



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Fisheries Science Center
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PROJECT REPORT

VESSEL: NOAA Ship *Oscar Elton Sette* SE-19-06

PROJECT PERIOD: September 11, 2019 to September 29, 2019

AREA OF OPERATION: The area of scientific operations encompassed nearshore waters around the main Hawaiian Islands. Surveys were conducted in water depths of 75 m to 300 m (Figure 1). Daily site selection was largely weather dependent.

The project targeted specific 500 × 500-m Primary Sampling Units (PSU or grids) following a stratified-random sampling approach (Richards et al. 2016) in an effort to best characterize bottomfish abundance across the survey domain (Ault et al. 2018).

TYPE OF OPERATION: The focus of this mission was to support the operational Bottomfish Fishery-Independent Survey in Hawaii (BFISH) using the Modular Optical Underwater Survey System (MOUSS) fishery-independent sampling gear (Amin et al. 2017). BFISH became operational as an annual survey in 2016. The MOUSS builds and improves upon previous efforts with the Baited Stereo-Video Bottom Camera System (BotCam), which has been effectively used to collect fishery-independent, species-specific size-structured abundance data on bottomfish in the main Hawaiian Islands (MHI) (Merritt et al. 2011).

Both MOUSS and DropCam Instrument Packages (DCIPs) were utilized during this mission. The MOUSS units were deployed and recovered from PIFSC 19-ft small boats launched from the NOAA Ship *Oscar Elton Sette*. The DCIP was deployed and recovered using *Oscar Elton Sette* deck equipment and personnel. MOUSS and DCIP sampling were concentrated within distinct operational areas from Ni‘ihau to Hawaii Island. Each unit remained on the seafloor for a minimum of 15 min at each sampling station.

Water samples were collected via a Niskin bottle incorporated into the DCIP and were filtered for subsequent environmental DNA (eDNA) analysis in an effort to assess select bottomfish species abundance and compare with camera estimates.

The PIFSC Life History Program conducted bottomfish sampling surveys in the 50–400-m depth zone around the main Hawaiian Islands, including: collection of deep-slope bottomfish samples (otoliths, gonads, tissue) and documentation of deep-slope bottomfish habitat and fish interactions with fishing gear.

ITINERARY:

- 11 Sept 0730 Departed Ford Island: Embarked full scientific complement. The NOAA Ship *Oscar Elton Sette* transited to fuel pier.
- 1230 Departed Pearl Harbor: Began transited to the Maui Nui survey area. The preferred survey area was chosen based on forecasted weather (~ 40–90 nmi; ~ 4.5–10 h).
- 12-15 Sept Conducted operations in the Maui Nui and North Maui area. 0730 Conducted Safety Briefing. Launched *Rubber Duck* and *Steeltoe* to conduct MOUSS deployments at assigned grid locations in the operational area. Deployed SE-4 to conduct juvenile bottomfish sampling surveys. DCIP were conducted from the NOAA Ship *Oscar Elton Sette* once all boats were away.
- 15 Sept 1900 Launched *Steeltoe* to conduct personnel transfer (PAX) at Hawaii Kai boat harbor. Disembarked Reardon and Bravender. Embarked Asher, Eaton, and Richards.
- 16-17 Sept Conducted operations on the north shore of Kauai (16 Sept) and Niihau (17 Sept). 0730 Conducted Safety Briefing. Launched *Rubber Duck* and *Steeltoe* to conduct MOUSS deployments at assigned grid locations in the operational area. Deploy SE-4 to conduct juvenile bottomfish sampling surveys. DCIP were conducted from the NOAA Ship *Oscar Elton Sette* once all boats were away.
- 18 Sept 0730 Conduct Safety Briefing. No boat operations due to increased weather conditions. DCIP were conducted from the *Sette* in the Penguin Banks area.
- 19-22 Sept Conducted operations in the west Hawaii area (19 Sept), Maui Nui (20 Sept), North Molokai (21 Sept), and Pailolo Channel (22 Sept). 0730 Conducted Safety Briefing. Launched *Rubber Duck* and *Steeltoe* to conduct MOUSS deployments at assigned grid locations in the operational area. Deploy SE-4 to conduct juvenile bottomfish sampling surveys. DCIP were conducted from the NOAA Ship *Oscar Elton Sette* once all boats were away.

