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**NOAA**  
**FISHERIES**

PACIFIC ISLANDS FISHERIES  
SCIENCE CENTER

# Report to the Western Pacific Regional Fishery Management Council

October 2019



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: 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 listing of publications produced during this reporting cycle.

## 1. Promote Sustainable Fisheries

### Pacific Insular Fisheries Monitoring, Assessment, and Planning Summit

The Pacific Insular Fisheries Monitoring, Assessment and Planning Summit (PIFMAPS) convened August 19–23 at the Ala Moana Hotel in Honolulu. Participants included employees from the PIFSC, PIRO, WPRFMC, and the U.S. Fish and Wildlife Service (U.S. FWS), as well as representatives from the U.S. Pacific territories of American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (CNMI). Additionally, a panel of subject matter experts participated to help with the decision-making process at the conclusion of the summit. While there have been extensive data collection efforts made in the U.S. Pacific territories over several decades, over that time period the needs of PIFSC and its partners have changed. Our data collection efforts should reflect those new priorities.

The purpose of PIFMAPS was to conduct a comprehensive review of the fishery-dependent data collection programs in the U.S. Pacific territories and examine their utility in the fisheries management process. The participants were expected to reach a common understanding of the steps needed to reach effective science-based fisheries management, with a long term goal of establishing a data collection program that can provide the data, scientific information, and monitoring systems necessary for robust data products.

Participants met for a full week, with each day comprised of background presentations and topic-driven discussion groups in which the U.S. Pacific territory representatives discussed daily outcomes and brainstormed ways to improve their data collection systems. On the final day, the territorial representatives reported their conclusions, and strategies for updating and modifying the existing programs. The panelists and federal staff also met separately to discuss and collate their own recommendations to present to the larger group. The recommendations that were accepted by the participants as a whole include the following:

1. Shore-based Creel Survey
  - PIFSC' Western Pacific Fisheries Information Network (WPacFIN) support will be phased out (timeline to be determined), and support will continue through U.S. FWS funding.
  - Augment funding and support through Marine Recreational Information Program (MRIP) certification. Continue pursuing MRIP certification and review.
  - PIFSC will continue fishery-independent surveys.
2. Boat-based Creel Survey
  - Focus on bottomfish management unit species (BMUS).
  - Temporarily (timeline needed) continue support for boat-based creel survey. Move to directed/targeted data collection and calibration of methodology.
  - Consider mandatory self-reporting by fisher, in conjunction with calibration (for example, electronic reporting with the option of paper reporting).
3. Commercial Receipt Program
  - Mandatory reporting for all fisheries, prioritizing bottomfish fisheries.

- Continue improvements to this program with federal support, including electronic reporting, image technology, improve species resolution (including BMUS), and add trip ID to both vendor data and fisher data.
4. Biosampling Program
- Focus on BMUS; revisit where current practices need adjustments.
  - Expand number of sampled vendors.

Following the PIFMAPS, Marlowe Sabater (Council) and Stefanie Dukes (PIFSC) are forming working groups and reviewing action items. They will lead the follow up effort, with full support of the Council and PIFSC, to ensure action items receive timelines and those timelines are met. There will be a transition period to work through staffing and technical concerns. A comprehensive report will be shared with the participants, and made publically available in the coming weeks.

### Main Hawaiian Islands Life History Research Cruise

The FRMD Life History Program conducted fishery-independent research aboard the NOAA Ship *Oscar Elton Sette* in the main Hawaiian Islands (MHI) from June 17th to June 29th, 2019. Operations were focused in the Maui Nui area, west Lānaʻi, and Penguin Banks. This was a multifaceted research cruise (SE-19-04) that addressed several research questions from both the life history and stock assessment programs. Specific operations included sampling bottomfish for life history studies, drop camera instrument package (DCIP) deployments and recoveries, and water sampling for bottomfish eDNA research.



**Onaga reproduction research.** A happy member of the PIFSC Life History Program after a day of fishing for onaga samples.

Onaga (*Etelis coruscans*) reproductive samples were unavailable from the commercial fleet during June–September. Year-round samples are required for spawning season estimates; therefore, scientists targeted adult females during the research cruise. Twelve females were captured during the cruise, which significantly increases the life history program’s June collection.



**Deployment.** DCIP/eDNA sampler being deployed from the *Sette*. The gray Niskin bottle is attached to the yellow acoustic release and is hanging below the DCIP frame containing the camera system.

Ta'ape (*Lutjanus kasmira*) were sampled for a Pathways Intern's senior thesis at the University of Hawai'i. This research examines external characteristics that are indicative of sexual dimorphism (differences between males and females) which would lead to more efficient sampling of this species for life history studies in Hawai'i, American Sāmoa and the Mariana Archipelago. Fifty-one samples of near-equal sex ratio were collected during the cruise.

