HCR-13
Submitted on: 3/29/2026 9:17:08 PM
Testimony for WAL on 3/31/2026 10:00:00 AM

Submitted By	Organization	Testifier Position	Testify
Kaakapua Swain	Individual	Support	Written Testimony Only

Comments:

Here is a polished **written testimony in support of HCR13**, grounded in Ka ʻUmeke Kāʻeo's current partnership and work in Puhi Bay:

Testimony in Support of HCR13
Relating to Coral Reef Restoration and Stewardship

Aloha Chair, Vice Chair, and Members of the Committee,

My name is Kaʻakapua Swain, and I am writing in strong support of HCR13.

At Ka ʻUmeke Kāʻeo Public Charter School, we are currently engaged in a meaningful and ongoing partnership with the Pacific Aquaculture and Coastal Resources Center (PACRC) in Hilo. Through this collaboration, our haumāna are actively participating in coral monitoring and outplanting efforts in Puhi Bay, connecting directly to the very goals outlined in this resolution.

This work is not theoretical—it is hands-on, place-based, and rooted in our community. Our students have had the opportunity to learn in PACRC's coral nursery and then apply that knowledge in the ocean through real restoration efforts. These activities include observing coral growth, participating in reef surveys, and helping to outplant coral fragments back into Puhi Bay.

Through this process, haumāna are not only learning science, but also ʻike kūpuna and kuleana. They come to understand that coral reefs are foundational to the health of our ecosystems and our people. In Hawaiʻi, coral species grow slowly and are highly vulnerable, making restoration and long-term monitoring essential to their survival.

Our partnership demonstrates that effective coral restoration is strongest when it is community-based and education-driven. Students, educators, scientists, and community members are working side by side—building both ecological resilience and the next generation of environmental stewards. These efforts reflect a broader statewide movement to restore reefs through nursery propagation, outplanting, and ongoing monitoring to ensure long-term success.

HCR13 supports the expansion and coordination of these types of initiatives. By advancing policies that prioritize coral restoration, monitoring, and community partnerships, this resolution will help ensure that programs like ours can continue and grow.

For our haumāna, this work is more than a lesson—it is a commitment to mālama ʻāina and mālama kai. Supporting HCR13 means investing in both our natural resources and our future leaders.

Mahalo for the opportunity to testify in strong support of this measure.

Respectfully,
Kaʻakapua Swain

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

STATE OF HAWAIʻI | KA MOKUʻĀINA ʻO HAWAIʻI
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA ʻOIHANA KUMUWAIWAI ʻĀINA
P.O. BOX 621
HONOLULU, HAWAII 96809

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RYAN K.P. KANAKAʻOLE
FIRST DEPUTY

CIARA W.K. KAHAHANE
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

Testimony of
RYAN K.P. KANAKAʻOLE
Acting Chairperson

Before the House Committee on
WATER & LAND

Tuesday, March 31, 2026
10:00 AM
State Capitol, Conference Room 411

In consideration of
HOUSE CONCURRENT RESOLUTION 13
REQUESTING THE DEPARTMENT OF LAND AND NATURAL RESOURCES TO COLLABORATE WITH THE DEPARTMENT OF EDUCATION AND STATE PUBLIC CHARTER SCHOOL COMMISSION TO DEVELOP A STUDENT CORAL STEWARDSHIP PROGRAM.

House Concurrent Resolution 13 requests the Department of Land and Natural Resources (Department) to collaborate with the Department of Education and State Public Charter School Commission to develop a Student Coral Stewardship Program that assists with public education, outreach, and reef-safe sunscreen awareness at state beaches. **The Department of Land and Natural Resources (Department) appreciates the intent of this measure and offers the following comments and suggested amendments.**

The Department agrees that improving public education and awareness regarding reef-safe practices can help protect coral reefs. A Student Coral Stewardship Program that assists with public education, outreach, and awareness of reef-safe practices is a great way to provide students with increased knowledge and hands on experience with marine stewardship.

The Department would be happy to collaborate with the Department of Education and State Public Charter School Commission in the development of this program. The Department can provide information on the status of Hawaiʻi's coral reefs, key issues and threats facing them, and recommendations for reef-safe practices. However, the Department believes that this effort to develop this student program, and any reporting on progress and

recommendations, should be led by the Department of Education and State Public Charter School Commission. Therefore, the Department offers the following amendments to this measure, beginning on page 2, line 12 (amended language highlighted in yellow):

BE IT RESOLVED by the House of Representatives of the Thirty-third Legislature of the State of Hawaii, Regular Session of 2026, the Senate concurring, that [~~the Department of Land and Natural Resources is requested to collaborate with~~] the Department of Education and State Public Charter School Commission, in collaboration with the Department of Land and Natural Resources, is requested to develop and propose a Student Coral Stewardship Program that assists with public education, outreach, and reef-safe sunscreen awareness at state beaches; and