- 22 Sept 1900 Launched *Steeltoe* to conduct PAX at the Kaunakakai boat harbor. Embarked Contreras.
- 23 Sept 0730 Conducted Safety Briefing. No boat operations due to increased weather conditions. DCIP were conducted from the *Sette* along the south Molokai coast.
- 1300 began transit to Lahaina Maui. 1500 Launched *Steeltoe* to conduct PAX at the Lahaina boat harbor. Disembarked Eaton, O'Malley, Nichols, and Miller. Embarked Kino.
- 24–28 Sept Conducted operations in the Hilo area (24 Sept), Haumakua coast (25 Sept), Penguin Banks (26 Sept), south Molokai coast (27 Sept), and the north shore of Oahu (28 Sept). 0730 Conducted Safety Briefing. Launched *Rubber Duck* and *Steeltoe* to conduct MOUSS deployments at assigned grid locations in the operational area. Deployed SE-4 to conduct juvenile bottomfish sampling surveys. DCIP were conducted from the *Sette* once all boats were away.
- On 26 Sept, during the final DCIP recovery of the day, the anchor set (concrete blocks) had to be acoustically released to ensure safe recovery of the DCIP and eDNA systems. All systems were recovered and data retrieved successfully.
- 29 Sept 0930 arrived Ford Island F9 Pier. Disembarked all scientific staff. End of Project.

MISSIONS AND RESULTS:

- A. Deploy MOUSS from *Oscar Elton Sette*-based PIFSC 19-ft SAFE Boats to collect stereoscopic video data to support fishery-independent estimates of species-specific, size-structured abundance for the main Hawaiian Islands Deep-7 bottomfish stock.
1. MOUSS was successfully deployed 270 times at 134 primary sampling units (PSU) (Tables 1–3).
- B. Deploy four (4) to eight (8) surface-tethered/untethered DropCam Instrument Packages (DCIPs) from the NOAA Ship *Oscar Elton Sette* for data collection and to test additional camera sensors and equipment. DCIP operations shall not interfere with Objective 1. (DCIPs have been previously deployed off the stern using the ship's crane and recovered using the port J-frame.)
1. DCIP was successfully deployed 104 times at 52 primary sampling units (PSU) (Tables 1–3).
- C. Supplementary (Piggyback) objective: Water samples may be collected via a Niskin bottle incorporated into the DCIP to be filtered for subsequent environmental DNA (eDNA) analysis in an effort to assess select bottomfish species abundance and

compare with camera estimates. These operations are supplementary in nature and not to interfere with Primary Objectives 1 and 2.

1. Niskin bottles were attached to all DCIP deployments. Water was collected and filtered for eDNA on 102 out of 104 deployments.

D. Supplementary (Piggyback) objective: The PIFSC Life History Program will be conducting bottomfish sampling surveys in the 50–400 m depth zone around the main Hawaiian Islands, including: collection of deep-slope bottomfish samples (otoliths, gonads, tissue) and documentation of deep-slope bottomfish habitat and fish interactions with fishing gear.

1. LHP identified a new nursery ground for juvenile opakapaka off south Maui. Previous sampling has not provided any juveniles in this area. The addition of these fish will assist with determining if an island specific elemental fingerprint can be associated with these juvenile opakapaka.