Little is known about the reproductive biology of the scorpionfish or hogo (*Pontinus macrocephalus*), a bycatch species in the Deep-7 fishery. During the cruise, we caught and sampled nine hogo.

The FRMD Stock Assessment Program and the Science Operations Division conducted operations for the quantitative comparison of the modular optical underwater stereo system (MOUSS) and Moana360 camera system to help determine effective sampling area for the MOUSS. A total of 55 DCIP/360° camera deployments and recoveries were completed.

Water samples were collected in concert with the DCIP deployments for an ultimate comparison of 'ōpakapaka (*Pristipomoides filamentosus*) abundance estimates between the camera and eDNA. The water was collected using Niskin bottles that were attached to the DCIP. The Niskin bottles were equipped with specially designed actuators that closed the bottles during the first 15 minutes of the camera deployment. During this time, the video annotators estimate the maxN, which is used to determine the number of individual fish around the camera. The collected water was immediately filtered on the ship for eDNA.

A necessary component of eDNA research is quantifying the amount of eDNA in the water surrounding the source of the eDNA. How far eDNA travels from the source location before it degrades is unknown. During the cruise, a fish "hotspot" was identified off west Lāna'i. A transect was run through the hot spot with the DCIP/eDNA sampler across depth contours and in water too shallow for 'ōpakapaka to water too deep for 'ōpakapaka. This provided baseline information on relative fish abundance using the cameras and the amount of eDNA in the water at that site. Following this,

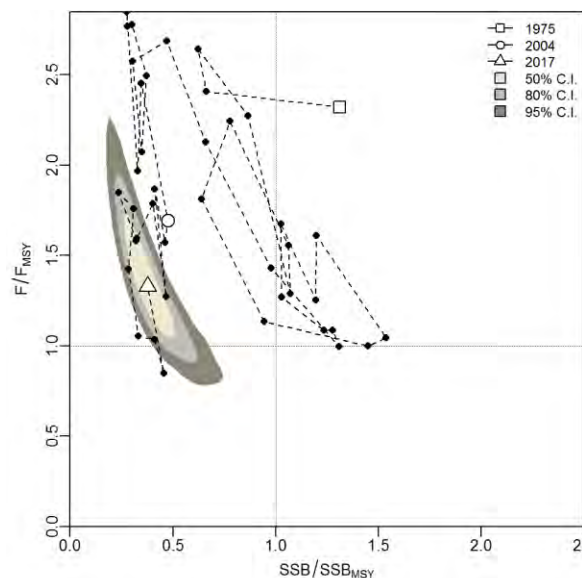


**Filtration for eDNA.** The filtration system simultaneously filters replicate water samples for eDNA taken from three different depths.

replicate water samples were collected at the bottom, 25 m, and 50 m using the *Sette* CTD rosette (which also collected water current, temperature, and salinity data). The combination of the DCIP/eDNA sampler and CTD-collected water samples provides a profile of eDNA in the water surrounding the hotspot. This *in situ* experiment is extremely informative in understanding fish DNA shedding rates, DNA degradation rates, and the transport of eDNA by currents.