BE IT FURTHER RESOLVED that the Student Coral Stewardship Program is intended to be educational, voluntary, and non-enforcement in nature, and may include student-led outreach, educational materials, and community engagement activities informed by current scientific research; and

BE IT FURTHER RESOLVED that the [~~Department of Land and Natural Resources is~~] Department of Education and State Public Charter School Commission are requested to submit a report to the Legislature no later than twenty days prior to the convening of the Regular Session of 2027 that summarizes collaborative efforts, including input and perspectives from participating students, and that presents any legislative, policy, or funding recommendations necessary to advance coral reef protection and student stewardship initiatives; and

Mahalo for the opportunity to comment on this measure.

JOSH GREEN, M.D.
GOVERNOR

KEITH T. HAYASHI
SUPERINTENDENT

STATE OF HAWAI`I
DEPARTMENT OF EDUCATION
KA ʻOIHANA HOʻONAʻAUAO
P.O. BOX 2360
HONOLULU, HAWAI`I 96804

Date: 03/31/2026
Time: 10:00 AM
Location: 411 VIA VIDEOCONFERENCE
Committee: WAL

Department: Education

Person Testifying: Keith T. Hayashi, Superintendent of Education

Title of Bill: HCR13, REQUESTING THE DEPARTMENT OF LAND AND NATURAL RESOURCES TO COLLABORATE WITH THE DEPARTMENT OF EDUCATION AND STATE PUBLIC CHARTER SCHOOL COMMISSION TO DEVELOP A STUDENT CORAL STEWARDSHIP PROGRAM.

Purpose of Bill: Requesting The Department Of Land And Natural Resources To Collaborate With The Department Of Education And State Public Charter School Commission To Develop A Student Coral Stewardship Program.

Department's Position:

The Hawai'i State Department of Education (Department) appreciates the opportunity to testify on HCR 13 and offers comments.

HCR 13 requests that the Department of Land and Natural Resources (DLNR) collaborate with the Department to develop a student coral stewardship program focused on public education, outreach, and reef-safe practices.

The Department agrees that students benefit from authentic, place-based learning experiences that connect science, environmental stewardship, and community engagement. Hawai'i's coral reef ecosystems offer meaningful opportunities for students to engage in science learning aligned with the Next Generation Science Standards, deepen their understanding of human impacts on natural systems, and contribute to the stewardship of Hawai i's ocean environment.

While the Department supports the intent of this measure, implementation would require coordination across agencies and consideration of instructional time, school capacity, and existing programs. The Department appreciates the collaborative approach outlined in the resolution and looks forward to continued coordination with DLNR and partners.

Thank you for the opportunity to testify on this resolution.

HCR-13
Submitted on: 3/27/2026 4:11:08 PM
Testimony for WAL on 3/31/2026 10:00:00 AM

Submitted By	Organization	Testifier Position	Testify
Margaret ANN Renick	Individual	Support	Written Testimony Only

Comments:

I support both HCR13 and HR15. Mahalo.

HCR-13
Submitted on: 3/28/2026 7:23:27 AM
Testimony for WAL on 3/31/2026 10:00:00 AM

Submitted By	Organization	Testifier Position	Testify
Johnnie-Mae L. Perry	Individual	Support	Written Testimony Only

Comments:

I, Johnnie-Mae L. Perry, Support

13 HCR REQUESTING THE DEPARTMENT OF LAND AND NATURAL RESOURCES TO COLLABORATE WITH THE DEPARTMENT OF EDUCATION AND STATE PUBLIC CHARTER SCHOOL COMMISSION TO DEVELOP A STUDENT CORAL STEWARDSHIP PROGRAM.

Hawaii Coral Science by Ron Tubbs, B.S.N.D. UHM 2026

Most of isles' coral recover from mass bleaching

By Audrey McAvoy Associated Press POSTED: 04:53 a.m. HST, Jan 29, 2015

(**5 months** after the summer high temperature bleaching event of 2014 **corals recovered**).

"The DLNR studied coral for bleaching -- a stress response that causes corals to lose algae and color from their tissue -- in Kaneohe Bay.

So when the stress of warmer-than-average ocean temperatures prompted many of Hawaii's corals to expel algae last year -- a phenomenon called bleaching because corals lose their color when they do this -- many were worried they might die. Now the Hawaii Department of Land and Natural Resources says most of the bleached corals have recovered. It plans to announce the result of its coral surveys on Thursday".

Coral relies on an algal symbiotic relationship for food and their survival. Corals, when they overheat, expel their algae, leaving an appearance of bleaching, but they are not dead. They can survive without algae for three months. Previous coral bleaching events in 2014 and 2015, as well as others, were short-lived, and corals largely recovered. Heating events lasting more than 8 weeks can lead to coral mortality. August is the hottest month in Hawaii's summer.

