

Aloha BLNR secretary,

Please provide a link to the Zoom Testimony for the F2 DAR SAP permit hearing on Friday, 9-26-25. Thanks

Aloha,

My name is Ron Tubbs, B.S.N.D. UHM and I are testifying in support of DAR item F2 regarding SAP permit issuance for educational purposes.

By allowing this permit, we will gain a better understanding of Zooplankton science and ecology. Understanding life cycles, habitat, and reproduction in aquariums is one of the greatest contributors to Marine science we have.

Do not underestimate the benefits aquariums provide to science. Please support marine sciences! Here are some of the important findings that our marine scientists have learned.

Meta-Analysis Hawaii, & Pacific Fisheries, Environmental Review, and Global Warming 2025 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.

Marine fish are Hawaii's most renewable resource. Opah Moon Fish produces 300 million eggs a year per pair. Tuna produce 5 million to 15 million fry per female per spawn. Reef fish produce tens of thousands to millions of fry per spawn per female. Fish can renew and sustain current fishing practices if appropriately managed. We must support a managed, sustainable fishery to create a more sustainable society, especially in isolated Hawaii.

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 immune to global warming impacts, and no Pacific marine fish species have become extinct over the past 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 the aquarium trade are listed as species of IUCN "Least Concern." The lowest conservation level there is.

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 Aquafarming and managed fisheries should be Hawaii's "Blue Revolution" 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.

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 an 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.

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An extensive detailed environmental review is available upon request.

Source [in-text links](#) and now below:

Jablonski D (1986) Mass and background extinctions: the alternation of macroevolutionary regimes. *Science* 231:129–133

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Forsgren, Kristy, et al. "Reproductive biology of the ocean sunfishes." *The Ocean Sunfishes* (2020): 87- 104.

Rønsted, Nina, et al. "Extinction risk of the endemic vascular flora of Kauai, Hawaii, based on IUCN assessments." *Conservation Biology* 36.4 (2022): e13896.)

<https://www.imf.org/en/Publications/fandd/issues/2020/12/impact-of-the-pandemic-on-tourism-behsudi>)

<https://www.westhawaii.com/2020/06/25/opinion/my-turn-we-expect-better/hjawaii-tropical-aquarium-fish>

<https://files.hawaii.gov/dlnr/reports-to-the-legislature/2020/AR20-WHRFMA-Rpt-FY19.pdf>

ME Bushnell, JT Claisse, CW Laidley - *Journal of Fish Biology*, 2010

Eble JA, Toonen RJ, Sorenson L, Basch LV, Papastamatiou YP, Bowen BW (2011) Escaping paradise: larval export from Hawaii in an Indo-Pacific reef fish, the yellow tang *Zebrasoma flavescens*. *Mar Ecol Prog Ser* 428:245-258. <https://doi.org/10.3354/meps09083>

([Lough et al., 1999](#)) ([Bagnato et al., 2004](#); [Damassa et al., 2006](#); [Cantin et al., 2010](#))

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Two major West Hawaii studies show that the aquarium fishery has no major impact on corals or detrimental effects on algae growth compared to closed habitats without aquarium fishing.

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S. Flecker. "Invasive aquarium fish transform ecosystem nutrient dynamics." *Proceedings of the Royal Society B: Biological Sciences* 280.1769 (2013): 20131520.

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Mathew, K. J. "Net avoidance behaviour among larval, juvenile and adult euphausiids." *Journal of the Marine Biological Association of India* 30.1&2 (1988): 93-98.

De Robertis, Alex, and Nils Olav Handegard. "Fish avoidance of research vessels and the efficacy of noise-reduced vessels: a review." *ICES Journal of Marine Science* 70.1 (2013): 34-45.

<https://www.fishbase.se/search.php>

[\(https://www.iucnredlist.org/](https://www.iucnredlist.org/)

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.

Recruitment at the Manuka survey site for example was 254% higher than on any other previous survey at the site over the last 20 years." (WHRFMA)

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Tissot, Brian N., William J. Walsh, and L. E. Hallacher. "The effectiveness of marine protected areas and the impacts of aquarium fish collecting in Hawai'i." *Hawaii Coral Reef Initiative, University of Hawaii* 1 (2002).

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Gove, Jamison M., et al. "West Hawai'i integrated ecosystem assessment ecosystem status report." (2019).

Friedlander, Alan M. (Alan Marc) ; Donovan, Mary K. ; Stamoulis, Kostantinos ; ...
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DAR BLNR Presentation 2024 <https://youtu.be/djItlsvg7qs?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 ; ...
https://repository.library.noaa.gov/view/noaa/907/noaa_907_DS1.pdf

Asher, Jacob. *A deeper look at Hawaiian coral reef fish assemblages: a comparison of survey approaches and assessments of shallow to mesophotic communities*. Diss. Curtin University, 2017.

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(<https://myfwc.com/research/saltwater/fishstats/commercial-fisheries/marine-life-tropical-ornamentals>)

Regulated Fishing Areas on O'ahu

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

