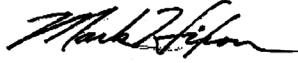


**Scientific Testimony  
to the Board of Land and Natural Resources  
in Support of  
Maunalua Bay Fisheries Management Area  
(12 July 2024)**



Dr. Mark Hixon (Professor, University of Hawai'i at Mānoa, School of Life Sciences)

*testifying as a private citizen*

Aloha Chair Chang and Board Members:

As a marine scientist with long experience studying coral reefs and their resident fishes in Hawai'i, I strongly support the **Maunalua Bay Fisheries Management Area**. In particular, I am extremely enthusiastic about the proposed “**prohibition on the take of marine life with a spear between 6pm and 6am.**” This prohibition will be a showcase for banning the rampant nightly pillaging of our parrotfishes (*uhu*) and other species.

**Maintenance and recovery of coral reefs requires abundant and diverse herbivores**, which are fishes and invertebrates that eat seaweeds (technically, benthic algae).<sup>1</sup> Herbivores prevent seaweeds from outcompeting and replacing corals, especially following coral mortality events.<sup>6</sup> Where herbivores are depleted, seaweeds eventually proliferate, which prevents reef recovery.<sup>6</sup> **The major herbivores that clean dead reef surfaces so corals can flourish are parrotfishes (*uhu*)<sup>2</sup>:** Subfamily Scarinae of the Family Labridae, of which there are seven species in Hawai'i.<sup>3</sup> Three of these species are found only in Hawai'i and therefore have irreplaceable biodiversity value.<sup>8</sup> **Parrotfish are also major producers of the sand that replenishes our beaches.**<sup>7</sup>

**Parrotfish and other herbivore populations are severely depleted near population centers in the main Hawaiian Islands, especially O'ahu.**<sup>4</sup> The Division of Aquatic Resources (DAR) considers the status of both small-bodied and large-bodied parrotfishes in Hawai'i to be “unsustainable”.<sup>5</sup> **The depletion of herbivores leaves Hawai'i's coral reefs extremely vulnerable to severe degradation because once coral dies and seaweeds cover a reef, corals cannot recover.**<sup>6</sup>

**A major contributor to parrotfish depletion is illegal or otherwise unethical spearing of these fish at night**, while they sleep helplessly under reef ledges.<sup>7</sup> Legal and otherwise ethical (*pono*) fishing of parrotfish occurs during the day by subsistence, recreational, and commercial fisheries.<sup>10</sup>

Management agencies have long been concerned about parrotfish depletion.<sup>8</sup> The DAR proposed a substantial package of herbivore fishing rules in December 2022.<sup>9</sup> By the time the final rules package was passed by the Board of Land and Natural Resources in December 2023,<sup>10</sup> **explicit protections for parrotfishes had been weakened to point where I believe these new rules will be ineffective. Additionally, the new rules do not address the sale of fish from successful poaching, which DOCARE reports is widespread at night.**

**The Maunalua Bay Fisheries Management Area (FMA) will locally ban illegal or otherwise unethical (i.e., not *pono*) night spearfishing of parrotfishes (*uhu*) and other species in the Bay, thereby fostering the replenishment of crucial herbivores to enhance the maintenance and recovery of Hawai‘i’s coral reefs. The night spearfishing ban will not affect subsistence and recreational fishers who fish *pono* during the day, nor commercial fishers who use nets or traps.**