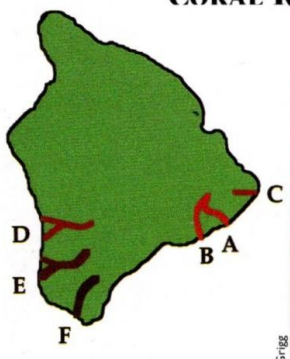
Richard Griggs and James Maragos Study,

The 1970s study was employed to examine the different stages of coral reef development in past lava flows; this was the ideal location for observing coral regrowth and development over decades. The slopes of the southern Big Island drop off quickly, so shallow depth ranges could be observed, too. Corals are light-dependent, so shallow corals grow more quickly than deeper corals. The fastest coral growth can reach 7 inches per year, Acropora, but those are not common corals in Hawaii. The corals that do broadcast breed over long distances and can repopulate via long-distance growth at 3 to 5 inches a year.

Massive Scale: The synchronized, mass spawning involves trillions of gametes released by entire reef systems, significantly increasing the chances of fertilization.

After Croals Broadcast Spawn, they can settle 10s of meters to Hundreds of kilometers, 186 miles or more away. At greater distances, it takes longer to reestablish significant populations.

CORAL REEF GROWTH AND SUCCESSIONAL DEVELOPMENT:
CASE STUDY: THE BIG ISLAND

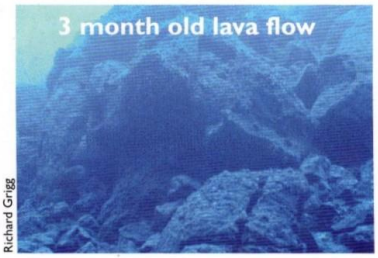



Richard Grigg

The Hawaiian Islands erupted out of the middle of the Pacific atop volcanoes which created new substrate for organisms to colonize...from these fiery beginnings arose the variety of reefs that surround the Hawaiian Islands today.

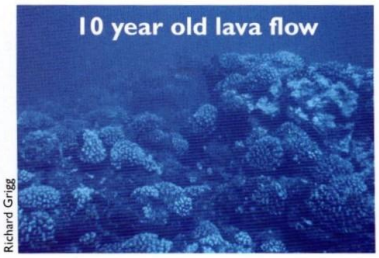

Richard Grigg

Back in the early 1970's, two scientists from the University of Hawai'i, Richard Grigg and James Maragos, set out to describe the development and succession of Hawaiian reefs. Up to that point, studies of these events had primarily been done with terrestrial and coastal species whose habitats could be easily manipulated, but how do you work with organisms such as corals whose life histories span multiple human generations? The answer lay on the developing island of Hawai'i where well-dated lava flows allowed "snapshots" in time of the succession of corals involved in Hawaiian reef development.



Richard Grigg

A. Three month old lava flow. No visible coral colonies present, primarily diatomaceous slime.

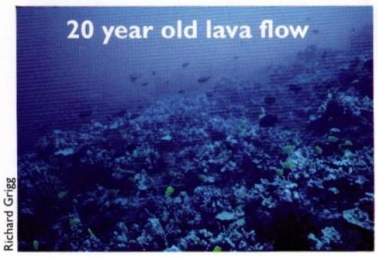


Richard Grigg

B. Ten year old lava flow supporting a coral colony roughly ten years old.

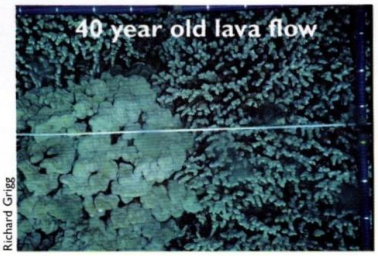
Richard Grigg

C. Fifteen year old lava flow. Coral cover is almost entirely *Pocillopora meandrina*; a fugitive species often found colonizing such flows.



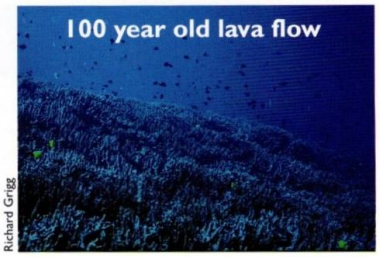
Richard Grigg

D. Twenty year old lava flow. Reef is made up of 12 species of corals, almost 100% coral cover.



Richard Grigg

E. Forty-four year old lava flow. At this point coverage is primarily Porites compressa and Porites *lobata*.



Richard Grigg

F. A hundred year old lava flow in a relatively undisturbed area. This very developed reef is almost 100% Porites compressa.