SCIENTIFIC PERSONNEL:

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Asher, Jacob	Coxswain / Gear Specialist	9/15/2019	9/29/2019	M	JIMAR/ESD	USA
Barlow, James	Coxswain/ Gear Specialist	9/11/2019	9/29/2019	M	NOAA/SOD	USA
Bravender, John	Weather Specialist	9/11/2019	9/15/2019	M	NOAA/NWS	USA
Demarke, Christopher	Gear Specialist	9/11/2019	9/29/2019	M	JIMAR/SOD	USA
Contreras, Emily	Life History eDNA Specialist	9/22/2019	9/29/2019	F	JIMAR/FRM D	USA
Eaton, Leigh Anne	Weather Specialist	9/15/2019	9/23/2019	F	NOAA/NWS	USA
Gonzalez, Alexa	Gear Specialist	9/11/2019	9/29/2019	F	JIMAR/SOD	USA
Kino, Genki	Weather Specialist	9/23/2019	9/29/2019	M	NOAA/NWS	USA
McVay, LT David	Coxswain/ Gear Specialist	9/11/2019	9/29/2019	M	NOAA/SOD	USA
Miller, Dianna	Gear Specialist	9/11/2019	9/23/2019	F	JIMAR/SOD	USA
Nichols, Ryan	Bottom Fisher	9/11/2019	9/23/2019	M	NOAA/FRM D	USA
O'Malley, Joseph	Life History - Fisher/eDNA specialist	9/15/2019	9/23/2019	M	NOAA/FRM D	USA
Reardon, Russell	DCIP Specialist	9/11/2019	9/15/2019	M	JIMAR/SOD	USA
Richards, Benjamin	Science Advisor	9/15/2019	9/29/2019	M	NOAA/FRM D	USA

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Rock, LT JG Laura	Gear Specialist	9/11/2019	9/29/2019	F	NOAA/SOD	USA
Schem, Jessica	Gear Specialist	9/11/2019	9/29/2019	F	JIMAR/SOD	USA
Taylor, Jeremy	Tech Manager/ Gear Specialist	9/11/2019	9/29/2019	M	JIMAR/SOD	USA
Yoshinaga, Chad	Chief Scientist	9/11/2019	9/29/2019	M	NOAA/SOD	USA

Submitted by: YOSHINAGA.CHAD.HIS Digitally signed by YOSHINAGA.CHAD.HISAO.
AO. Date: 2020.02.12 10:07:12 -10'00'

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2. Ault JS, Smith SG, Richards BL, Yau AJ, Langseth BJ, O'Malley JM, Boggs CH, Seki MP, DiNardo GT. 2018. Towards fishery-independent biomass estimation for Hawaiian Islands deepwater snappers. *Fisheries Research*. 208:321–328. doi:[10.1016/j.fishres.2018.08.012](https://doi.org/10.1016/j.fishres.2018.08.012).
3. Merritt DW, Donovan MK, Kelley C, Waterhouse L, Parke M, Wong K, Drazen JC. 2011. BotCam: A baited camera system for non-extractive monitoring of bottomfish species. *Fishery Bulletin*. 109:56–67.
4. Richards BL, Smith, Steven G., Ault JS, DiNardo GT, Kobayashi DR, Domokos R, Anderson J, Taylor JC, Misa W, Giuseffi L, et al. 2016. Design and implementation of a bottomfish fishery-independent survey in the main Hawaiian Islands. Honolulu, HI Report No.: NMFS-PIFSC-53. <https://doi.org/10.7289/V5/TM-PIFSC-67>.

Tables

Table 1. A table showing the number of MOUSS/DCIP deployments by vessel by day during SE-19-06.

Date	Vessel			Grand Total
	Oscar Sette	Rubber Duck	Steel Toe	
09/12/2019	4	10	8	22
09/13/2019	6	14	12	32
09/14/2019	6	12	12	30
09/15/2019	4	8	4	16
09/16/2019	6	10	8	24
09/17/2019	4	8	6	18
09/18/2019	8			8
09/19/2019	12	14	12	38
09/20/2019	8	10	6	24
09/21/2019	6	8	8	22
09/22/2019	8	12	10	30
09/23/2019	8			8
09/24/2019	6	10	10	26
09/25/2019	6	10	8	24
09/26/2019	8	6	6	20
09/27/2019		6	6	12
09/28/2019	4	8	8	20
Grand Total	104	146	124	374

Table 2. A table showing the number of primary sampling units (PSU) by vessel by day during SE-19-06.

