NOAA FISHERIES

PACIFIC ISLANDS FISHERIES SCIENCE CENTER

Report to the Western Pacific Regional Fishery Management Council

December 2020

Yellow-tang-Zebrasoma-flavescens. Photo credit: Paula-Ayotte.

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 five major divisions: the Operations, Management, and Information Division (OMI); Science Operations Division (SOD); 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. In 2018, the Center developed a 5-year framework for annual prioritization of research and monitoring activities in order to fully utilize the capabilities of PIFSC and its partners (e.g., NOAA Fisheries Pacific Islands Regional Office (PIRO); Western Pacific Regional Fishery Management Council (WPRFMC)). In 2019, the Center released an updated 5-year science plan. All activity updates and reports herein are organized in accordance with the research themes (per the PIFSC Science Plan 2019–2023) outlined below:

1) Promote Sustainable Fisheries
2) Conserve Protected Species
3) Research to Support Ecosystem-based Fisheries Management (EBFM) and Living Marine Resource Management
4) Organizational Excellence

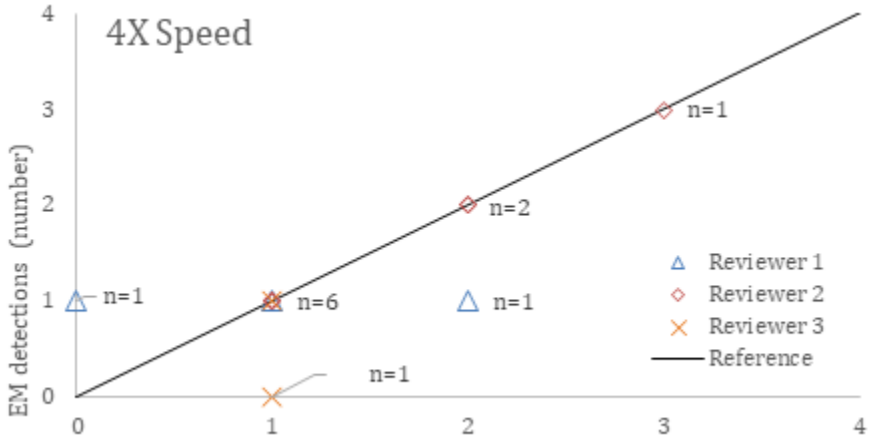
This report concludes with a list of publications produced during this reporting cycle.

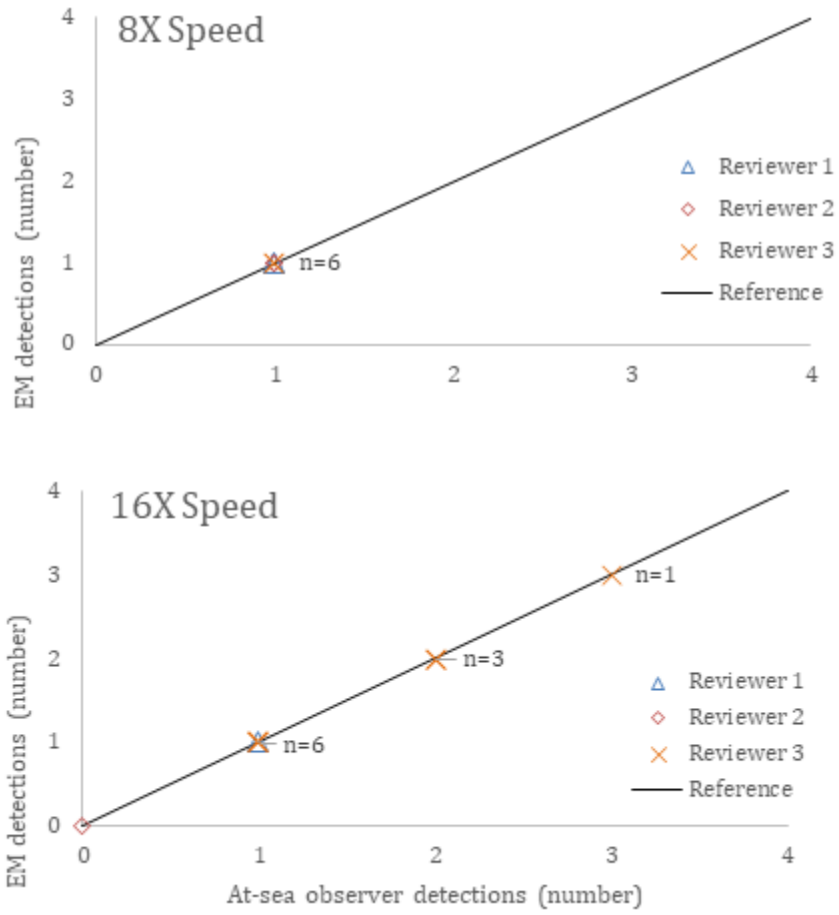
1. Promote Sustainable Fisheries

Study examining the optimal review speed of EM video footage collected from the Hawaii longline fisheries

The PIFSC electronic monitoring (EM) program completed a study examining the optimal review speed of EM video footage collected from the Hawai‘i-based longline fisheries. In addition, this study determined the ability of reviewers to detect and identify protected species (Figure 1) with video selected *a priori* for review with known protected species interactions. Detection accuracy between reviewers, trips, and review speeds (4×, 8×, and 16× real speed) were evaluated by comparing detections between EM reviewers and at-sea observers. This study indicates that retained species in the Hawai‘i-based longline fishery may be detected with little uncertainty between review speeds and reviewers. However, detections for discarded species may vary between reviewers and speeds with current catch handling protocols. As a result, a study will be conducted beginning in 2021 to determine if modifications to fishermen handling of sharks can improve detection. The study also found that protected species could be detected from EM video footage; however, reviewers missed some animals at the slowest (4×) speeds. This suggests reviewers may lose engagement at slow review speeds. Although protected species were not typically missed at fast speeds, we caution against adopting 16× speed for review, because protected species may be in limited footage with not much time for the reviewer to detect the animal.

The data report is available at https://repository.library.noaa.gov/view/noaa/27083





Comparison of protected species detections by electronic monitoring (EM) reviewers and video review speeds. At-sea observer detections were assumed to have no bias and considered ground-truth estimates to compare bias and precision by EM reviewers and speeds. Observer detections were excluded if the animal was not captured in video. Detections are shown by haul.