The above page 134 is from “Hawaiian Coral Reef Ecology” by David Gulko c1998

Recolonization Timeline:

Hawaii lava flows created the perfect study area for coral regrowth. Many areas saw coral growth within a few years, with exposed areas, such as the Puna coast, coral communities can show significant recovery within 10 years. In 20 years, the above study showed complete coral growth coverage. In contrast, more sheltered areas may require more than 50 years to fully develop.

Coral Science Summary:

Coral relies on an algal symbiotic relationship. When they overheat, they expel their algae, producing a bleached appearance, but the algae are not dead. They can survive without algae for up to three months. Previous coral bleaching events were short-lived, and corals mostly recovered.

The Hawaii coral bleaching events were in **1996, 2002, 2004, 2014, 2015, and 2019**. The 2014-2015 events were particularly severe, resulting in high bleaching rates and widespread bleaching, especially around Maui Nui and West Hawaii. The last severe Coral Bleaching event was in 2015, and no coral bleaching events have occurred in Hawaii since 2019. Bleaching is not coral death unless it occurs for longer than around 3 months, which is usually not the case.

Coral regrowth can occur quickly, with corals in shallow areas showing increased growth rates under light. Many Hawaii coral species can grow 3 to 5 inches a year. Acropolis corals grow 7 inches a year.

Kaneohe Bay and Reef Pots.

Shallower corals grow faster due to sunlight-dependent growth rates. In Kaneohe Bay, reef pots, areas of large coral growth that have grown shallow depths are very abundant. These coral reach the surface and also become overgrown. Corals grow more at the top due to light-dependent growth rates. The overhanging corals will then fall over, tumbling down the ledge in large chunks until they reach the bottom of the reef area. These corals then provide a base for future reef pot expansion.

Coral Spawning Volume:(embedded link**):**

Massive Scale: The synchronized, mass spawning involves trillions of gametes released by entire reef systems, significantly increasing the chances of fertilization.

Bundle Composition: Most hermaphroditic corals release buoyant pink, white, or orange bundles containing both eggs and sperm, ensuring they float to the surface for fertilization.

One-Time Event: Because producing such large amounts of gametes is energy-intensive, most corals only perform this mass broadcast spawning once a year.

Hawaii Coral Regrowth Recolonization Timeline:

Hawaii lava flows created the perfect study area for coral regrowth. Many areas saw coral growth within a few years, with exposed areas, such as the Puna coast, coral communities can show significant recovery within 20 years. In contrast, more sheltered areas, may require more than 50 years to fully develop.

Pioneer Species: *Pocillopora meandrina* (cauliflower coral) is a primary pioneer species, thriving in high-energy, recently formed lava environments.

Deep-Sea Coral: While shallow corals recover relatively quickly, deeper, slow-growing gold coral communities may take thousands of years to develop on submerged lava flows. But they are less affected by bleaching and global warming events.

Process of Growth: Lava entering the ocean creates a new, often steep, substrate of rock and sediment. While initially sterile, these areas are quickly colonized by algae, followed by corals, though the process can be delayed by sedimentation or water quality issues.

- **Environmental Factors:** Recovery depends on exposure to waves, with more robust, wave-exposed areas often developing faster than protected ones.

Studies of past lava flows, such as those in Puna and Kona, indicate that these ecosystems are resilient and capable of creating new, thriving reefs over time.

Hawaii Corals grow 3 to 5 inches a year, and some corals report 20cm, 7.874Inches, a year growth. Huge new coral areas have grown in Hawaii with shallower corals growing faster and light dependent deeper corals growing much slower. Hawaii has not seen a major coral bleaching event since 2015. Warmer waters due to climate change, agricultural run off and other pollutants are the biggest problems facing corals.

DAR study Link: https://files.hawaii.gov/dlnr/reports-to-the-legislature/2020/AR20-WHRFMA-Rpt-FY19.pdf

Global Warming and the Future

The 5 extinction level events that have hit the earth were all survived by deeper ocean species. “Deep Refuge” is the science that support the resilience of fish to global warming.

Past warming events and some results. With Warmer Sea Temperatures in 2015 we saw a “Biblical Spawning” of Hawaii Reef Fish; Do warmer temperatures with global warming mean we will see more reef fishes? Corals control algae as a symbiotic nutrient source; but control algae grown on corals with inhibitors. When water temperatures get higher especially in shallower waters, corals expel their algae which allows for sun heat reflection. Corals can to without algae for 90 days before it can affect their potential death. If waters cool in that time corals recover. Multiple Coral algae expulsion events can weaken corals. Deep corals seem immune to warming event so far.

