



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Fisheries Science Center
1845 Wasp Blvd. Bldg. 176 • Honolulu, Hawaii 96818
(808) 725-5300

PROJECT REPORT¹

VESSEL: NOAA Ship *Oscar Elton Sette*, SE-17-02

PROJECT PERIOD: 8-22 March 2017

AREA OF OPERATION: Main Hawaiian Islands

TYPE OF OPERATION: Insular Bottomfish Survey (BFISH_2017_S)

ITINERARY:

8 MAR **Departed Pearl Harbor:** Embarked scientific complement (Amin, Nichols, O'Malley, Ossolinski, Reardon, Richards, Taylor) at Ford Island at 0800. Departed Pier F9 (0930) and began the usual routine of settling aboard the ship in between drills, briefs, planning meetings, and breaking out equipment while transiting to the southern tip of the Big Island of Hawaii (BRFA M).

9-10 MAR **Hawaii Island Scientific Operations:** Conducted tethered-DCIP operations in BRFA M off the south point of the Big Island of Hawaii. Life History Team conducted hook-and-line sampling for juvenile bottomfish in areas surrounding BRFA M. Upon completion of operations, transited to BRFA K off the North Kohala / Hamakua Coast of the Big Island.

11-12 MAR **Hawaii Island Scientific Operations:** Conducted tethered-DCIP operations in BRFA K off the North Kohala / Hamakua Coast of the Big Island of Hawaii. Life History Team conducted hook-and-line sampling for juvenile bottomfish in areas surrounding BRFA K. Upon completion of operations, transited to BRFA H in Pailolo Channel, between the islands of Maui and Molokai.

¹ PIFSC Cruise Report CR-17-001.
Issued X May 2017.

- 13-14 MAR **Pailolo Channel Operations:** Conducted a half day of tethered-DCIP operations in BRFA H in Pailolo Channel prior to switching to un-tethered DCIP operations for the remainder of the period due to increased humpback whale activity in the vicinity. Life History Team conducted hook-and-line sampling for juvenile bottomfish in areas surrounding BRFA H. Upon completion of operations, transited to BRFA G, east of the Kalaupapa Peninsula on the north shore of Molokai.
- 15-16 MAR **Molokai Operations:** Conducted tethered-DCIP operations in BRFA G, east of the Kalaupapa Peninsula on the north shore of Molokai. Life History Team conducted hook-and-line sampling for juvenile bottomfish in areas surrounding BRFA G. Disembarked Nichols to Hawaii Kai Small Boat Harbor via small boat @ 2330 on 15 March. Continued survey operations in BRFA G 16 March. Upon completion of operations, transited to the island of Kauai. This marked completion of the primary SE-17-02 survey sites.
- 17 MAR **Kauai Operations:** Conducted tethered-DCIP operations along the Na Pali Coast of Kauai. Life History Team conducted hook-and-line sampling for juvenile bottomfish. Upon completion of operations, transited to the island of Niihau.
- 18-19 MAR **Niihau Operations:** Conducted tethered-DCIP operations along the northwest (18th) and northeast (19th) coasts of Niihau. Life History Team conducted hook-and-line sampling for juvenile bottomfish. Upon completion of operations, transited to the island of Kauai.
- 20-21 MAR **Kauai Operations:** Disembarked Richards (and ET Roessler) to Kapaa Small Boat Harbor (20 Mar @ 0800) via small boat. Conducted tethered-DCIP operations along the east-northeast (20 Mar) and Na Pali Coast (21 Mar) of Kauai. Life History Team conducted hook-and-line sampling for juvenile bottomfish. Upon completion of operations, transited to Pearl Harbor.
- 22 MAR **Pearl Harbor: End of Project.** *Oscar Elton Sette* on station at Papa Hotel (0800) and subsequently alongside Pier F9 shortly after 0900. Complete offload and demobilization continued for the remainder of the work day.

MISSIONS AND RESULTS:

The original objectives of the Project were to:

- A. Deploy MOUSS from *Oscar Elton Sette*-based PIFSC 19' 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 focusing in the State of Hawaii Bottomfish Restricted Fishing Areas (BRFAs).
- B. Deploy surface-tethered/untethered MOUSS/DCIPs from *Oscar Elton Sette* 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 focusing in the State of Hawaii Bottomfish Restricted Fishing Areas (BRFAs), not to interfere with Objective A. Anticipated tempo 6–8 deployments per day.

- C. The PIFSC Life History Program will conduct 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); collection of Carangidae samples; and documentation of deep-slope bottomfish habitat and fish interactions with fishing gear. These operations will be conducted using *SE-4*, are supplementary in nature and not to interfere with Objective A or B.

Results related to each of these objectives are presented below.

In regards to small boat MOUSS operations (Objective A):

1. Due to a ship-sailing 7-day delay and the resulting scheduling conflict with other projects, the two PIFSC 19' SAFE Boats slated for this mission were not available for the entirety of SE-17-02. Hence, Objective A did not occur.