### Striped Marlin Stock Assessment

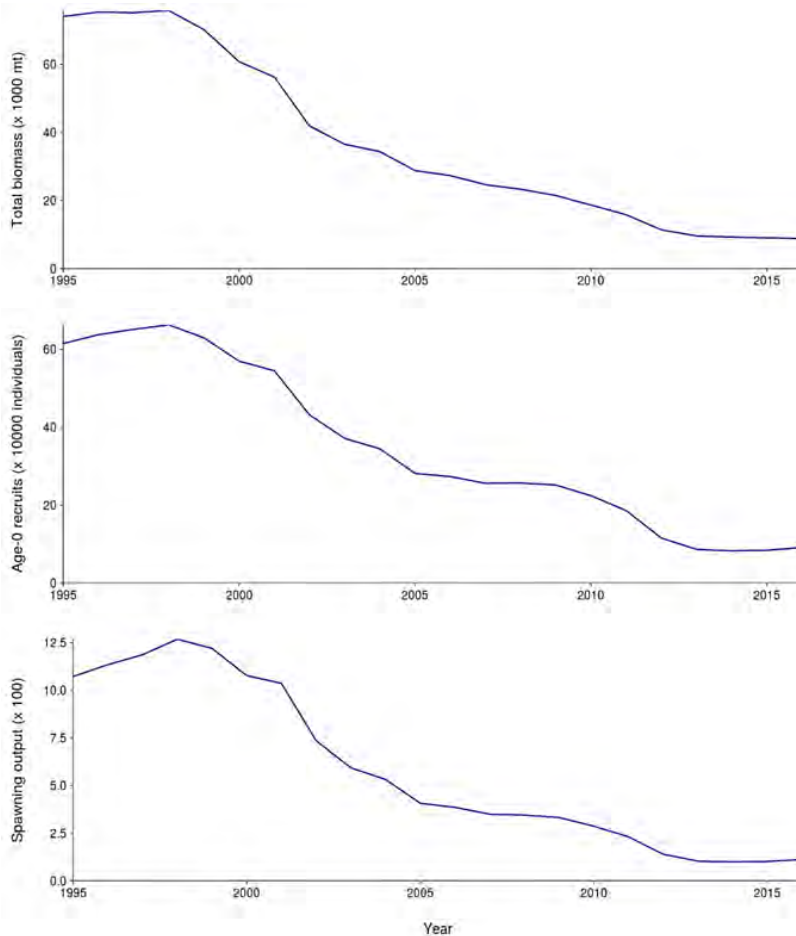
FRMD Stock Assessment Program staff conducted a benchmark stock assessment of the Western and Central North Pacific Ocean (WCNPO) striped marlin. The assessment area consisted of waters of the North Pacific Ocean contained in the Western and Central Pacific Fisheries Commission (WCPFC) management area bounded by the equator and 150°W. All available fishery data from this area were used for the stock assessment, including catches, standardized catch-per-unit-effort (CPUE), and size composition data by fleet. The 2019 assessment was conducted with Stock Synthesis (SS3) and the results indicated that the WCNPO striped marlin stock is currently overfished and is experiencing overfishing relative to MSY-based reference points. This assessment was discussed, reviewed, and approved by the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean (ISC) and by the WCPFC's Scientific Committee. The WCPFC will consider the assessment for adoption at its meeting in December 2019.



**Striped marlin assessment.** Kobe plot of the time series of estimates of relative fishing mortality ( $F/F_{MSY}$ ) and relative spawning stock biomass ( $SSB/SSB_{MSY}$ ) of WCNPO striped marlin.

### Oceanic Whitetip Shark Stock Assessment

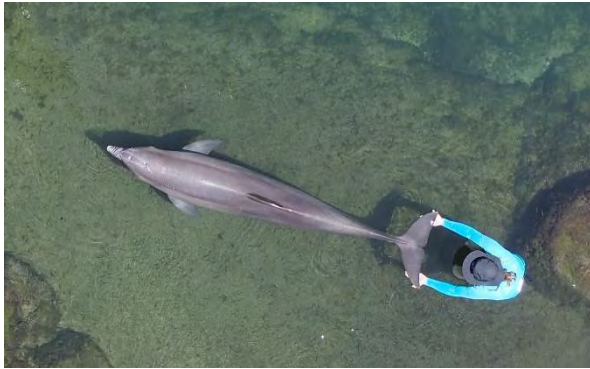
FRMD Stock Assessment Program staff collaborated with the Secretariat of the Pacific Community (SPC) in developing the stock assessment for the Western and Central Pacific Ocean (WCPO) oceanic whitetip shark. Previously, there has only been a single stock assessment for this species worldwide, which was focused on the WCPO region and included the period between 1995 and 2009. The current assessment provides an update of the previous 2012 assessment, including 7 years of additional data and a revised Stock Synthesis model. Also, the current assessment model includes a new methodology to predict historical catches and updates key biological parameters of this species. A new development in this assessment was the inclusion of discard mortality scenarios in the historical catches (provided by PIFSC scientists). This was a key step to account for the potential impacts of the no retention measure for oceanic whitetip sharks across the WCPFC Convention Area, which became active after January 1, 2013. The general conclusions of the assessment were that total biomass, spawning biomass and recruitment declined steadily through the time span of the assessment (below), and that overfishing is occurring and the stock is in an overfished state. This assessment was discussed, reviewed, and approved by the WCPFC’s Scientific Committee. The WCPFC will consider the assessment for adoption at its meeting in December 2019.



**Oceanic whitetip shark assessment.** Time series of total biomass, recruitment, and spawning biomass for WCPO oceanic whitetip shark.

## 2. Conserve Protected Species

### A Collaborative UAS Project with the University of Hawai‘i



**UAS image.** Aerial image of Liho in stationary position taken from the APH-22. Measurements of total length and widths at 5% increments along the body will be used to estimate the total volume of this dolphin.

over six bottlenose dolphins housed at Dolphin Quest to examine accuracy and precision in dolphin length, width, and volume measurements against physical measures for each of the animals.