Good news for coral reef restoration efforts: Study finds 'full recovery' of reef

https://phys.org/news/2024-03-good-news-coral-reef-efforts.html

Coral Reefs Show Remarkable Ability to Recover from Near Death | Scientific American

Coral spawning and larvae dispersal allow reefs to repopulate over distances ranging from

a few meters to hundreds of kilometers, depending heavily on the species, local currents, and whether they are "brooders" or "broadcast spawners".

- **Broadcast Spawners (Long Distance):** These corals release eggs and sperm into the water column, creating larvae that float for days or weeks, often traveling **tens to hundreds of kilometers** to settle on distant reefs.
- **Brooding Corals (Short Distance):** These corals release larvae that are ready to settle almost immediately, often traveling only **a few meters to hundreds of meters** from the parent colony.

Here are the key details on how far coral larvae travel to repopulate reefs:

Spawning and Dispersal Distances

- **Local Settlement (0–100 meters):** While many larvae travel far, a significant portion settles close to their parent reef to maintain local population density. Research on some species shows most larvae settle within 23 to 102 meters.
- **Reef-to-Reef (Kilometers):** Broadcast-spawning species (like *Pocillopora verrucosa*) can travel across open water to neighboring reefs, with studies recording distances up to **52 kilometers**.

- **Long-Distance Dispersal (Hundreds of km):** Some larvae can survive in the open ocean for weeks or even months, enabling them to travel hundreds of kilometers. This rare, long-distance dispersal is essential forcolonizing new areas or recovering completely devastated reefs.

Factors Affecting Repopulation

- **Ocean Currents:** Larvae rely on ocean currents to carry them from one reef to another.
- **Larval Duration:** Larvae can float for days or weeks before finding a suitable hard substrate to settle on.
- **Reef Health:** Larvae are attracted to healthy reefs with specific chemical cues (like crustose coralline algae) and sounds, which help them locate new areas to grow.
- **Colony Proximity:** For successful fertilization, adult corals generally need to be within 10–20 meters of each other.

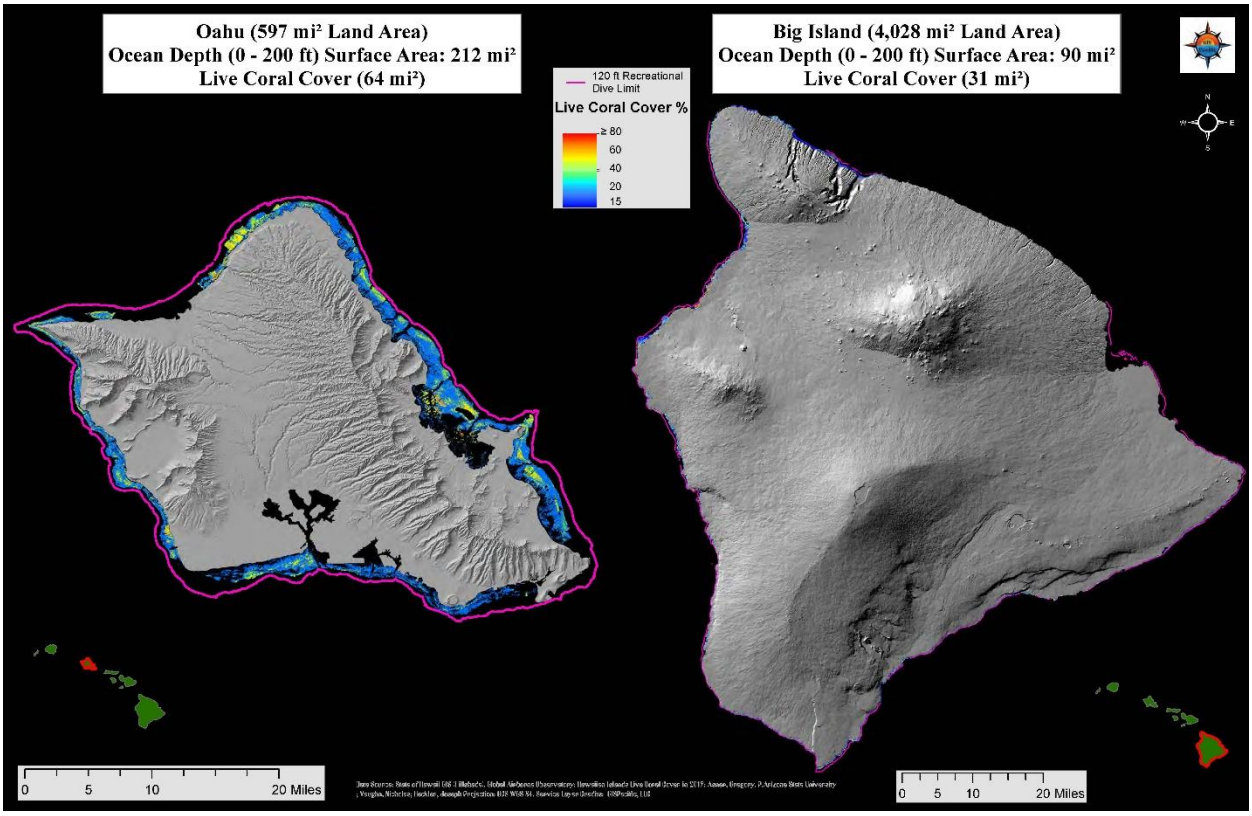
Summary of Differences

Coral Type	Dispersal Distance	Primary Goal
Broadcasters (*e.g., Acropora*)	Kilometers (long)	Genetic mixing & expanding range

