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**Report to the 200th Meeting of
the Western Pacific Regional
Fishery Management Council**

Pacific Islands Fisheries
Science Center

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Pacific Islands Fisheries Science Center
National Marine Fisheries Service
1845 Wasp Boulevard
Honolulu, HI 96818

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About this report

The Pacific Islands Fisheries Science Center (PIFSC) uses the PIFSC Special Publication series to promptly distribute informal scientific and technical information. Documents within this series reflect sound professional work and may be referenced in other literature. The information contained may also be published later in more formal scientific settings.

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Executive Summary

The Pacific Islands Fisheries Science Center (PIFSC or Center) administers and conducts scientific research and monitoring programs that produce science to support the conservation and management of fisheries and living marine resources. This is achieved by conducting research on fisheries and ocean ecosystems and the communities that depend on them throughout the Pacific Islands region and by dedicating efforts to the recovery and conservation of protected species. The Center is organized into four major divisions: the Operations, Management, and Information Division (OMI); Fisheries Research and Monitoring Division (FRMD); Protected Species Division (PSD); and Ecosystem Sciences Division (ESD).

PIFSC continues to improve its science and operations through collaboration and integration across divisions, and increased communication, cooperation, and coordination with partners and stakeholders. This report highlights research, projects, activities, and other events that are of direct interest to the Council including Guam BMUS data WPSAR, a new bycatch estimate interface, survey of Makapu'u precious coral bed, PIFSC details on the economic contributions of small boat fisheries in Guam and the CNMI, and a list of our published research from this fiscal year.



Guam BMUS Data WPSAR

The Western Pacific Stock Assessment Review (WPSAR) Steering Committee, at its 2024 annual meeting, approved the peer review of the Guam bottomfish management unit species (BMUS) fisheries data before the development of the benchmark assessment. This fisheries data review for the Guam BMUS, conducted with meticulous attention to detail, is the first application of the revised WPSAR policy approved in February 2024.



(From left to right) Marc Nadon, Felipe Carvalho, Toby Matthews, and Erin Bohaboy present on the status of the 13 BMUS species. Photo credit: NOAA Fisheries.

PIFSC staff composed of Felipe Carvalho, Erin Bohaboy, Toby Matthews, Marc Nadon, Eva Schemmel, Eric Cruz, and Mia Iwane worked with the WPSAR Panel on the review of catch, catch per unit effort, length composition, and life history information of the 13 BMUS species.

The panel comprised Dr. Milani Chaloupka (University of Queensland, SSC member and WPSAR Chair), Dr. Paul Medley, and Dr. Matthew Cieri (Center for Independent Experts or CIE). The WPSAR Coordinating Committee members Marlowe Sabater, Mark Fitchett (WPFMC), and Keith Kamikawa (PIRO), worked with Lynker representative Dean Szumylo on the logistics of the meeting. The bottomfish fishing community attended the review, as did the Guam Fishermen's Cooperative Association and representatives from the Guam Department of Agriculture's Division of Aquatic and Wildlife Resources and the Guam Bureau of Statistics and Plans.



(From left to right) Dr. Paul Medley, Dr. Milani Chaloupka, and Dr. Matthew Cieri, WPSAR panelists, discuss data components for the benchmark assessment. Photo credit: NOAA Fisheries.

The stock assessment team presented the different data components for the benchmark assessment. The review panel asked the analysts clarifying questions and provided their evaluation for each data component and recommendations on how the data should be handled in the benchmark assessment. They also provided alternative modeling and analytical approaches. In addition, the panel requested the analysts provide supplemental analyses on the effects of the use of ordinal categorical predictors as nominal categorical predictors and the functional form of some effort predictors, such as hours fished.

The panel suggested testing log-normal hours-fished rather than hours-fished for mafute' *Lethrinus rubrioperculatus* and the same function instead of hours-fished and number of gears for gádao mattingan *Variola louti*. The analysts reported back to the panel that the suggested functions slightly improved the estimates, but the error increased in some cases.



Members of the public in attendance at WPSAR. Photo credit: NOAA Fisheries.

The fishing community was given numerous opportunities for public comment. The WPSAR chair encouraged participation by directing some panel questions to the fishers present at the meeting. This fostered an open and transparent discussion, allowing the fishing community to have direct input into the science review process. The fishers shared their knowledge and observations of the fishery over time, expressed concerns about the data, and recognized the great effort made by PIFSC scientists to improve the data prior to its integration into stock assessments. They also demonstrated a willingness to collaborate to enhance the data further. A fisherman and local fishery agency representative provided a public comment at the closing of the review. They stated that they appreciate PIFSC's effort to bring the review to the community that might be affected by the science produced and including them in the science process through data workshops and the fishery independent survey.