Two new projects funded through the Fisheries Information System Program, National Catch Shares Program, and National Observer Program

The PIFSC FRMD received two grants for fiscal year 2021 from the federal funding opportunity administered by the Fisheries Information System (FIS) Program, National Catch Shares Program, and National Observer Program. These grants will support improvements to data collection and processing that will improve management of pelagic and insular fisheries in the Pacific Islands region (PIR):

Project 1: The efficacy and implementation of electronic monitoring to quantify mortality and serious injury of marine mammals and post-interaction mortality of sea turtles in Pacific Islands region longline fisheries.

Since 2016, electronic monitoring (EM) projects conducted in the PIR indicate that EM technology may be used to detect retained fish catch, bycatch, and protected species interactions that take place in Pacific pelagic longline fisheries. Human review of EM video footage was determined to be reliable at detecting retained fish with an overall detection rate of 89%. Further work also determined that the best speed to watch footage is eight times actual speed, making EM more cost effective than at-sea observer data collection. Previous FIS-funded projects determined that EM in PIR longline fisheries aligns with the most recent EM policy directive that encourages the consideration of EM in fisheries where it may be scientifically accurate and achieve the most cost-effective approach to management. While work to date indicates that EM may collect reliable data similar to at-sea observers, there are still areas of research needed to determine the range of EM capabilities.

This project has three distinct parts: First, we aim to assess the potential utility of EM to inform marine mammal mortality and serious injury and sea turtle post-interaction mortality determinations. These determinations inform how a particular interaction will be included in the estimation of stock impacts. Second, we propose to bolster our artificial intelligence (AI) library with images of protected species interactions and will incorporate them into publicly available AI algorithms that we are training using open source AI software. Third, we will further efforts on potential implementation of EM by consulting with a fisheries policy analyst to evaluate regulatory frameworks and options.

Photo credit: NOAA Fisheries/Mark Cotter.

Photo from the False Killer Whale Take Reduction Team webpage.

Project 2: Electronic Reporting in the U.S. Pacific Islands Bottomfish Fisheries: American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands.

The Council and NMFS have developed a pilot mobile application (Catch it-Log it app) to collect catch and effort data from fishermen and vendors in the American Samoa, Guam, and CNMI bottomfish fisheries. These fisheries are regionally and culturally important commercial, recreational, and subsistence fisheries. NMFS and the Council manage the bottomfish fisheries under the Fishery Ecosystems Plans for America Samoa and the Mariana Archipelago, and under annual catch limits and accountability measures in addition to other regulatory requirements. Currently, data are typically collected through in-person boat- and shore-based creel surveys, and commercial receipts. Survey data are expanded by incorporating additional data from periodic boat activity inventories. These methods can be labor intensive, and due to limited resources in these island areas, do not provide timely data to accurately monitor fish catch in near real time. Furthermore, recent stock assessments by NMFS determined that the bottomfish stocks in American Samoa and Guam are overfished and bottomfish in American Samoa are experiencing overfishing. Successful implementation and adoption of the new reporting app can provide additional data streams from electronic reporting (ER) that can improve management of fisheries across the territories.

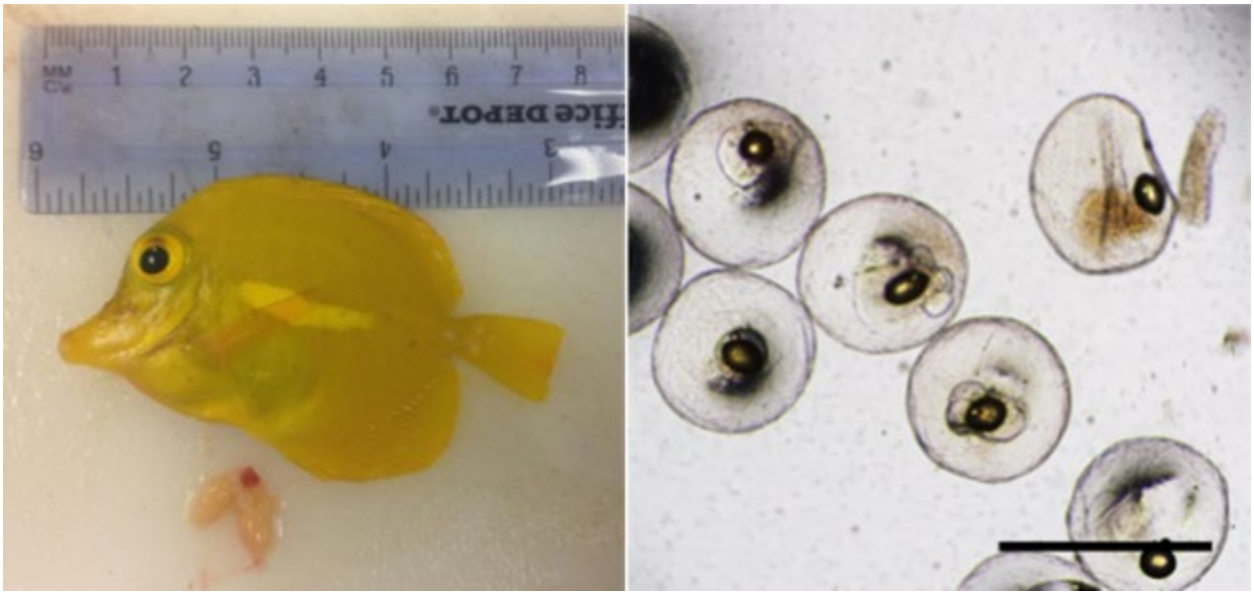
Because of its inherent reach/scalability, ER could provide fisheries managers access to better quality and more timely data to manage these fisheries in near-real time, and at a scale that cannot currently be met with the existing in-person data collection program. Therefore, this project will assess the feasibility of ER in the American Samoa, Guam, and CNMI bottomfish fisheries to improve overall data collection—access, quality, timelines—that meets fisheries monitoring objectives and further improves PIFSC's ability to conduct rigorous stock assessments of the bottomfish management unit species.

(Photo credit: NOAA Fisheries/ Michale Quach)

Reproductive biology of yellow tang (Zebrasoma flavescens) from the Oahu, HI aquarium fishery.