- While some coral species are capable of traveling huge distances, many rely on nearby reefs, making local conservation efforts crucial for survival.
-
- Aquarium Fishermen can play a critical role in conservation by reporting observations and, potentially, by breeding coral populations in captivity, thereby **ensuring an ark of captive-bred stock for repopulation**. This is discussed in the

state's SWAP, State Wildlife Action Plan report to Fish and Wildlife. Removing invasive introduced fish species for profit has also been discussed.

- Currently, all coral breeding is being funded by grants and donations, for such a project could be funded through the aquarium's resale of cultured corals, an option not currently employed. However, the collection of corals is currently prohibited for commercial resale in Hawaii. **We should reconsider our ocean policies.**

- **Note that significant studies do not link coral declines or coral damage to the Aquarium Fishery.**
- Clearly, long-term science studies prove the aquarium fishery does not cause coral damage.
- Dr. Bill Walsh DAR study Link: https://files.hawaii.gov/dlnr/reports-to-the-legislature/2020/AR20-WHRFMA-Rpt-FY19.pdf
- Dr. Brian Tissot study link p.68: https://www.malamamaunalua.org/wp-content/uploads/DLNR-DAR-2010.pdf
- 

The aquarium fishery Environmental Review commissioned the above map. Each island has its own ecosystems and habitats. The Big Island has deep currents rising to cool

corals, but it is at a lower latitude than Oahu, which may produce higher temperatures than Oahu.

Meta-Analysis Hawaii, & Pacific Fisheries, Environmental Review, and Global Warming 2026 Report

Sustainability is Key to Hawaii's future. As the most isolated island in the world, Hawaii is too dependent on tourism, the military, and other non-sustainable, unreliable economic sources. UHERO Forecast for the State of Hawai'i: Mild recession and weak recovery in 2026 - UHERO

Marine Fish are Hawaii's and the World's most renewable resource.

Blue Fin Tuna can produce 45-50 million and even upwards of 540 million per spawn daily.

Opah Moon Fish produces 300 million eggs per female.

Tuna produce 5 million to 15 million fry per female per spawn daily over a period of weeks!

Yellow tangs daily produce 24,000 to 44,000 fry per spawn per female, many times a month. Male fish sperm spawn numbers far outweigh female egg counts, so females with lower numbers are referred to in fecundity reproductive science. Recent research indicates that they can spawn daily, and that means they probably greatly exceed the 1.14 million to 1.055 million per female yearly estimates that were based on full-moon breeding days alone!

Multiply that by the 3.6 million West Hawaii Yellow Tang 2026 population in the 30-to-60-foot range alone, at a 1% survival rate to full adult breeding stage, has a potential of 22 billion new adult breeder fish on the reefs every few months! Yellow tangs are found up to 265 feet deep so the 3.6 million is only a small population estimate!

Other surgeon fishes have also been shown to breed daily year-round.

Yellow tangs after the fry spend around 4 months at sea developing, they return to the reefs, where they reach breeding size in 3 months. Yellow tangs as small as 2.6 inches 65mm have reproductive organs and oocytes in their ovaries. Large 8-inch breeders are restricted in take for the Hawaii aquarium fishery, leaving active breeders on every Hawaiian reef ocean location to repopulate.

The aquarium fishery is truly a "Model Fishery," Leaving breeders and fishing only smaller fish that replenish quickly!

The complete yellow tang population doubling time is only 15 months.

Fishers Angel female spawns 102 times out of 110 days, producing hundreds to thousand of fry per spawn.

Potters Angel spawns nearly every day, producing thousands to hundreds to 6,000 fry daily.

Wrasse, like the luna wrasse, produce hundreds to thousands of fry per spawn up to 7 times a day.

Triggers like the Cross hatch can produce 32,000 fry per spawn daily but for how many days.

NOAA reports consistently show that over 90% of monitored U.S. fish stocks are not subject to overfishing, highlighting a robust, sustainable management system. Under the Magnuson-Stevens Act, **90–93% of United States and Hawaii fish stocks are fished at sustainable levels**, with many rebuilding. Data shows 80% are not currently overfished.