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- <sup>1</sup> Review by Hixon, M.A. 2015. Reef fishes, seaweeds, and corals: a complex triangle. Pages 195-215 in C. Birkeland, editor. Coral reefs in the Anthropocene. Springer, Dordrecht, Netherlands. Hawai‘i case study: Gove, J.M., G.J. Williams, J. Lecky, E. Brown, E. Conklin, C. Counsell, G. Davis, M.K. Donovan, K. Falinski, L. Kramer, K. Kozar, N. Li, J.A. Maynard, A. McCutcheon, S.A. McKenna, B.J. Neilson, A. Safaie, C. Teague, R. Whittier, and G.P. Asner. 2023. Coral reefs benefit from reduced land-sea impacts under ocean warming. *Nature* 621:536-542. See also <https://dlnr.hawaii.gov/holomua/files/2021/11/Sustainable-Herbivore-Management-Plan-2021.pdf>
- <sup>2</sup> Review by Bonaldo, R.M., A.S. Hoey, and D.R. Bellwood. 2014. The ecosystem roles of parrotfishes on tropical reefs. *Oceanography and Marine Biology: An Annual Review* 52:81-132. Hawai‘i case study: Howard, K.G., B.D. Schumacher, and J.D. Parrish. 2009. Community structure and habitat associations of parrotfishes on Oahu, Hawaii. *Environmental Biology of Fishes* 85:175–186.
- <sup>3</sup> Randall, J.E. 2007. Reef and shore fishes of the Hawaiian Islands. Sea Grant College Program, University of Hawai‘i. 546 pp.
- <sup>4</sup> Studies in Hawai‘i: Edwards, C.B., A.M. Friedlander, A.G. Green, M.J. Hardt, E. Sala, H.P. Sweatman, I.D. Williams, B. Zgliczynski, S.A. Sandin, and J.E. Smith. 2014. Global assessment of the status of coral reef herbivorous fishes: evidence for fishing effects. *Proceedings of the Royal Society B* 281:20131835. Nadon, M.O. 2017. Stock assessment of the coral reef fishes of Hawai‘i, 2016. NOAA Technical Memorandum NMFS-PIFSC 60. Friedlander, A.M., M.K. Donovan, K.A. Stamoulis, I.D. Williams, E.K. Brown, E.J. Conklin, E.E. DeMartini, K.S. Rodgers, R.T. Sparks, and W.J. Walsh. 2018. Human induced gradients of reef fish declines in the Hawaiian Archipelago viewed through the lens of traditional management boundaries. *Aquatic Conservation: Marine and Freshwater Ecosystems* 28:146-157. Gorospe, K.D., M.J. Donahue, A. Heenan, J.M. Gove, I.D. Williams, and R.E. Brainard. 2018. Local biomass baselines and the recovery potential for Hawaiian coral reef fish communities. *Frontiers in Marine Science* 5:DOI 10.3389/fmars.2018.00162. Stamoulis, K.A., J.M.S. Delevaux, I.D. Williams, M. Poti, J. Lecky, B. Costa, M.S. Kendall, S.J. Pittman, M.K. Donovan, L.M. Wedding, and A.M. Friedlander. 2018. Seascape models reveal places to focus coastal fisheries management. *Ecological Applications* 28:910-925. Donovan, M.K., C.W.W. Counsell, M.J. Donahue, J. Lecky, L. Gajdzik, S.D. Marcoux, R. Sparks, and C. Teague. 2023. Evidence for managing herbivores for reef resilience. *Proceedings of the Royal Society B* 290:20232101 (see figure at end of Appendix).
- <sup>5</sup> <https://dlnr.hawaii.gov/holomua/files/2021/11/Sustainable-Herbivore-Management-Plan-2021.pdf>
- <sup>6</sup> Review by Williams, I.D., T.L. Kindinger, C.S. Couch, W.J. Walsh, D. Minton, and T.A. Oliver. 2019. Can herbivore management increase the persistence of Indo-Pacific coral reefs? *Frontiers in Marine Science* 6:doi 10.3389/fmars.2019.00557. Supplemental material focuses on Hawai‘i.
- <sup>7</sup> Recent examples: <https://dlnr.hawaii.gov/blog/2023/11/08/nr23-192/>, <https://dlnr.hawaii.gov/blog/2023/05/16/nr23-91/>, <https://dlnr.hawaii.gov/blog/2022/10/10/nr22-150/>, <https://dlnr.hawaii.gov/blog/2021/10/24/nr21-188/>, <https://dlnr.hawaii.gov/blog/2020/09/18/nr20-144/>, <https://dlnr.hawaii.gov/blog/2020/08/18/nr20-121/>, see photo at end of Appendix.
- <sup>8</sup> WESPAC. 2008. Biology of parrotfish in Hawai‘i. [https://www.wpcouncil.org/coralreef/Hawaii%20Parrotfish\\_Jan%202008%20Final%20Report.pdf](https://www.wpcouncil.org/coralreef/Hawaii%20Parrotfish_Jan%202008%20Final%20Report.pdf)
- <sup>9</sup> <https://dlnr.hawaii.gov/wp-content/uploads/2022/12/F-5.pdf>
- <sup>10</sup> <https://dlnr.hawaii.gov/wp-content/uploads/2023/12/F-5.pdf>
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