The PIFSC Life History Program recently completed a study on aspects of yellow tang (*Zebrasoma flavescens*) reproductive biology. Yellow tang are important herbivores on coral reefs and also highly valued in the Hawai‘i ornamental (aquarium) fishery because the majority of individuals in the global ornamental fish market come from wild collections in Hawai‘i. The study used samples collected from cooperative fishermen to provide the first estimates of size at maturity (L_{50}) from the aquarium fishery. We found a smaller than expected L_{50} for females (63.4 mm TL (CI: 62.7 – 65.5 mm TL)) and males (67.4 mm TL (CI: 66.4 – 70.3 mm TL)), with size at first spawning at 65 mm TL. This was surprising because individuals this small were previously considered well within the juvenile stage. The estimated age-at-maturity (A_{50}) was 95 days, meaning that spawning takes place at not only a small size, but also an extremely young age considering that they can live up to 40 years. Actively spawning female GSI ranged from 0.07 to 2.47. However, the maximum gonad weight was 0.26 g for females, suggesting a low total reproductive contribution from these small individuals. These reproductive estimates are not only important for understanding yellow tang shifts in habitat utilization and spawning strategy, they are also important pieces of information necessary for sustainable fisheries management.

Schemmel, E. and Kamikawa K. *Reproductive biology of yellow tang (Zebrasoma flavescens) from the Oahu, HI aquarium fishery. Environmental Biology of Fishes. In review.*



Actively spawning female yellow tang (left; 85 mm total length) and a close up of the hydrated oocytes (right; scale bar is 1000 µm). Photos by Eva Schemmel.

2. Conserve Protected Species

One of the Center's first in-house field projects during the COVID pandemic was conducted when the Cetacean Research Program began spinner dolphin surveys around O'ahu on October 30. This survey planned for 10 days of small boat survey efforts following a line-transect design. The fall 2020 effort is intended to provide a full island survey with inshore-offshore stratified design to examine the efficacy of the survey design and whether additional inshore stratification is needed to account for local animal densities around O'ahu. The overall survey effort, to continue through fall 2021, is a collaborative project with the Marine Mammal Research Program at HIMB and the University of St. Andrews and is intended to provide island-wide abundance estimates for spinner dolphins in support of management actions to reduce impacts from swimmers and tour vessels during the dolphin's daytime rest period. The project partners have also designed surveys for Maui Nui and Hawai'i Island with the intent to survey those regions with a combination of small vessel, ship, and aerial surveys over the next few years.

The survey team has had 3 sightings of spinner dolphins on the first 3 days of survey effort (October 30–November 1). When groups are seen the team approaches for identification photos of each individual in the group for use in a companion mark-recapture study of dolphin abundance, residency, and movements around O'ahu and between islands.

The line-transect design required some modifications to our data collection toolset when surveying from the small boat. Here, Marie Hill uses a rail-mounted angle board and pointer to measure the angle to the sighted group. The team also measures distance to the group before approaching to enable use of distance sampling statistical methods (requiring a measure of perpendicular distances of each sighting).

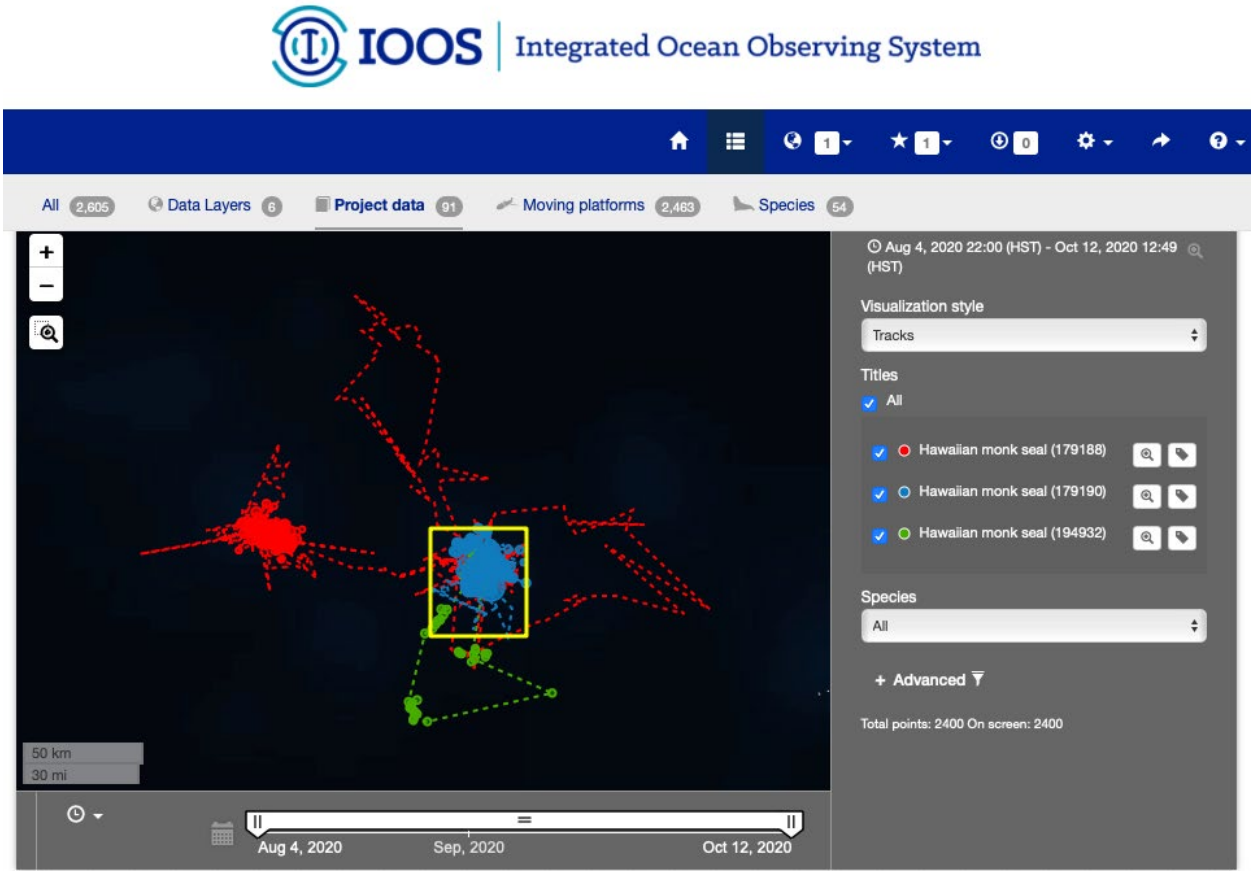
Hawaiian monk seal tracking data is now available online

NOAA has recently partnered with the Animal Telemetry Network (ATN), an online platform to host wildlife telemetry data. The ATN system provides a useful tool for compiling thorough metadata to ensure that data remain available and understandable for future research. The web portal provides visual mapping tools, standardized metadata, and makes data products publicly available for download. This year (2020), the Hawaiian Monk Seal Research Program is posting our full telemetry archive on the ATN, including nearly 400 animals tracked over the course of over 25 years!