PIFSC staff, other agency representatives, WPSAR panelists and community members pose for a photo. Photo credit: NOAA Fisheries.

Overall, the review panel finds the data for most of the species to be well documented and the analysis to be appropriate for use in the planned future benchmark assessment. The data and associated analysis met the WPSAR terms of reference. The panel provided several short- and medium-term recommendations that could be done leading to the development of the benchmark assessment. The chair and the two CIE reviewers commended the team for the hard work, particularly the excellent documentation provided and the additional resources like the SHINY app for viewing the data. These made the review process more efficient and effective. The panel also acknowledged the participation of the local agency and the fishing community in the review, recognizing their valuable contributions.

New Bycatch Estimate Interface

PIFSC has developed a bycatch Graphical User Interface (GUI) for managing data from the Hawai'i deep-set, Hawai'i shallow-set, and American Samoa longline fisheries. The GUI encapsulates the bycatch estimates and totals from the three Western Pacific longline fisheries into a single interface, significantly increasing access to recent and historical bycatch estimates. The GUI helps users generate and search tables of historical bycatch, and it allows for the user to export the data to a CSV file. It is in review and awaiting regional approval for public access (see screen shot below).

Recently, Brett Cooper and Marti McCracken have made improvements to the interface. They developed new views and filters for users, included 2022 and 2023 bycatch estimates, and taken comments from reviewers into production. Researchers, fisheries managers, and other users can effortlessly pull up comprehensive bycatch data for all fish, seabird, and sea turtle species, across the fleets and fisheries.

This GUI eliminates the need to sift through PDFs on the institutional repository or query complex and confidential databases. With a few clicks, users can analyze trends, identify areas of concern, and inform conservation efforts for a multitude of bycatch species. This newfound ease of access significantly improves our understanding of bycatch patterns and empowers stakeholders to make data-driven decisions.

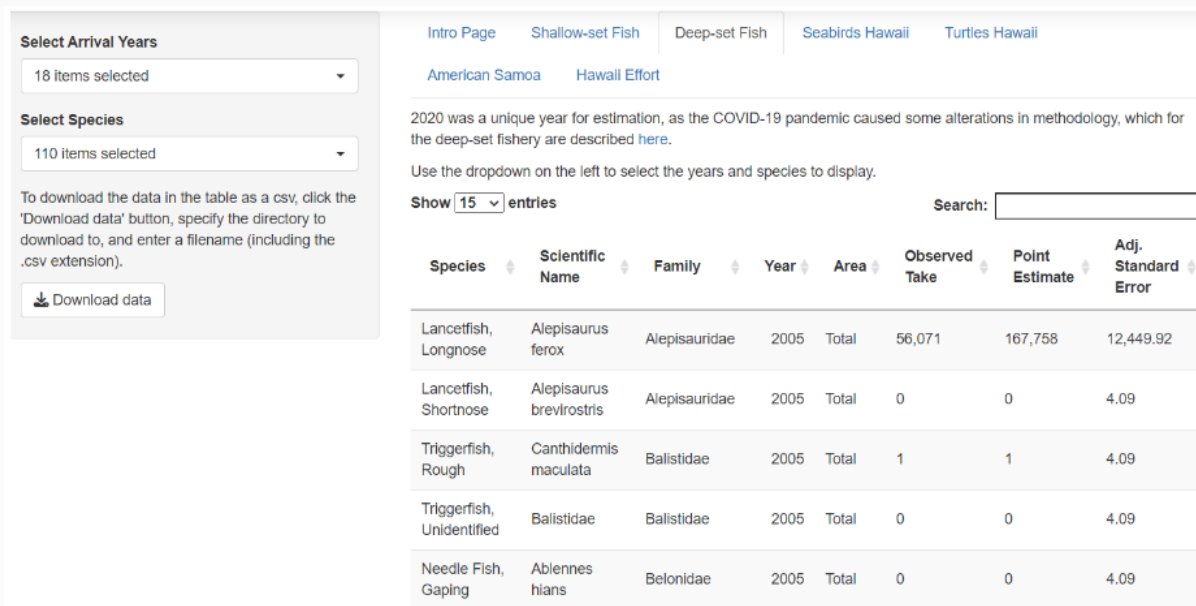


Figure 1. The Bycatch GUI allows users to quickly filter through years and species of bycatch to create time series for fish, seabirds and sea turtles. The GUI includes the Hawai'i Deep-set, Hawai'i Shallow-set, and American Samoa longline fisheries' bycatch and effort.