Part of the project involves a cross-comparison between UAS platforms, so the CRP team is making the same measurements from images collected by the UAS used by PIFSC (Aerial Imaging Solution's APH-22) to compare to those taken by the UAS used by the MMRP (DJI's InspirePro 2). The cross comparison will ensure that comparable data can be collected across more than one UAS platform. This project will provide calibration data for use with free-ranging dolphins, enabling studies of demography and health from aerial imagery collected at sea. Specifically, this study will facilitate evaluation of the age structure of dolphin groups and the body condition of dolphin individuals, measures that are likely more sensitive to human impacts and easier to obtain than standard assessment measures such as population abundance and growth rate.

While emerging unmanned aircraft system (UAS) technology has been successfully applied to measure the body size and condition of large whales, small cetaceans such as dolphins have previously been understudied using UAS given specific challenges related to their size and body position at the water surface. The PIFSC Cetacean Research Program (CRP) is working with Dr. Lars Bejder and PhD student Fabien Vivier of the University of Hawai‘i's Marine Mammal Research Program (MMRP) on a project to assess the health of dolphin groups and individuals in Hawaiian waters using UAS imagery. As part of his PhD dissertation, Fabien will use vertical imagery taken during flights



**Calibration.** Fabien Vivier (University of Hawai‘i) and Dolphin Quest trainers measure the total length of Hoku in order to ground truth measurements made from aerial photos taken with the UAS.



### Ongoing Nearshore Assessment Field Work within the Mariana Islands

The Marine Turtle Biology and Assessment Program (MTBAP), together with local partners, conducted marine turtle surveys and in-water captures of green turtles (*Chelonia mydas*) and hawksbill turtles (*Eretmochelys imbricata*) in the nearshore waters of Guam and CNMI. Captured turtles were weighed, measured, biopsied, and tagged (i.e., flipper, PIT, satellite tracking) in an effort to expand our knowledge of the population demographics, population structure, and fine-scale habitat use of the turtles. Blood samples were also collected for hormone analysis to determine population sex ratios. The aforementioned activities were permitted under National Marine Fisheries Service (NMFS) Endangered Species Act §10(a)(1)(A) take permit #21260, NMFS IACUC SWPI2013-05R, and Guam Department of Agriculture License #SC-MPA-19-001. Local partners in Guam contributed to the hands-on field efforts and continue to be engaged in this collaborative research effort. This mission included 5 days of in-water surveys and turtle captures in Guam. Weather conditions were good for all 5 days, with clear to partly cloudy skies and low wind speed (<12 knots).



**Guam sea turtle partnership.** PIFSC MTBAP researchers and Guam partners from Guam DAWR, University of Guam Sea Grant, Navy, and U.S. FWS after a day of field work at the Sea Plane boat ramp in Apra Harbor, Guam.

Survey effort was initiated within Apra Harbor and progressed south to Dadi and north to Haputo (Double Reef). The team departed from the Sea Plane boat ramp on the northern shore within Apra Harbor, where a local shore team was set up to process turtles. The shore team included a number of local partners, including several biologists from Guam's Department of Agriculture Division of Aquatic and Wildlife Resources (DAWR), researchers from University of Guam Sea

Grant, Navy biologists and more. Surveys began around Western Shoals, before proceeding to Spanish Steps near the mouth of Apra Harbor, then extending to Orote Point to the south of the harbor entrance. Conditions were optimal for in-water operations at Double Reef, along the northwest coast of Guam. This area can often be difficult to survey due to prevailing ocean conditions and hence the limited number of surveys and captures from this area during previous expeditions. During all 5 in-water survey days, the team observed a total of 55 turtles, 14 of which were captured, and 12 of which were outfitted with satellite transmitters (Table 1).

**Table 1. Summary of in-water survey effort, observations, captures, and deployed satellite tags.** Cm = green turtle (*Chelonia mydas*). Ei = hawksbill turtle (*Eretmochelys imbricata*). Unk. = unknown turtle species (either Cm or Ei). No cetaceans (Cet.) were observed during these surveys.