This telemetry research is part of NOAA's ongoing multi-decadal study of Hawaiian monk seals, providing a foundation for science-based management and recovery activities that have helped this population. In the telemetry component of this research, Hawaiian monk seals are instrumented for a number of purposes, including research (space use, foraging ecology), monitoring (after veterinary procedures, rehabilitation, translocation), and management issues (interactions with humans, fisheries). Studying how these animals utilize their environment is a crucial part of NOAA's larger effort to understand the ecology of Hawaiian monk seals, identify and mitigate threats to survival, and work toward the recovery of this endangered species.

In a collection of seven projects (spanning different geographic and temporal extents), we share over 25 years of telemetry research on Hawaiian monk seals throughout their range, including the main Hawaiian Islands (Kauaʻi, Niʻihau, Oʻahu, Molokaʻi, Maui, Lanaʻi, Kohoʻolawe, Hawaiʻi) and several subpopulations in the Northwestern Hawaiian Islands (Nihoa Island, Mokumanamana (Necker) Island, French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll, Kure Atoll). Within each project, we provide a master deployment log, which provides details about each deployment on each seal associated with all of the data sets within the campaign. This master file can be used to determine which data sets may be of interest for a particular question or goal.

The first dataset available online is *Real Time Tracking of Hawaiian Monk Seals, 2020* (the remaining six data sets containing archival data are expected to go live before the end of the year). This data set allows the public to follow along online as we track monk seals currently carrying telemetry instruments. In this case, earlier in 2020, we started tracking three juvenile monk seals when they were released at Midway Atoll after rehabilitation at Kei Kai Ola Monk Seal Hospital. These animals' tracks can be viewed at the direct link:
https://portal.atn.ioos.us/#metadata/42f96dc7-9aa1-40a2-9536-160d95e63090/project
Or save the master URL where you can access real-time tag deployments to view monk seals, sea turtles, or other species being tracked in Hawaiʻi and around the globe.
https://portal.atn.ioos.us



This map is an example of telemetry data displayed through the ATN project *Real Time Tracking of Hawaiian Monk Seals, 2020.*

Council 5-year priority: PS1.1 Develop robust stock assessments to support evaluation of fisheries impacts on protected species populations, improving understanding of Hawaiian monk seal causes of death in the main Hawaiian Islands by developing a new analytical approach.

Understanding population-level impacts of natural and anthropogenic causes-of-death for Hawaiian monk seals in the main Hawaiian Islands

Understanding why Hawaiian monk seals die, and the impacts of various threats to survival is fundamental when developing sound management plans and practices for seals in the main Hawaiiian Islands. In the analysis presented in the following recent publication, Hawaiian Monk Seal Research Program researchers and collaborators quantified the frequency of specific causes-of-death for main Hawaiian Islands monk seals and assessed the impact of these causes of death on the monk seal population growth rate. We examined all cases where seals were known or strongly inferred to have died during 2004–2019. For each seal, we used necropsy results, histopathology, and other evidence to assign the probabilities of death from each of 11 different causes of death, and then evaluated the influence of each cause on the population growth rate. The causes of death with the largest influence on the population growth rate were anthropogenic (human caused) trauma such as clubbing or shooting, anthropogenic drowning such as when a seal is trapped underwater in a net, and protozoal disease such as toxoplasmosis, which is carried by cats. Together, the two anthropogenic causes of death (trauma and drowning) had a larger effect on the population growth rate than disease or other natural causes of death. Data collection on causes of death will be ongoing, and it is our hope that by quantifying the impacts of different causes of death on seal survival we will be able to provide a more complete science-based context for managers as they develop and prioritize efforts to conserve this endangered species.

https://onlinelibrary.wiley.com/doi/full/10.1111/mms.12742

Council 5-year priority: PS2.2.2 Conduct research to improve understanding of mechanism of interactions (e.g., mechanism of how sea turtles are hooked).

Understanding environmental drivers of protected species bycatch in the Hawaii longline fishery

The Ecosystem Based Fisheries Management Project, a joint venture between PIRO, PIFSC, and the WPRFMC, has published the results from phase 1. This multiyear project aims to understand fishery interactions and management options for protected species. A machine learning model, called the Ensemble Random Forest (ERF), was developed and tested with collaborators at the University of Florida to predict spatial interactions between protected species and Hawai‘i longline fisheries using oceanographic drivers. The publication highlights the utility of the ERF method for defining rare species interactions and is now available in *Endangered Species Research*. The team will continue its efforts on the broader project, including demonstration of the utility of the ERF method in understanding olive ridley and leatherback turtle interactions with the longline fishery (the original impetus for this project).

https://www.int-res.com/abstracts/esr/v43/p183-197/

ABSTRACT: Relative to target species, priority conservation species occur rarely in fishery interactions, resulting in imbalanced, overdispersed data. We present Ensemble Random Forests (ERFs) as an intuitive extension of the Random Forest algorithm to handle rare event bias. Each Random Forest receives individual stratified randomly sampled training/test sets, then downsamples the majority class for each decision tree. Results are averaged across Random Forests to generate an ensemble prediction. Through simulation, we show that ERFs outperform Random Forest with and without down-sampling, as well as with the synthetic minority over-sampling technique, for highly class imbalanced to balanced datasets. Spatial covariance greatly impacts ERFs' perceived performance, as shown through simulation and case studies. In case studies from the Hawaii deep-set longline fishery, giant manta ray Mobula birostris syn. Manta birostris and scalloped hammerhead Sphyrna lewini presence had high spatial covariance and high model test performance, while false killer whale Pseudorca crassidens had low spatial covariance and low model test performance. Overall, we find ERFs have 4 advantages: (1) reduced successive partitioning effects; (2) prediction uncertainty propagation; (3) better accounting for interacting covariates through balancing; and (4) minimization of false positives, as the majority of Random Forests within the ensemble vote correctly. As ERFs can readily mitigate rare event bias without requiring large presence sample sizes or imparting considerable balancing bias, they are likely to be a valuable tool in bycatch and species distribution modeling, as well as spatial conservation planning, especially for protected species where presence can be rare.