Survey of Makapu'u Precious Coral Bed

The survey of the Makapu'u precious coral bed commenced on Monday morning, July 22, 2024. The survey was the first time a telepresence remote operating vehicle (ROV) system was used to inspect the Makapu'u precious coral bed. The goal was to better define the boundaries of the coral bed in support of essential fish habitat refinement and estimation of maximum sustainable yield. Meagan Putts from the University of Hawai'i joined as the expert in coral identification and she facilitated the entire dive. The ROV launched around 10:15 a.m. and reached the bottom around 11:00 a.m. The primary goal for the dive was to conduct a series of visual transects across the region of seafloor where the precious corals were known to attempt to delineate the boundaries

of high-density coral aggregations (Figure 2). Unfortunately, high currents in the area and the short amount of time allocated for the dive prevented us from completing all the objectives.

The ROV surveyed the south western extent of the precious coral bed, exploring an area that had not been explored previously. Approximately 1.7km were covered by the survey transect which started at a depth of ~500m. They started to see the start of the precious coral bed halfway through the dive when they reached a depth of ~450m. This data will help us better to define the southern boundary of the precious coral bed. At first, the coral community was dominated by the hard coral *Enallopsammia rostrata*. There was diversity of fish species observed throughout the dive with some notable appearances by a swordfish, two octopuses, and the Hawaiian spurdog shark *Squalus hawaiiensis*. As the transect continued, they started to see higher densities and diversity of corals as well as a higher abundance of demosponges. Unfortunately, the dive was cut short due to high currents which were a known hazard at this site. The recording of the full dive will be made available when the ship returns to port in September.

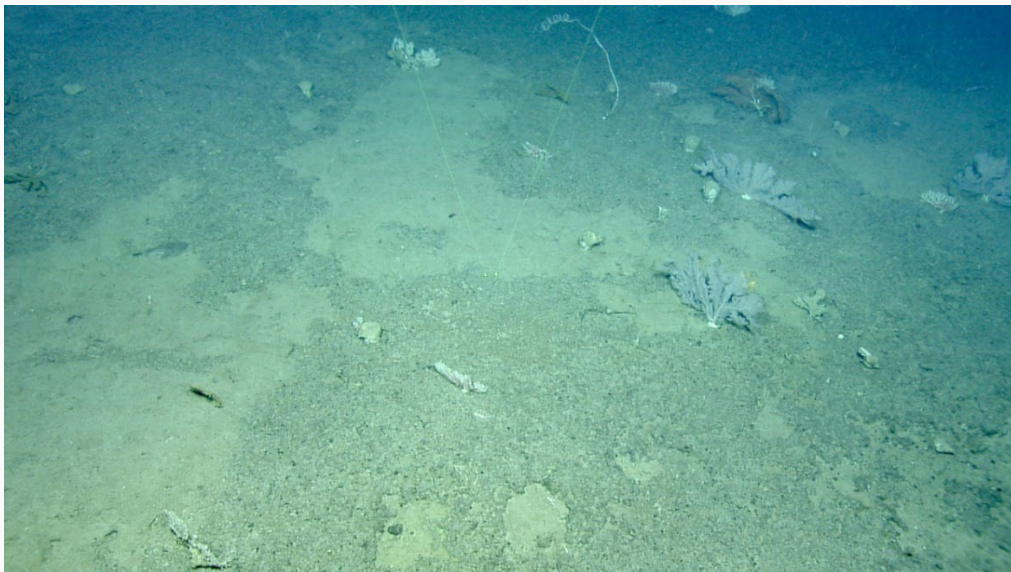


Figure 2. Video frame capture from the HD camera on Hercules showing coral diversity in the Makapu'u precious coral bed. Green parallel laser dots are 10 cm apart.

The Council's Archipelagic Plan Team and others were kept apprised of the delays and departure of the survey to facilitate their shore-based viewing. During the survey, the vessel held two live Ship-to-Shore Interactions, reaching approximately 22 elementary school youth from Huntsman Marine Science Center (10 children) and Cowichan Estuary Nature Center (12 children). Unfortunately, Manumalo Academy, American Samoa, though scheduled, was unable to join. The ship held interviews with Maui News Now and Palau International Coral Reef Center. This report was heavily abstracted from the Nautilus situation report shared with the science team after the dive.

PIFSC Details Economic Contributions of Small Boat Fisheries in Guam and the CNMI

PIFSC recently published a NOAA Technical Memorandum titled “Economic Contributions of Small Boat Fisheries in Guam and the CNMI”. This report describes fishery contributions in terms of sales, value-added impacts, jobs, and income to island economies. Taken together with the results in Chan (2023), which evaluated the economic contributions of U.S. commercial fisheries in American Samoa, PIFSC established the first set of baseline estimates of economic contributions for U.S. territory fisheries in the Pacific Islands region.



(Left) A small boat approaching Guam. Photo credit: James C. Borja. (Right) A small boat in Saipan Lagoon. Photo credit: NOAA Fisheries.

