coral	Coralline Algae	Emergent Vegetation	Macroalgae	Seagrass	Turf	Unclassified	Uncolonized	Unknown	Total
Site E*	0.000	0.000	0.000	0.000	0.000	2.592	0.000	0.051	187.585	190.228
Site F*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	269.998	269.998
Site G*	0.001	0.000	0.000	0.000	0.000	0.000	0.037	0.008	60.726	60.772
Site H*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	51.435	51.435
Site J*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	161.575	161.575
Site K*	0.000	0.000	0.000	0.000	0.000	0.119	0.000	0.101	909.285	909.505
Site L*	2.952	0.000	0.000	0.000	0.000	0.000	0.000	0.610	114.774	118.336
Site M*	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	53.718	53.726
Ahihi Kinaʻu NAR*	0.688	0.000	0.000	0.000	0.000	0.034	0.021	0.054	8.395	9.191
Kahoolawe Island Reserve*	0.008	0.000	0.000	0.037	0.000	0.091	0.046	0.000	0.017	0.200
Paiko Lagoon Wildlife Sanctuary*	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.110	0.000	0.116
Moku O Loʻe Island Marine Laboratory Refuge*	0.029	0.000	0.000	0.119	0.000	0.037	0.113	0.096	0.000	0.395
Hawaiian Islands Humpback Whale National Marine Sanctuary**	123.361	4.985	1.124	146.294	0.000	105.699	8.523	102.251	3,062.706	3,554.943
Kalaupapa National Historic Park**	0.668	0.307	0.000	0.000	0.000	2.186	35.436	0.662	4.358	43.616
Kaloko-Honokohau National Historical Park**	0.024	0.000	0.000	0.000	0.000	0.141	2.374	0.004	0.000	2.543
Papahānaumokuākea Marine National Monument**†	109.1	7.23	N/A	163.88	N/A	N/A	417.63	2,076.61	1,988.61	4,763.06
Puukohola Heiau National Historic Site**	0.000	0.002	0.000	0.000	0.000	0.004	0.315	0.000	0.000	0.321
Pearl Harbor National Wildlife Refuge**	0.000	0.000	0.024	0.001	0.000	0.000	0.371	0.019	0.000	0.415

* State Site
** Federal Site
† Emergent Vegetation, Seagrass, and Turf benthic habitat types were not part of the classification scheme for the Papahānaumokuākea Marine National Monument (NW Hawaiian Islands) benthic habitat data.

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