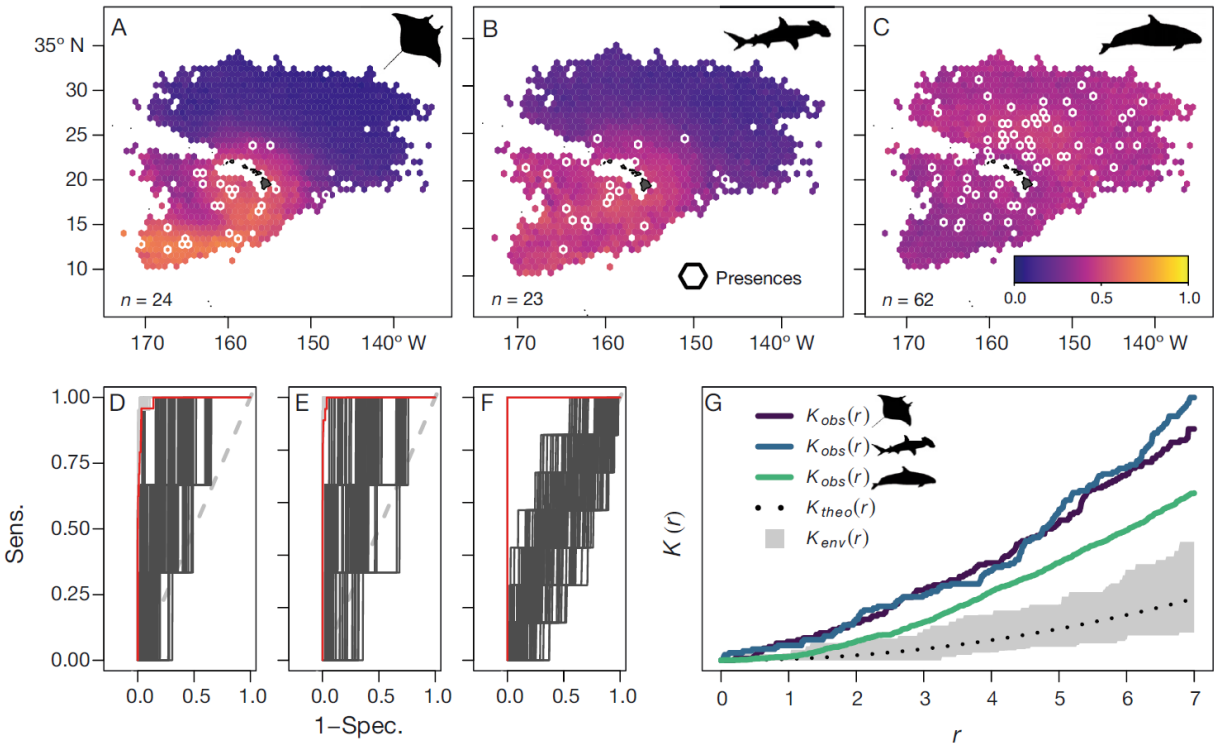


Fig. 5. Ensemble Random Forests spatial predictions in the central north Pacific for (A) giant manta ray, (B) scalloped hammerhead, and (C) false killer whale, with warmer colors indicating a higher probability of presence. The receiver operator characteristic curves for the training set (light gray lines), the test set (dark gray lines), and the ensemble predictions (red line) against the random expectation (dashed 1:1 line) for (D) giant manta ray, (E) scalloped hammerhead, and (F) false killer whale. (G) Ripley's K functions for the theoretical expected clustering (K_{theo}, dotted line) and theoretical envelope (K_{env}, gray polygon), and for the case studies (K_{obs}): giant manta ray (purple line), scalloped hammerhead (blue line), and false killer whale (teal line)

3. Research to Support EBFM and Living Marine Resource Management

U.S. Pacific Coral Resilience Metrics Provide a Robust Standard for Prioritizing Effort under Resilience-Based-Management

The NOAA Coral Reef Conservation Program (CRCP) recently released a set of "Local Manager Reports" summarizing estimates of coral reef ecological resilience and social vulnerability for the U.S. Pacific. Drawing from broad ecological data from the National Coral Reef Monitoring Program and social data from the American Community Survey, these reports provide a comparable estimate of resilience and social vulnerability across the entire U.S. Pacific. They break down both metrics into their component parts, and highlight geographic distinction within and among Pacific regions.