PSU Count	Vessel			Grand Total	
	Date	Oscar Sette	Rubber Duck		Steel Toe
	9/12/2019	2	5	4	11
	9/13/2019	3	7	6	16
	9/14/2019	3	6	6	15
	9/15/2019	2	4	1	7
	9/16/2019	3	5	4	12
	9/17/2019	2	4	3	9
	9/18/2019	4			4
	9/19/2019	6	7	6	19
	9/20/2019	4	5	3	12
	9/21/2019	3	4	4	11
	9/22/2019	4	6	5	15
	9/23/2019	4			4
	9/24/2019	3	5	5	13
	9/25/2019	3	5	4	12
	9/26/2019	2	3	3	8
	9/27/2019		3	3	6
	9/28/2019	2	4	4	10
Grand Total		50	73	61	184
<i>Mode</i>		3	5	4	12
<i>Max</i>		6	7	6	19

Table 3. A table showing strata-specific primary sampling units completed during SE-19-06 with respect the the design allocation. Depth stratification is based on depth recorder by the temperature-depth recorder (TRD) attached to MOUSS.

Strata	MOUSS Sampling				
	PSU Allocation		PSU Completed		Remaining
	#	%	#	%	
HB_H_D	0	0%	0	0%	0
HB_H_M	29	16%	26	14%	3
HB_H_S	97	55%	109	59%	-12
HB_L_D	0	0%	0	0%	0
HB_L_M	20	11%	19	10%	1
HB_L_S	17	10%	18	10%	-1
SB_A_D	0	0%	0	0%	0
SB_A_M	4	2%	3	2%	1
SB_A_S	9	5%	9	5%	0
Grand Total	176		184		5

