



FISHING LINKS

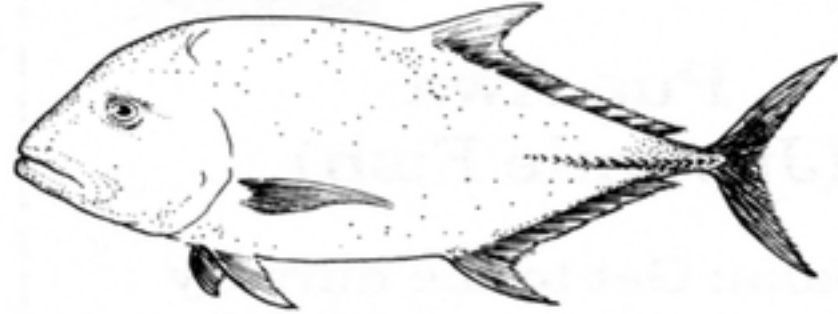
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LEARNING LOG - 1

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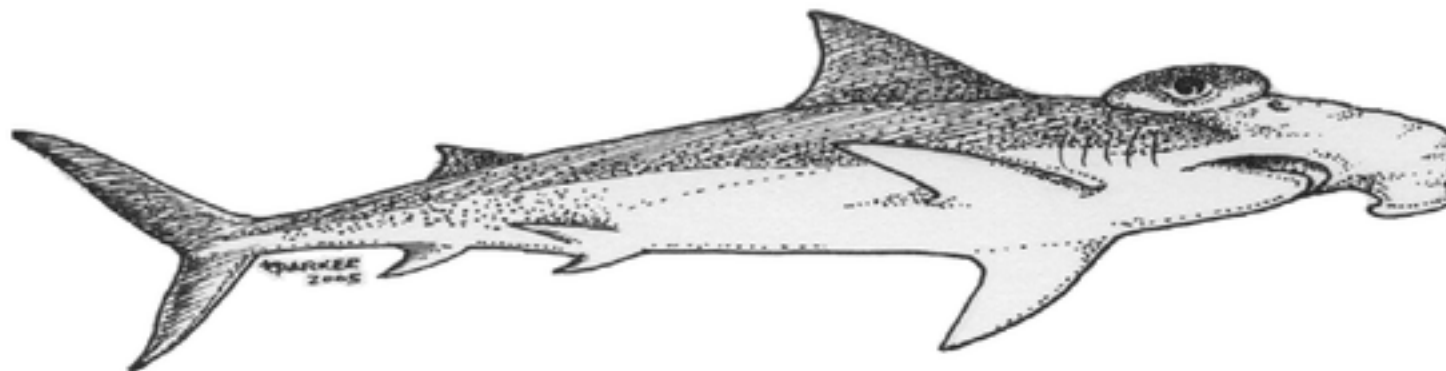
PREDATOR/PREY RELATIONSHIPS

Many predator/prey relationships exist to support the largest predators in the bay—the *manō* (shark) and the *ulua* (giant trevally). These predators at the top of the food chain are called apex predators. Think of all of the life that is required to support the *manō*.



ulua (giant trevally)

Make a list of the species that you think need to exist on the reef in order for the *manō* and the *ulua* to survive.



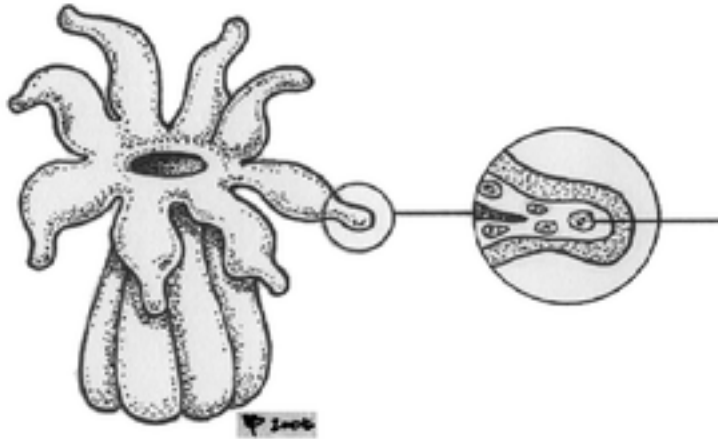
In the Northwestern Hawaiian Islands (NWHI), apex predators make up 54% of the reef. In the main Hawaiian Islands these top-level predators make up only 3% of the reef. Why do think there is such a difference? List your ideas below:



SYMBIOTIC RELATIONSHIPS

A symbiotic relationship is one where both species benefit. Some examples are:

***Ko'a* (Coral) and *Limu* (Algae)**

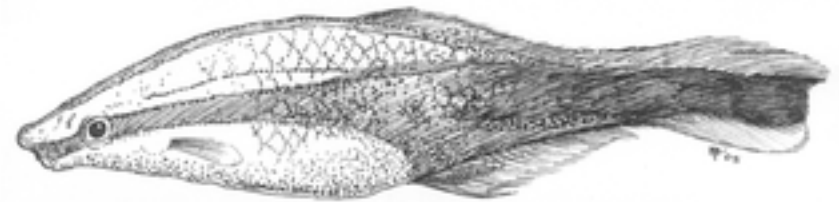


coral polyp with zooxanthellae (algae)

Corals are made up of tiny polyps that have a sac-like gut with an opening surrounded by tentacles with tiny stinging cells. These cells capture zooplankton—very tiny animals that drift by in the currents. Living inside the coral's tissues are single-celled algae called zooxanthellae. These algae use the sun's energy to convert water and carbon dioxide into food that the polyps utilize. The algae benefit from this relationship by being protected from animals that feed on it.

STOP BY THE CLEANER'S! *Pō'ou* (Cleaner Wrasse)

This tiny fish is only a few inches long. It is abundant in Mā'alaea Bay. If it nibbles on bait that it does not find tasty, its skin will change to a paler shade of color (Titcomb, 1977).



The *pō'ou* has an interesting behavior. It picks parasites off the bodies of other fishes. These cleaner wrasses tend to “set up shop” in a particular area of the reef. Fishes in need of a cleaning know these locations or “cleaner stations” and stop by for a cleaning. When these fish arrive, they pose motionless which attracts the cleaner to come and inspect and then pick off and feed on irritating parasites (Hobson, 1972).

YOUR RELATIONSHIP TO THE CORAL REEF

Write a paragraph or a poem that summarizes your relationship to the coral reef.



FISHING LINKS

STUDENT READING

Kuhaimoana, Shark-guardian of Ko'olaupoko

*Maika'i Mōkapu aia i ka la'i
He 'āina kahiko e kalani e
He 'āina ihi kapu no ke Ali'i
No ke Akua, e ala e!
No ke Akua, e ala e!*

*Aia Mokumanu noho i ke kapu
O Kuhaimoana he kupua manō
He kia'i kapu o keia wahi
Ua malu kaulana e ho'i la!
Ua malu kaulana e ho'i la!*

Beautiful is Mōkapu, lying in the calm
Ancient land of the Heavenly One
Sacred land of the Chief
For *ke Akua*, rise up!
For *ke Akua*, rise up!

There is Mokumanu at rest in sacredness
Kuhaimoana the supernatural shark
A sacred guardian of this land
Famous protector, return!
Famous guardian, return!

(Source: "Maika'i Mōkapu," Composed by Chinky Mahoe, 2007)

More than a thousand years ago, when the first Polynesians began to venture out from Nu'uhiwa (the Marquesas Islands), the bravest of them took small journeys as far as the winds they could name and call upon. One of those early *ho'okelewa'a* (navigators) was Kalani-menehune (Wichman, 1998). Kalani's ancestors were famous for their skill in reading the star-trails, calling the *makani* (winds) and reading the ocean currents. Still, none of them had ever gone beyond the limits of their *'ike* (knowledge).