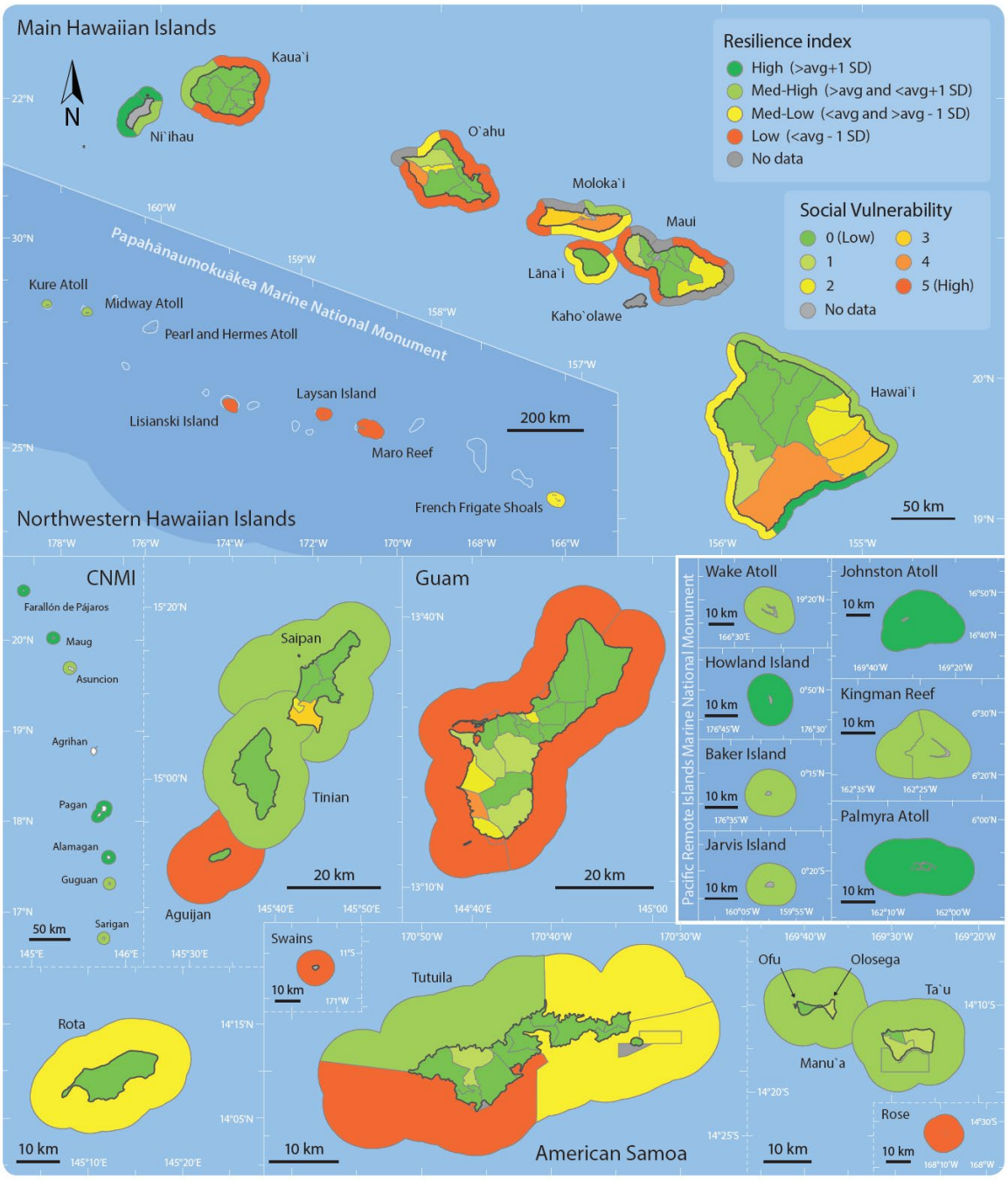
Extending the results of these reports, NOAA researchers compare the resilience metrics to a diversity of other metrics for prioritizing management actions under a regime of resilience-based management. Using efficiency frontier analysis, they show that the resilience metrics provide a robust method of prioritizing effort in resilience-based management that successfully generates "win-win" tradeoffs across a diversity of concerns.

Compare results from the Local Manager Reports for Hawai'i, Guam, CNMI, and American Samoa.

Oliver TA, Hospital J, Brainard RE. 2020. Spatial Prioritization under resilience based management: evaluating trade-offs among prioritization strategies. NOAA Technical Memorandum. NOAA-TM-NMFS-PIFSC-105, 47 p. doi:10.25923/xdf2-t259

For more information contact:

coralreef@noaa.gov or Thomas.oliver@noaa.gov



These nested maps highlight each U.S.-affiliated Pacific Island, showing the aggregate Resilience index along the coast and the Social Vulnerability index with sectors on land. We see that many remote areas show relatively high resilience, including many of the islands across the Pacific Remote Island Marine National Monument, but remoteness itself is not a guarantee of resilience, as islands in Papahānaumokuākea Marine National Monument range from medium-high to low resilience. Many areas around population centers in O'ahu, Maui, S. Tutuila, and Guam show low resilience. Social Vulnerability indices show low vulnerability in Hawai'i and Guam, but higher vulnerability in Tinian, Saipan, and American Samoa.

Summary of the 4th Annual Collaborative Climate Science Workshop

Over 110 staff from the Council, PIFSC, PIRO, NESDIS, and PMNM participated in the 4th Annual Collaborative Climate Science Workshop which was held virtually October 13th – 15th. The goal of these annual internal workshops is to keep regional staff abreast of ongoing and emerging climate-related management needs and climate science. This year's workshop built on the results of previous workshops with an eye toward what can be accomplished by the end of FY21, which marks the end of the current phase of the Pacific Islands Regional Action Plan for climate science (PIRAP).

The workshop began with a plenary session that included updates on all 15 focal projects discussed at last year's workshop. The plenary session was followed by four 3-hour theme sessions: Protected Species, Insular Fisheries, Pelagic Fisheries, and Essential Fish Habitat & Corals. In each of these sessions, participants first conducted a gap analysis of each focal project within the session's theme. Following this discussion, participants conducted a second gap analysis that looked outside these focal projects to the four regional priorities that emerged from the 2nd Workshop in 2018: Understanding future shifts in species distributions underpinned with robust baselines, better understand species' physiological responses to climate change, continue to investigate food web responses to climate change, and improved collaboration between scientists and managers. This year's workshop was preceded by a half-day special session on mitigation work at French Frigate Shoals. The goal of this special session was to further understand of the impacts of climate variability and change on protected species and associated habitat at French Frigate Shoals.

This year's workshop accommodated the challenges associated with current mandatory telework orders. The plenary session was recorded and made available to those unable to attend the live broadcast. Additionally, the theme session conversations were documented in real time and these documents were left open for two weeks following the workshop to enable additional contributions. The workshop steering committee is just beginning work to consolidate these conversations into a workshop report, which is expected to be released early next calendar year.