| Date           | Island | Location                | Observations           |    |     |      | Captures           |    | Sat. Tags           |    |
|----------------|--------|-------------------------|------------------------|----|-----|------|--------------------|----|---------------------|----|
|                |        |                         | Cm                     | Ei | Unk | Cet. | Cm                 | Ei | Cm                  | Ei |
| 6/4            | Guam   | Apra Harbor/Orote Point | 15                     | 2  | 0   | 0    | 4                  | 2  | 4                   | 2  |
| 6/5            | Guam   | Apra Harbor/Orote Point | 11                     | 2  | 0   | 0    | 4                  | 1  | 3                   | 0  |
| 6/7            | Guam   | Double Reef             | 4                      | 2  | 2   | 0    | 0                  | 2  | 0                   | 2  |
| 6/8            | Guam   | Double Reef/Haputo      | 6                      | 2  | 0   | 0    | 1                  | 0  | 1                   | 0  |
| 6/9            | Guam   | Double Reef/Haputo      | 6                      | 3  | 0   | 0    | 0                  | 0  | 0                   | 0  |
| <b>Totals</b>  |        |                         | 42                     | 11 | 2   | 0    | 9                  | 5  | 8                   | 4  |
| <b>TURTLES</b> |        |                         | <b>55 observations</b> |    |     |      | <b>14 captures</b> |    | <b>12 sat. tags</b> |    |



**Turtle field work.** Left: Two hawksbills captured and equipped with satellite tags at Double Reef, along the northwest coast of Guam. Right: Dr. Camryn Allen drawing blood from a hawksbill turtle onboard the research vessel.

A Guam Department of Agriculture enforcement boat operated by local conservation officers joined to assist with research activities, primarily by providing transportation of turtles back to the shore team for processing. Local conservation officers also brought the Department of Agriculture Director Chelsa Muña-Brecht, Council member, to experience and partake in research activities.



**Turtle field work.** Left: The shore-based team processing sea turtles near the Sea Plane boat ramp. Right: Council member and Director of Guam’s Department of Agriculture Chelsa Muña-Brecht (far left) receiving an explanation of sea turtle research activities by contractor and sea turtle captain.

## Return of Northwestern Hawaiian Islands Field Camps

On September 3, the PSD Hawaiian Monk Seal Research Program (HMSRP) welcomed back the summer 2019 assessment and recovery camp field biologists from the Northwestern Hawaiian Islands (NWHI). This was the 36<sup>th</sup> season of this long-term dataset, which forms the backbone of our population monitoring capacity and enables direct life-saving interventions for individual seals.



**Happy campers.** Monk seal field campers returning to the ship.



**Nap time.** A monk seal resting near the camp.

In May, these field teams were deployed at Kure Atoll, Midway Atoll, Pearl and Hermes Reef, Lisianski Island, Laysan Island, and French Frigate Shoals. During the ship-based missions, surveys were also conducted in May and Aug/Sept. at Nīhoa and Mokumanamana in the NWHI, and Ni‘ihau in the main Hawaiian Islands. Some shifts in female pupping locations were observed at French Frigate Shoals, but it remains under study what extent these shifts indicate impacts from Hurricane Walaka relative to the inherently dynamic nature of this atoll, broader impacts of sea level rise, and this year’s king tides.

A total of 143 pups were born across the NWHI this season, which is comparable to pupping in the previous 2–3 years. Many weaned pups and juveniles were in good nutritional condition this year. Though data are still preliminary, juvenile survival was variable from site to site. In sum, 44 interventions were conducted to directly enhance seal survival. These actions include translocating weaned pups away from areas of high shark predation or conspecific aggression, reuniting mother-pup pairs, disentangling seals from trash and debris,

and mitigating entrapments. Two malnourished seals from the 2018 field season were returned to Laysan Island in May after several months of rehabilitation at Ke Kai Ola, NOAA's partner in monk seal rehabilitation. Four new patients were admitted for malnutrition to Ke Kai Ola in early September, including two female weaned pups from Pearl and Hermes Reef and two female weaned pups from Lisianski Island.

### Unique Hook Removal Methods for Two Monk Seals

This summer, two adult male monk seals on O'ahu ingested barbed circle hooks that required removal at the NOAA Inouye Regional Center. Both individuals were reported to the statewide stranding hotline by the fishermen who accidentally hooked them. Their immediate reporting gave NOAA and partners (Hawai'i Marine Animal Response and Hawai'i DAR) the ability to respond rapidly and identify the affected seal. The removal procedures were noteworthy because of the unique methods employed to remove the hooks from each seal's stomach, thus avoiding surgery and extended post-operative care.

In the first case (seal ID RW02), the circle hook was removed by the use of a flexible endoscope, which is a small camera at the end of a fiber optic cable. A delicate instrument like an endoscope is typically not strong enough to dislodge hooks from the internal tissues of a seal. But in this case, the hook had not penetrated the stomach wall and therefore was much more easily grabbed and removed by the endoscopic tools through the mouth.