The report estimates three distinct economic effects of Mariana small boat fisheries including direct, indirect, and induced. The direct effects include ex-vessel values of the fish landed in Guam and the CNMI. Indirect effects from fisheries include upstream activities from fishing operations including a) trip-level expenditures such as fuel, bait, ice, food, and gear; and b) annual fixed expenditures that are incurred by fishers, such as vessel repair and maintenance, electronics, and insurance. These expenditures trigger a ripple effect in the economy by bolstering supporting industries, resulting in business-to-business purchases in the region.

This interdependence of industries, fueled by the spending to support fishing operations, leads to additional output/sales, value-added benefits/gross domestic product (GDP), employment, and income. Induced effects are generated from household spending on goods and services locally with a) income earned by fishers from selling fish as a direct effect, and b) wages and salary earned by employees supporting the indirect effects. Figure 3 summarizes the three types of economic contributions estimated for small boat fisheries on Guam and the CNMI.

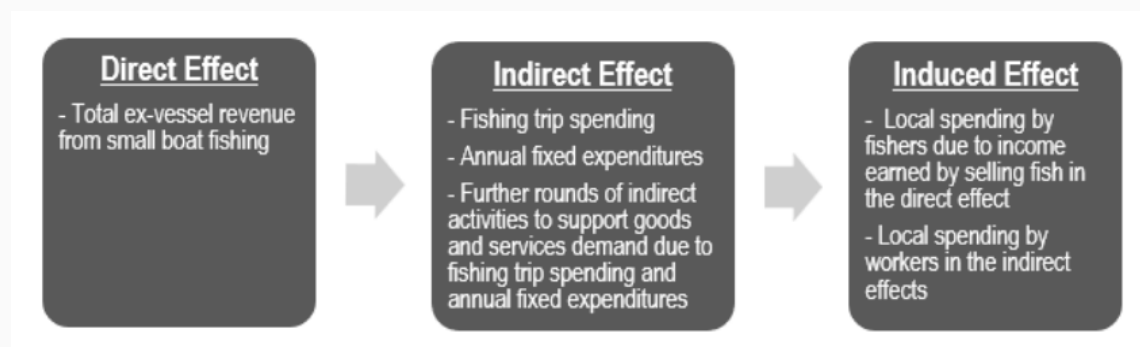


Figure 3. Economic contributions generated by small boat fisheries in Guam and the CNMI.

The indirect and induced effects from the small boat fisheries landings in Guam and the CNMI are estimated using IMPLAN, a commercially available software that uses input-output analyses to track the interrelationships among industries and consumers. The IMPLAN model results, for Mariana small boat fisheries in 2019, by island area, indicate:

Guam

- Indirect and induced output effects: \$2.23 million - \$3.26 million
- Value-added effects: \$1.49 million - \$2.18 million
- Total employment effects: 30 - 44 jobs
- Estimated labor income effects: \$0.92 million - \$1.36 million

CNMI

- Indirect and induced output effects: \$0.57 million - \$0.90 million
- Value-added effects: \$0.33 million - \$0.51 million
- Total employment effects: 8 - 14 jobs
- Estimated labor income effects: \$0.20 million - \$0.34 million

The relative importance of small boat fisheries to total economic contributions in Guam and the CNMI is computed by the ratio of total output effects relative to ex-vessel value. The ratios are 5.5 to 7.6 in Guam, and 1.9 to 2.4 in the CNMI, representing that for every \$1 of ex-vessel value, an additional \$4.5 to \$6.6 of output/sales is generated in Guam, and an additional \$0.9 to \$1.4 output/sales is generated in the CNMI. In terms of value-added/GDP effect, every \$1 of ex-vessel value supports \$3.0 to \$4.4 of GDP in Guam and \$0.5 to \$0.8 of GDP in the CNMI. In terms of employment effects, for every \$1 million of ex-vessel value, small boat fisheries support 61 to 90 jobs in Guam and 12 to 22 jobs in the CNMI. For the labor income effects, for every \$1 of ex-vessel value,

small boat fisheries support \$1.9 to \$2.8 of labor income in Guam, and \$0.3 to \$0.5 of labor income in the CNMI.

This is the first study to evaluate the economic contributions of small boat fisheries in Guam and the CNMI. This information is critical for fisheries managers to consider and reference when assessing fisheries policies or evaluating ecosystem factors that could potentially affect fishing activities and, therefore, their economic contributions in the two island economies.

It is important to note that small boat fisheries in Guam and the CNMI contribute to local food security, preserve culture and traditions, and support resilient island communities. Although this specific report does not fully evaluate these benefits, this is a critical component of the PIFSC research portfolio, is documented in other PIFSC reports, and will continue to be a priority for future research.

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