4. Organizational Excellence

Science Operations Division Council Submission
August 7th - November 27th, 2020

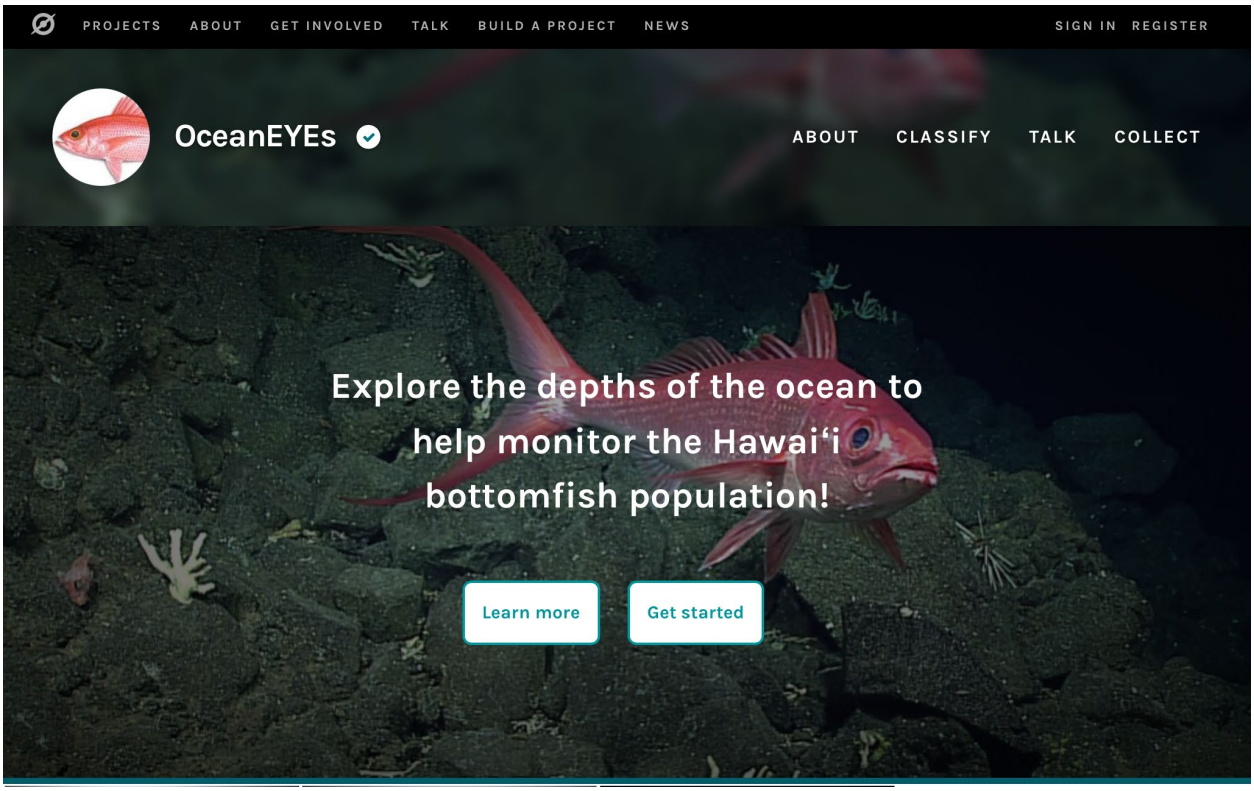
Artificial Intelligence (AI): 3,000 Citizen Scientists Help Train Machine Learning Models for Hawaii Deep 7

Hana Ra[1], Audrey Rollo[2], Ben Richards[3], Jeremy Taylor[2], Dianna Miller-Greene[2]
[1]State of Hawaii Division of Aquatic Resources and NOAA PIFSC Volunteer
[2]Joint Institute for Marine and Atmospheric Research
[3]NOAA Pacific Islands Fisheries Science Center - Science Operations Division

PIFSC launched the OceanEYEs Citizen Science project on September 15, 2020. Since its launch, over 3,000 volunteer citizen scientists have made approximately 350,000 classifications across nearly 40,000 images collected by the PIFSC Modular Optical Underwater Survey System (MOUSS) during the 2019 Bottomfish Fishery-Independent Survey in Hawai‘i (BFISH).

These classifications will be used to help train new machine learning models begin automating the laborious process of identifying and counting Deep 7 individuals within MOUSS video. To improve accuracy, each image is classified by 15 independent citizen science volunteers whose classifications are then merged to create a consensus annotation. Initial results from a pilot study indicate accuracies of these consensus annotations rival that of professional annotators. As citizen science volunteers are annotating one image for every second of camera deployment, their annotations also allow PIFSC researchers to investigate new ways of counting fish over the course of the video record.

The current volunteer base includes citizen scientists from the USA (63%), UK (13%), Canada (3%), India (2%), and Germany (2%). Within the USA, 18% are from California, 7% from Texas, and 6% from Hawai‘i. Additional information can be found at https://www.fisheries.noaa.gov/feature-story/citizen-scientists-help-count-deep-7-bottomfish-hawaii



The introductory "splash" page for the OceanEYEs Citizen Science project.

PIFSC Launches Working Group to Guide Strategic Investment in Cloud

Benjamin Richards, Ann Allen, Bradley Gough, Brett Schumacher, Jeremy Taylor, Jesse Abdul, Keith Bigelow, Nick Tenney, Stacie Robinson, Thomas Oliver, Timothy Lee, Vikram Khurana