One day Kalani decided to seek out the lands-beyond-the-horizon. He realized this would take him beyond the star-trails, the *makani* and the currents that his family and people had known. Yet his sense of *kuleana* (responsibility) would not allow him to stay home. It was also clear that he could not complete his mission alone. So, he chose a handful of skilled ones—specialists in the areas of plant medicine, woodworking, masonry, fishing and farming. The stars, *makani*, and currents would be his *kuleana* for their journey.

Kula! When the day dawned for their *wa'a* (canoe) to rise through the waters, Kalani gathered his crew and they shared breath with their *'ohana* one last time. (The exchanging of breath between two people, nose-to-nose and forehead-to-forehead, has been commonly practiced among *ka po'e o Ni'ihau* and other Hawaiians and Polynesians for time immemorial (Keale and Tava, 1989). Each crewmember would have a role in guiding the *wa'a* toward its new home. The first day and night were easiest since Kalani knew the names of the *makani* that would aid in filling the sails of the *wa'a*. They blew, and they blew, and they blew!

And finally, when they could no longer fill the sails and still remain connected to the ancestral lands, the *makani* turned back toward home. All night without a breeze the lazy sea lapped against the sides of the motionless *wa'a*.

For two nights and two days, the sails of Kalani's *wa'a* hung empty as he and his crew drifted aimlessly on the open sea. At night, it mattered not that Kalani could see the star of Kāne or the dim eyes of Makali'i. Their *wa'a* would not be moving anywhere soon! While the sails sagged on the mast all members of the crew devoted their time to catching fish, taking note of the new star-trails at night, and offering *pule* (prayers) day and night to *ke Akua*, *nā kūpuna*, and the *'aumakua*.

At sunrise on the third day, the crew was awakened by a gentle breeze blowing out of the north. Maybe this nameless *makani* would befriend them; but could they trust it to carry them to the land-beyond-the-horizon? What land was it from? How would they know what direction it would lead them if it decided to really blow? Luckily this playful *makani* still wasn't strong enough to cause the crew to put up sails.

Then something amazing happened! Bump. Bump! The once motionless *wa'a* shuddered with a thud. Something had just banged and brushed up against the outer rigging of the *wa'a* and it was enormous! First a bump, then a dark shadow blurred beneath the hull only to return with another thud. Yet each time, rather than causing fear it seemed as if the giant *manō* (shark), easily the length of their *wa'a*, was simply trying to get their attention.



Like the traveling guardians spoken of by the Ancient Ones, a *kia'i kapu* or what some called a *kupua* had come to save them! Slowly, as Kalani-menehune and his crew charted the star-trails for the first journey to Hawai'i nei, Kuhaimoana led them with the help of the Malanai and Nāulu winds. In the years to come these early settlers of Hawai'i nei would come to revere the awesome canoe-leading *manō* of Ni'ihau and Ko'olaupoko, O'ahu—Kuhaimoana. The shark, distinguished by the giant barnacles that dot its back, is often seen where it originally led the first settlers. At 'Āina o Ka'ula in Ni'ihau and Mokumanu near Kailua Bay, both "bird-islands", the 'aumakua guards its sacred lands.

VOCABULARY

'ike — knowledge or understanding

makani — wind

'ohana — family and extended family

Nu'uhiwa — otherwise known as the Marquesas Islands

ho'okelewa'a — navigator or one who sails a canoe

kula — rising of the Sun or the canoe through a wave

wa'a — canoe; *pahi* is the old word from Kalani's land of origin

kuleana — destiny, responsibility or calling

pule — a prayer or chant of request

Kāne, Ke Akua — the Creator

nā kūpuna — ancestors

'aumakua — family guardian, benefactor or provider

kia'i kapu — a sacred guardian

kupua — a supernatural guardian

manō — shark

Malanai — the famous wind of Kailua on the island of O'ahu

Nāulu — the famous wind of the island of Ni'ihau

WRITING CHALLENGE

Describe the Hawaiian relationship with the *manō* as 'aumakua.