We must support a managed, sustainable fishery to create a more sustainable society, especially in isolated Hawaii.

Historical Global Warming Perspective

Since the introduction of the first men to Hawaii in 400 A.D., land-based species have resulted in over 100 endemic plant species, 30 bird species, 74 insect species, and 41 tree snails becoming endangered or extinct. Insects, Birds, snails, and many others are listed as Hawaii IUCN red species of concern. In 2023 8 more birds were removed from the Federal Lists of Endangered and Threatened Wildlife and Plants due to their confirmed extinction.

Marine Fish are more resistant to the impacts of global warming, and no Pacific marine fish species have become extinct over the current historical period. No Hawaiian marine fish are on the IUCN Red List of Endangered Species. Moreover, almost all of Hawaii's marine fishes used for seafood and the aquarium trade are listed as species of IUCN "Least Concern." The lowest conservation level is there for exactly these reasons.

Examining the marine species extinctions of the past five global extinction-level events, marine fish have been more resilient to global impacts and are likely to out-survive land-based species.

It should be noted, however, that some marine mammals, with their low and long reproductive cycles, are more vulnerable than broadcast-spawning, highly reproductive marine fish species.

Marine fish's vast geographical distribution, due to broadcast breeding and larval distribution over as much as five thousand miles and even other oceans like the Atlantic and Indian Ocean from and to Hawaii, makes them much *less vulnerable* to fishing and environmental impacts. Marine fish studied in aquariums show that they are more resistant to global warming temperature changes, pH changes, salinity changes, and other ecological changes than land-based species. For example, Tuna and many other species are found in all oceans of the world. Ocean Depth habitat range, the latitude of the Hawaiian Islands chain from 19 degrees to 28 degrees latitude, and 1500 miles of 132 atolls, reefs, and shoals create a vast, unique habitat range protecting Hawaii's ocean biodiversity. Seventy percent of the earth is ocean, making marine fish in Hawaii less vulnerable to point-source pollution and global warming.

The Hawaii Sustainable Seafood Industry and fisheries generate around $867 million in annual sales impacts, making it a significant contributor to the state's economy, with the majority of this value coming from the high-value, a low-volume longline fishery that is considered the largest food-producing industry in Hawaii. Small Nearshore fisheries without the Aquarium Fishery 53 million benefits are worth 16 million annually, and the Tuna Fishery is worth 100 million annually.

Along with agriculture, Managed Marine Fishing and Mariculture could be very valuable and sustainable resources for Hawaii's increased sustainability. Pisciculture is a type of aquaculture that consists of fish farming to obtain fish products as food, and this could greatly lessen our dependence on imported foods and the carbon footprint imports create.

Reports show **global aquaculture production** (including aquatic plants) in 2016 was 110.2 million tonnes, with the first sale value estimated at US$244 billion. Three years later, in 2019, the reported output from global aquaculture operations was over 120 million tonnes, valued at US$274 billion. Increased Aquaculture and managed fisheries should be Hawaii's "Blue Revolution" for a sustainable future.

Hawaii could greatly benefit from the 2.15 billion per year ornamental marine fish trade and the **207- billion-dollar** United States pet trade,

which has grown from 100 billion in just a few years.

You cannot take live marine fish for aquaculture without some type of aquarium fish permit, as this type of fishing is essential for aquaculture to replace broodstock periodically to maintain healthy, highly reproductive brood stocks!

Aquarium fishers are the source of broodstock for most aquaculture facilities, fish ponds, public aquariums, and research facilities in Hawaii, and we do not want to lose their expertise with a ban.

The value of Hawaii's nearshore oceans is worth 15.3 billion dollars in highly renewable resources in 2024, with a current 50% estimated increase every 20 years, which means one of The state of Hawaii's most valuable resources is our Ocean. *Tourism impacts are Hawaii's biggest ocean ecological offender and the largest source of Carbon Footprint and is not sustainable*.

Reports show global aquaculture production (including aquatic plants) in 2016 was 110.2 million tonnes, with the first sale value estimated at US$244 billion. Three years later, in 2019 the reported output from global aquaculture operations was over 120 million tonnes valued at US$274 billion. Managing fisheries to their safest environmental output, improved ocean marine management science, and Aquafarming should be Hawaii's "Blue Revolution" to ensure a sustainable future.

The aquarium fishery, with its higher biomass value and sustainable, highly renewable resources, should be utilized to its fullest to aid the state's plan for a sustainable future.

University of Hawai'i Economic Research Organization report in 2024 by UHERO. "Hawai'i's economy depends heavily on tourism and is therefore vulnerable to sudden drops in visitor numbers and inconsistent and slow growth in tourism revenue for the past 30 years". The University of Hawai'i Economic Research Organization (UHERO) analyzes the variety of industries across counties in the U.S. and Hawai'i to identify potential opportunities to diversify the state's economy.