FIGURES

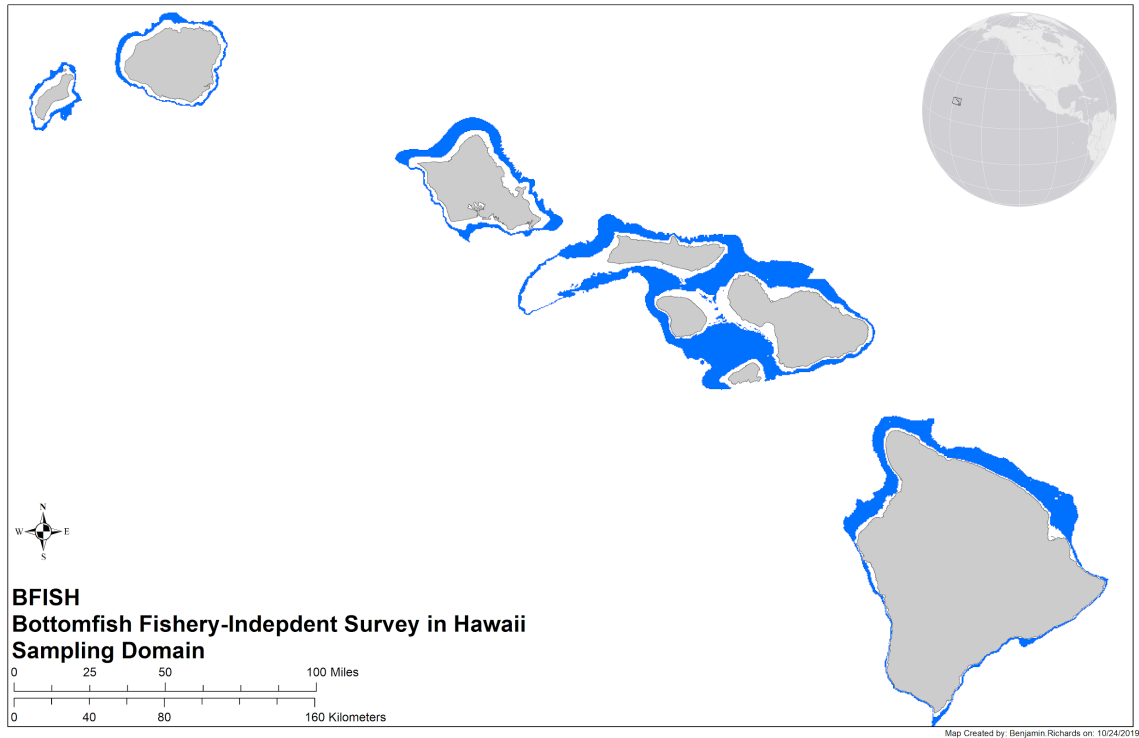


Figure 1. A map showing the 75–400 m sampling domain for the Bottomfish Fishery-Independent Survey in Hawaii (BFISH).

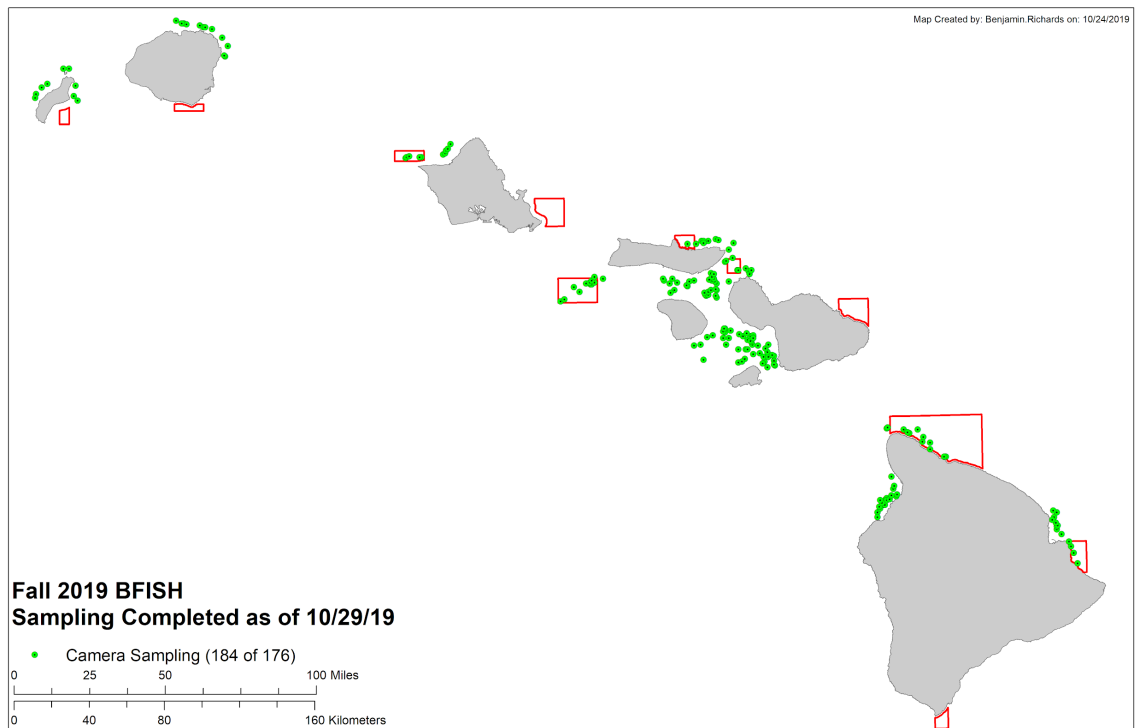


Figure 2. A map showing the spatial distribution of the 184 MOUSS/DCIP primary sampling units (PSU) sampled during SE-19-06 within the 75–300 m depth range around the main Hawaiian Islands.