The second seal, R333, was not as fortunate. In his case, the hook was strongly set through the stomach wall. The same endoscope was used to visually assess the stomach and guide the use of some custom-made rigid de-hooking tools to the site. These tools were made to follow the line from the mouth to the stomach and then engage the hook. Once engaged, the tools were manipulated to push the hook out of the stomach tissue. The endoscope assured the veterinary team that bleeding was minimal and there were no substantial tears in the stomach. Then, the hook was protected with flexible PVC hose and removed through the mouth.

While both seals required anesthesia, which is risky in diving marine mammals, they recovered well and were released within 24 hours of the procedure.

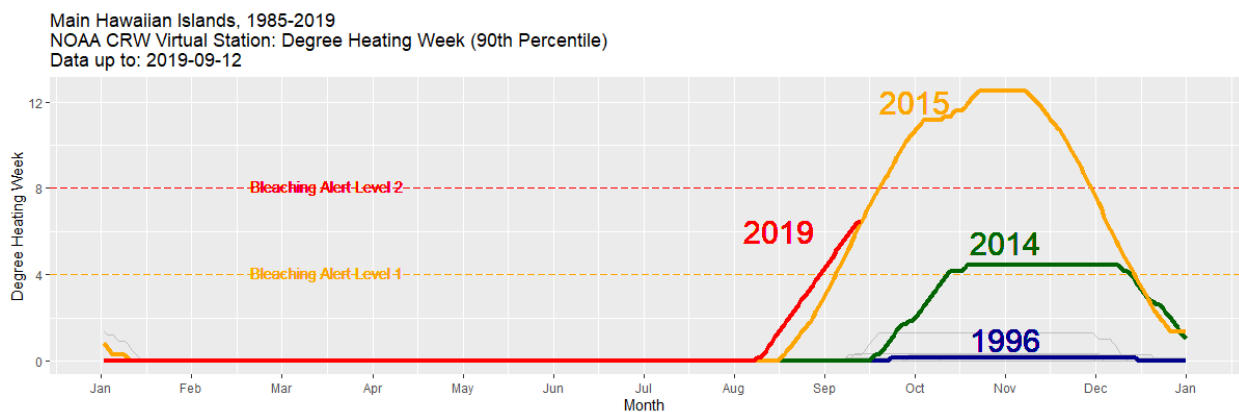
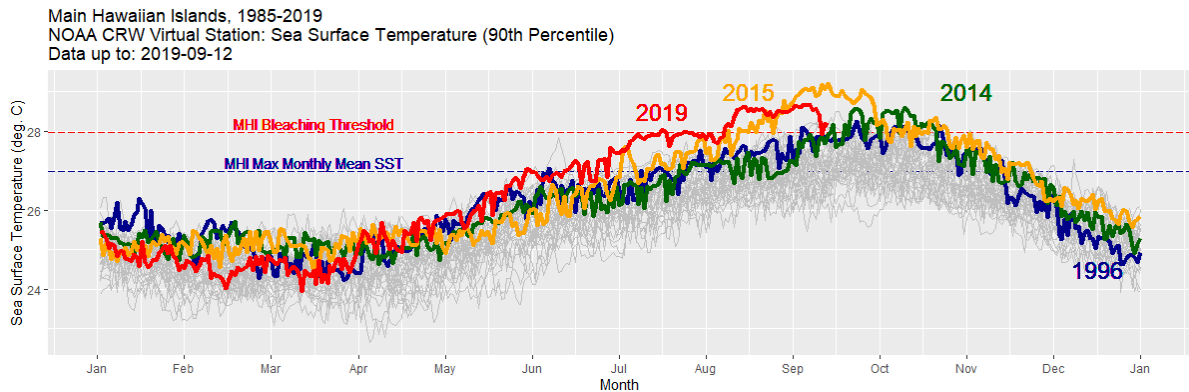


**Return to the wild.** Adult male monk seal R333 is released at Camp Erdman, Mokolē'ia, O'ahu with a satellite tag following a hook removal procedure.

### 3. Research to Support EBFM and Living Marine Resource Management

#### Severe Coral Bleaching Predicted for Hawaiian Reefs in 2019: Leveraging Partnerships and Lessons Learned from the 2015 Bleaching Event

In 2015, the Ecosystem Sciences Division (ESD) participated in a large, state-wide effort to assess the impacts of the most severe coral bleaching event in Hawaii’s history at that time. This thermal event had significant, state-wide impacts, with over 50% of surveyed coral paling or bleaching during the event, and pre- and post-event surveys showed a reduction in coral cover of over 30%. Current predictions generated by NOAA’s Coral Reef Watch (CRW) suggest that between September and November 2019 there is a greater than 90% chance of coral reefs around the MHI suffering an Alert Level 2 event (i.e., mass bleaching with likely mass mortality). In fact, sea surface temperatures in Hawaiian coastal waters exceeded the bleaching threshold two weeks earlier than in 2015. If thermal conditions hold constant, bleaching is predicted to continue or worsen. Scientists, reef managers and local residents have already started reporting bleaching across the state.