What UHERO found based on industries already in Hawai'i, the study shows Hawai'i has great potential for ocean- based industries—such as *fishing, fish farming* and hatcheries, boat building, port and harbor operations, and seafood packaging. Diversifying into these industries can create long-term stability and support growth beyond tourism."

With science supporting the sustainability of the aquarium fishery, approval of fishery permits could aid the state in its greatly needed shift to sustainable, renewable resource uses.

Out of the national 277-billion-dollar pet industry, Hawaii pet owners spent 355 million dollars on pets in 2021. Providing 21.8 million state tax revenues and 27.3 million local tax revenues. Hawaii residents have 1.7 pets per household on average. Nearly 57% of Hawaii households have one pet. That is 11% of U.S. household's fish. Taping into the sustainable renewable income aquarium fishing can provide sustainable economic benefits. **Marine fish used as pets are worth per fish as much as % 400 more than those similar fish used for food purposes.** Pet fish leave breeders' sizes to make it a "**Model Fishery**." Declines in food fish near shore near humane populated areas have not been seen in reef fish used for aquarium purposes.

Science presented by
by Ron Tubbs B.S. N.D. UHM

An extensive, detailed environmental review or an exact data information source is available upon request.

Source in-text links and now below:

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Effectiveness of the West Hawai'i Regional Fishery Management Area (WHRFMA) that overall fish populations of targeted aquarium fish species increased significantly in West Hawaii over 20 years. "Overall Yellow Tang abundance in the 30'-60' depth range over the entire West Hawai'i coast is estimated to have increased by over 3.4 million fish from 1999/2000 to 2017/2018 (150% increase) to a current population of about 5.7 million fish within this depth range alone. Over time, management and habitat increases due to coral growth contribute to increased fish populations. Overall Kole abundance in the 30'-60' depth range over the entire West Hawai'i coast is estimated to have increased 118% (>5.1 million fish) during this time period with a current estimated population of almost 9.6 million fish. As with Yellow Tang, summer 2014 recruitment for Kole in many areas was very strong.

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DAR BLNR Presentation 2024 https://youtu.be/djjtIsvg7qs?feature=shared

Oahu there is a much greater refuge area than West Hawaii. Sources; 2013 By Friedlander, Alan M. (Alan Marc) ; Donovan, Mary K. ; Stamoulis, Kostantinos ; ...
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Regulated Fishing Areas on O'ahu

https://dlnr.hawaii.gov/dar/fishing/fishing-regulations/regulated-areas/regulated-fishing-areas-on- oahu/

Big Island Coral Cover

ASU Lidar coral cover map ASU Hawaii South West Above compared to Oahu

Oahu Coral cover Lidar ma, Huge Oahu areas are missing, like the Barbers Point Shelf, Haleiwa, and East Oahu. ASU survey, Lidar is only good to shallower depths, so the expansive Meso coral gardens around Oahu are not reflected in this survey.

Coral Reefs https://share.google/hDPsuzAYZD7hZOQTo

Key Coral Reef Resources & Maps for Oahu

- Hawaii Statewide GIS Program - Coral Reefs**:** Provides a comprehensive map of coral reefs in marine waters near the main Hawaiian Islands, including 474 records from NOAA charts.
- Oahu Benthic Habitats Map - NOAA Fisheries**:** Features an interactive viewer showing 27 distinct benthic habitat types, covering 790

  and mapping 415

  of coral reef and hardbottom.
- ArcGIS StoryMap of Oahu's Reefs**:** Illustrates risks to Oahu's coral reefs, including runoff and human activity, and highlights areas for potential Marine Protected Areas (MPAs).
- Coral Reef Monitoring - NOAA**:** Displays damage assessment maps (e.g., ship grounding, prop scars) in Hawaii's reefs, including Kaneohe Bay.
- 3D Model of Kaneohe Bay - Vimeo**:** Features a high-resolution 3D survey of the coral reef area in Kaneohe Bay, Oʻahu.

- Coral Card Map - PacIOOS**:** Provides data on coral bleaching and health as reported by community members across Hawaii.
- Coral Sampling Locations - ResearchGate**:** Highlights specifically studied locations including Kaneohe Bay, Mokuleia, Makaha, and Waikiki.

  Hawaii Statewide GIS Program (.gov) +7

Key Locations/Findings

- **Kaneohe Bay & Hanauma Bay:** Known for having sheltered, thick reef accretion.
- **Mamala Bay & Sunset Beach:** Experience high wave exposure, resulting in minimal reef accretion.
- **Monitoring Data:** Data includes percent scleractinian coral cover, 2005-present.
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