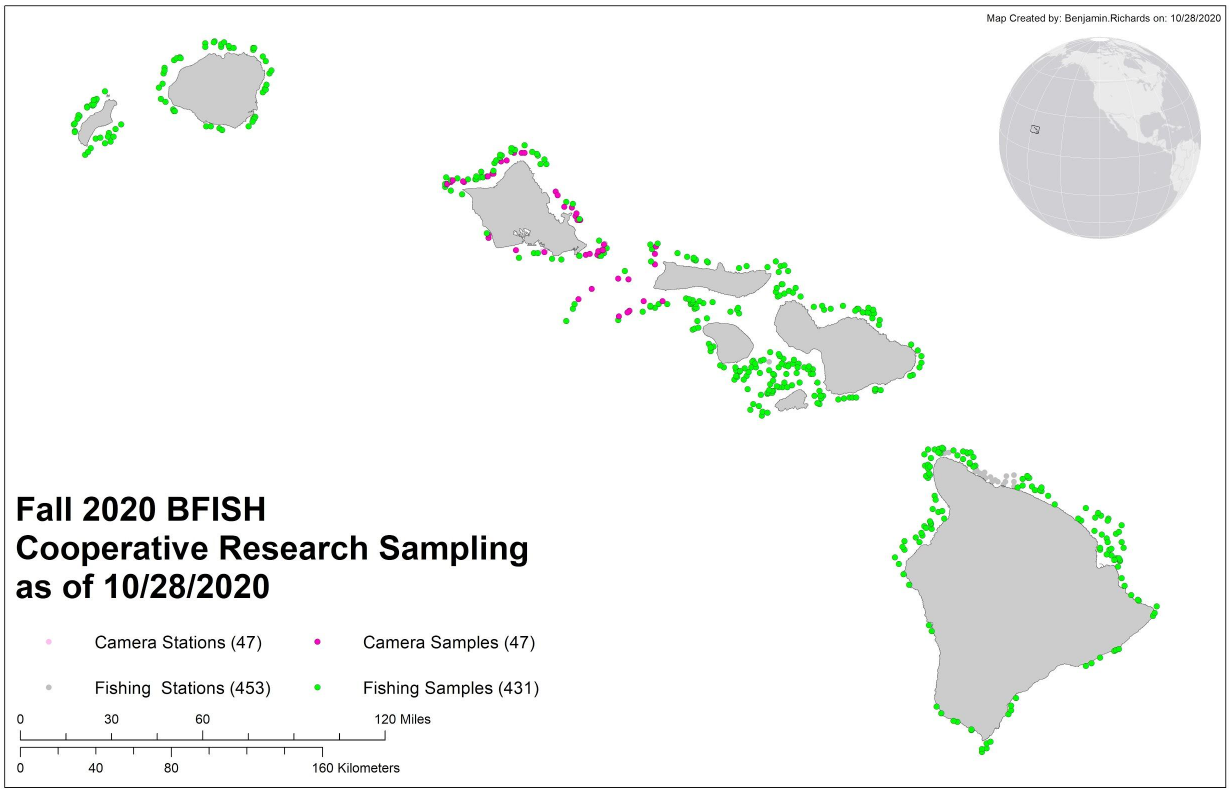
The PIFSC has launched the PIFSC Cloud Working Group to guide strategic investments in Cloud services. This working group will meet monthly to keep abreast of emerging technologies, cultivate a Center-wide understanding on where and how PIFSC should invest in the cloud, and will aid in development of an affordable roadmap that is meaningful to the current and near-future science enterprise.

PIFSC Nears Successful Completion of the 2020 BFISH Survey

Benjamin Richards, Jerald Ault, Steve Smith, Clayward Tam, Forrest O'Neil, Christopher Demarke, Dianna Miller-Greene, Jessica Schem, Alexa Gonzales, Garry Harsanyi, Noriko Shoji, Michael Seki

The 2020 BFISH Survey is nearing successful completion. All 47 camera survey stations have been completed and only 22 of 453 research fishing stations remain, as of October 28.

Beginning on August 15, the success of BFISH within the novel COVID-19 environment has been due, in no small part, to the dedication and resourcefulness of our Lynker/Pacific Islands Fishing Group (PIFG) partners and the local commercial fishing community. PIFSC was able to work with Lynker/PIFG to develop appropriate COVID-19 mitigation guidelines that have allowed for safe sampling.



A map of the sampling domain and completed sampling for the 2020 Bottomfish Fishery-Independent Survey in Hawaii (BFISH). As of October 28, the BFISH is 95% complete, with only a few research fishing stations off the northern point of Hawai'i Island remaining.

In addition to work done from the NOAA Ship *Oscar Elton Sette*, local bottomfishers typically conduct two-thirds of the overall annual BFISH sampling effort. This year, they have stepped up to the plate and are conducting 100% of the sampling using up to six commercial fishing vessels distributed among the main eight Hawaiian Islands. A notable first has been the successful deployment of the MOUSS stereo-video camera system by the PIFG F/V *Ao Shibi IV*, independently and without a PIFSC technician aboard.

These small, open-deck fishing vessels are crewed by only a few people and offer a safer alternative to larger platforms, such as NOAA ships. All parties are following the Center for Disease Control-recommended precautions to make sampling as safe as possible. Most of the vessels have been operating to and from neighbor islands, where COVID-19 cases have remained lower than in more populated regions. All crew members conduct self-evaluations with temperature checks each morning and wear masks at all times.

While our partnership with the local community has always been important, this year it has been critical to the continued success of the survey. More information can be found at https://www.fisheries.noaa.gov/feature-story/cooperative-research-key-successful-start-annual-bottomfish-survey-hawaii

Mike Abe and Gary Shirikata sampling off the island of Hawai‘i on August 15, 2020. They are holding four ‘opakapaka, one lehi, and one hapu‘upu‘u. Photo courtesy of Mike Abe.

PIFSC Co-Hosts First Virtual Bottomfish Constituents Meeting

Benjamin Richards[1], Forrest O'Neil[2], Clay Tam[3]
[1]NOAA Pacific Islands Fisheries Science Center - Science Operations Division
[2]Lynker Technologies, LLC
[3]Pacific Islands Fisheries Group

Due to COVID-19, the 2020 Bottomfish Constituents Meeting was hosted as a virtual event. Co-hosted by NOAA PIFSC, Lynker Technologies, and the Pacific Islands Fisheries Group, the meeting drew nearly 35 participants from the main Hawaiian Islands, Guam, and Alaska.

Benjamin Richards, of the PIFSC Science Operations Division, gave a presentation on the 2020 BFISH survey followed by Ryan Nichols of the Fisheries Research and Monitoring Division's Life History Program on the life history of MHI Deep-7 bottomfish, with particular emphasis on size and age. Following these presentations, Christopher Demarke of the PIFSC Science Operations Division gave a presentation on the successful deployment of the MOUSS stereo-video camera system by the F/V *Amo Shibi IV*, which was (for the first time) done independently and without the aid of a PIFSC technician.

Analysis & Evaluation

Audrey Rollo[1], Dianna Miller-Greene[1], Jacob Asher[1]
[1]Joint Institute for Marine and Atmospheric Research

The Analysis Team completed annotation on the Baited Remote Underwater Video Station (BRUVS) videos (108 in total) from the SE1202 American Samoa research cruise. Annotations identify how often target species are spotted by the BRUVS cameras. The final data product will determine the feasibility of conducting future BRUVS surveys for fishery independent indices of abundance for the three shallow water bottomfish management unit species: *Lethrinus rugioperculatus* (emperor), *Lutjanus kasmira* (snapper), and *Variola louti* (grouper).

Analysis Photo: screenshot from the SE1202 American Samoa BRUVS cruise showing two of the three target species (snapper and emperor). Depth: 48.5 m.

5. Publications

Admin Reports

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