**Monitoring data.** Top: Sea surface temperature between 1985 and 2019 with years that bleaching was reported indicated by blue (1996), green (2014), yellow (2015), and red (2019) lines. All other years are indicated by gray lines. The horizontal red line indicates the MHI bleaching threshold (1°C above maximum monthly mean). Bottom: Degree heating weeks (DHW °C weeks) between 1985 and 2019 with years that bleaching was reported indicated by blue (1996), green (2014), yellow (2015), and red (2019) lines. Horizontal lines indicate alert 1 (4 DHW) thermal stress that is likely to result in onset of mass coral bleaching and alert 2 (8 DHW) that is likely to result in onset of mass mortality. Data from NOAA Coral Reef Watch’s 5km v3 Virtual Stations.

In the last week, relevant to the time of this writing (Sep. 5- Sep. 12), we've seen sea surface temperatures cooling back to just above the local CRW bleaching threshold (~28 °C), and thermal stress is accumulating more slowly, though is still increasing.

Following the 2014 event, ESD helped form the Hawai'i Coral Bleaching Collaborative to address the 2015 and future events. This organization is led by Hawaii's Division of Aquatic Resources and includes state, federal, academic and NGO partners. This October, ESD and the Hawaii Coral Bleaching Collaborative are participating in a larger state-wide monitoring effort to conduct both rapid assessments across a large number of sites as well as focused assessments using structure-from-motion (SfM) technology at fixed sites to track recovery and reef trajectory over time. Our specific goals are to document the spatial extent of bleaching using in-water rapid response surveys, and inform management action by identifying which areas and species are more or less resilient to thermal stress.



**SfM Workshop.** Participants in PIFSC ESD's Structure-from-Motion training workshop led by Tom Oliver at Hawaii's Marine Education and Research Center on Hawaii Island on August 26-27<sup>th</sup>, 2019. The workshop included members from Arizona State University, Hawaii Division of Aquatic Resources, University of Hawaii at Hilo, The Nature Conservancy, and the National Park Service.

In preparation for this event, ESD is also leading a series of SfM workshops to (1) train partners on ESD's SfM imagery collection methods and receive feedback on ways to improve image collection; (2) help partners adapt a survey design that will suit their questions and logistical constraints; and (3) discuss the long-term vision for using SfM across the state, especially in context of this bleaching event. The first of these workshops was led by Tom Oliver at Hawaii's Marine Education and Research Center on Hawai'i Island, August 26-27<sup>th</sup>, 2019, and included members from Arizona State University, Hawai'i Division of Aquatic Resources, University of Hawai'i at Hilo, The Nature Conservancy, and the National Park Service. Additional workshops will be held in Honolulu in early October.

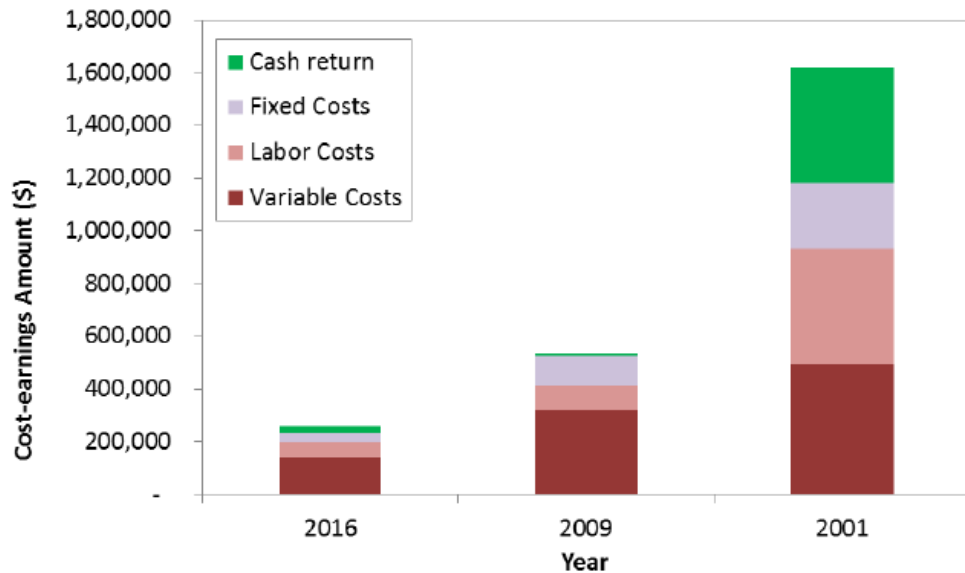
### **Researchers Assess the Economic Performance of the American Samoa Longline Fishery**

PIFSC recently completed an evaluation of economic performance for the American Samoa pelagic longline fishery. PIFSC economists conducted a survey in 2017 to collect cost-earnings data and performed a cost-earnings analysis using both primary and secondary sources of data on fleet operations in 2016. This study follows an approach similar to past assessments (2009 and 2001), and provides timely information and analyses needed to support sustainable fishery resource utilization and fishery management.