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FISHING LINKS

LEARNING LOG - 2

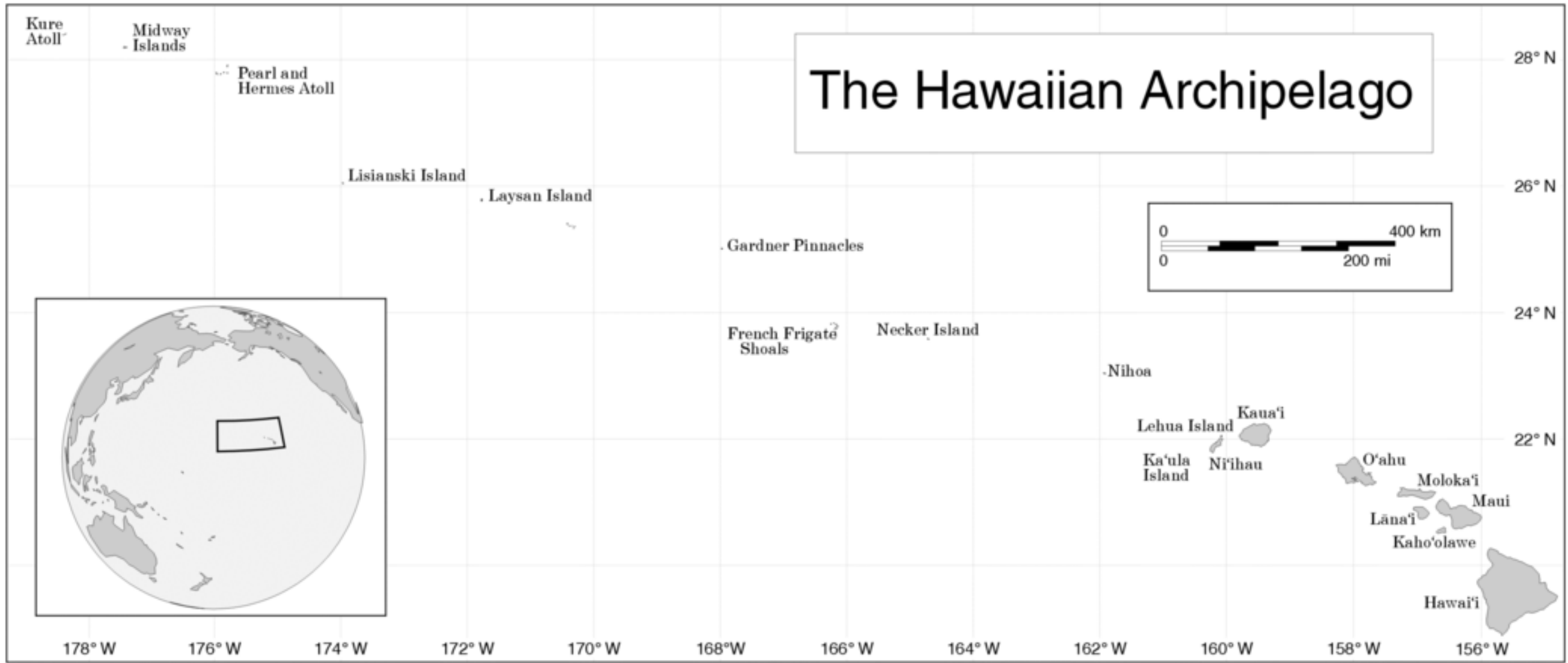
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Fill in the “missing links”—the herbivores, omnivores, and carnivores that connect the producers to the apex predators.

PRODUCERS	HERBIVORES	OMNIVORES	CARNIVORES	APEX PREDATORS
Phytoplankton 				Manō (Hammerhead Shark) 
Limu 				
Coral 				Ulua (Giant Trevally) 

Explain how nutrients are made available to the producers.



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