The recent study shows, on average, that 2016 fishing operations had positive cash returns to vessel owners—approximately \$26,000 annually per vessel—before subtracting the possible

costs involved with the fishing business. An improvement in the economic performance of the American Samoa fleet in 2016 was evident over 2009 operations, yet was still poor compared to 2001 operations. Although the average return to vessel owner was positive, there was variation among vessels. Of the 10 vessels surveyed, 30% (3 vessels) were not able to realize net earnings (cash returns). The disparity among vessels in net returns was due to variations in revenue across individual vessels, as fishing costs were relatively consistent.

The report notes that the improvement of economic performance in 2016 over 2009 was not necessarily due to the improvement of fishing operations in the American longline fishery, but rather a function of the dynamics of higher fish prices, lower fuel prices, and lower fixed costs. A sensitivity analysis shows that the American Samoa longline fleet continues to operate on a thin profit margin and is particularly vulnerable to changes in CPUE and fish prices.



American Samoa Longline Fishery. Comparison of 2016 cost-earnings performance with previous studies.

The study also illustrated the increasing trend in dual permits (vessels permitted to fish in both Hawaii and American Samoa longline fisheries) since 2009, while the number of active vessels in American Samoa longline continues to decline. Two main factors appear to contribute to this phenomenon: the poor economic performance of the America Samoa longline fishery and the advantage of continued access to the Hawai‘i longline fishery during closures due to the WCPO bigeye tuna catch limit.

This study provides important baseline economic information for these fisheries, and this information is crucial for fishery managers in order to evaluate potential economic impacts from regulatory alternatives in these fisheries.



## 4. Organizational Excellence

### Update from PIFSC Field Office Liaison for CNMI

Science Operations Division (SOD) PIFSC Liaison for the CNMI, Michael Trianni, has drafted a manuscript on the life history and status of *Lethrinus atkinsoni* with co-authors Drs. Ed DeMartini and Brett Taylor. Revisions are in process.

The CNMI Science Liaison has been working with Dr. Kimberly Lowe, Hoku Johnson, and Risa Oram to develop the Marianas Trench Marine National Monument Research Compendium, which summarizes prior research in the Marianas Archipelago.

The PIFSC CNMI Liaison co-mentored a Hollings Scholar, D'amy Steward, this summer who was gathering baseline information on the invasive striped eel catfish (*Plotosus lineatus*) in Saipan Lagoon. The species was first documented in the CNMI in 2005, when a fisherman showed CNMI Division of Fish and Wildlife biologists a specimen he captured in a talaya net. The prior range of the species in Micronesia was to Yap, and the species has not been observed to date on Guam. For more information on the project, please visit the [Striped Eel Catfish story map](#).



**Summer work.** D' Amy Steward, Hollings Scholar, in Saipan Lagoon.

## 5. Publications

### Technical Memorandums

- Langseth B, Syslo J, Yau A, Carvalho F. 2019. Stock assessments of the bottomfish management unit species of Guam, the Commonwealth of the Northern Mariana Islands, and American Samoa, 2019. U.S. Dept. of Commerce, NOAA Technical Memorandum NMFS-PIFSC-86, 177 p. <https://doi.org/10.25923/bz8b-ng72>
- McCracken M. 2019. Evaluation of Potential Fishing Location Bias when an Observer is Aboard a Hawaii Deep-set Longline Trip. U.S. Dept. of Commerce, NOAA Technical Memorandum NMFS-PIFSC-84, 17 p. <https://doi.org/10.25923/e7qn-6x46>
- Pan M. 2019. Cost-earnings Study and Economic Performance Analysis of American Samoa Longline Pelagic Fishery—2016 Operation and Recent Trends. U.S. Dept. of Commerce, NOAA Technical Memorandum NMFS-PIFSC 85, 28 p. <https://doi.org/10.25923/jemx-6804>
- Rankin S, Miller B, Crance J, Sakai T, Keating J. 2019. Sonobuoy Acoustic Data Collection during Cetacean Surveys. U.S. Dept. of Commerce, NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-614, 38 p. <https://doi.org/10.25923/aygg-5b93>

### Data Reports

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