In regards to ship DCIP operations (Objective B):

1. NOAA Ship *Oscar Elton Sette* exceeded expectations, successfully completing 57 DCIP Primary Sampling Units (PSU) and 113 secondary sampling units (SSU) at an average of 8 SSU per day. A maximum of 12 SSU were sampled on 3/21/17 (Figure 1, Tables 1, 2, 3).
2. As Objective A was no longer possible, the operational tempo of NOAA Ship *Oscar Elton Sette* ship-based operations was increased.
3. The original plan to conduct camera-based survey operations in each of the 11 State of Hawaii Bottomfish Restricted Fishing Areas (BRFAs) was replaced with a plan to conduct sampling operation in the four (4) BRFAs (that were not be sampled during the October 2016 survey mission (BFISH_2016_F, SE-17-01).
4. Following completion of sampling operations in the four aforementioned BRFAs, additional DCIP sampling was conducted around the islands of Kauai and Niihau, which are difficult to access from Oahu and which have had minimal camera-based sampling.
5. Both surface-tethered and un-tethered DCIP operations were conducted successfully. Modification to the DCIP surface tether since SE-16-01, included:
 - a. Increasing the diameter of the tether line from $\frac{3}{8}$ " to $\frac{1}{2}$ " resulted in minimal slippage within the pinch-puller mounted to the port-side J-frame on NOAA Ship *Oscar Elton Sette*.
 - b. Removing the surface sinking line and replacing the BlueSteel™ surface tether with yellow polypropylene line resulted in increased surface visibility, which aided ship positioning during recovery.
 - c. Incorporation of variable tether length by means of quick-link line shots reduced the amount of tether line on the ocean surface, aiding in ship positing and recovery.

6. The surface-tethered DCIP was used as the primary deployment configuration. Sampling operations within Pailolo Channel between Maui and Molokai (BRFA H) were conducted with numerous whales in the vicinity. To minimize the risk of entanglement, the DCIP was deployed in the un-tethered configuration in this area. As a result, 39 concrete anchor blocks were left on the seafloor. Additionally, 3 anchor blocks were left on the seafloor when the DCIP anchor line parted on 13 March. The failed anchor line was recovered successfully, and no line was left on the seafloor. Additionally, untethered DCIPs were deployed and 6 anchor blocks were left on the seafloor on 18 March when the J-Frame was taken offline for emergency repair and maintenance. In total, 48 anchor blocks were left on the seafloor, while 291 (86%) were recovered successfully.
7. A large great-white shark (*Carcharodon carcharias*) was observed in a DCIP video at a depth of approximately 195m off the north coast of Molokai (Figure 2).
8. Large, conical mounds of an unknown dark substance – possibly volcanic rock, rotoliths, or other material – were observed in DCIP video off the north coast of Molokai (Figure 2).

In regards to PIFSC Life History Program operations (Objective C, above):

1. SE-17-02 represented an opportunity for the PIFS Life History Program (LHP) to target specific species and sizes for biological sample collections (Table 4).
2. SE-4 worked in the general location of DCIP operations; however, special care was taken not to fish near the DCIP PSU so as not to bias the video data.
3. Depending on the type of available habitats (depth, bathymetry, bottom type), LHP scientists:
 - fished for juvenile *Pristipomoides filamentosus* and *P. seiboldii* in flat, featureless locations in 20-80 fathoms. It is believed that this is the preferred habitat based on research from the described Kaneohe Bay nursery area. LHP scientists caught several juvenile *P. filamentosus* and *P. seiboldii* in muddy bottom off the Hamakua Coast and sandy areas on the east side of Kalaupapa.
 - fished for juvenile *Etelis carbunculus* and *E. coruscans* in similar habitats as adults but focused more on rubble and small rocky areas. LHP scientists caught juvenile *Etelis carbunculus* in these habitats near Pinnacle 88.
 - fished steep slope areas for juvenile bottomfish. LHP scientists suspected that perhaps juveniles might be in this type of habitat due to the protection it may offer. LHP scientists captured several juvenile *P. zonatus* on a very steep wall on Kauai. The wall was very ‘sticky’ (lost fishing weights). Hence, LHP scientists believe that juvenile *P. zonatus* may inhabit holes for protection from predators.
4. LHP scientists fished for juvenile *P. filamentosus* and *P. seiboldii* with sabiki rigs (#16 and #18 hooks) baited with squid. Juvenile *E. carbunculus*, *E. coruscans* and *P. zonatus* were fished using modified kaka rigs originally made by Eddie Ebisui. LHP scientists used #10 size hook on the bottom swivel, #12 on the next higher swivel, and #18-22 hooks on the top two swivels (when fished). The length of the mainline between the bottom two swivels was shortened. A combination of squid and aku belly was used as bait. The intent was to get the hooks as close to the bottom as possible in case that is where the juveniles were.

5. LHP scientists spent significant effort exploring and fishing in areas not typically targeted for adults. Although adults were not targeted, several were captured. Fish that were not needed for life history studies were released if they appeared healthy and could be returned to the bottom quickly. A large *P. zonatus* (46.9 cm) as well as *Aphareus rutilans* and *Hyporthodus quernus* were sampled as the LHP does not have many biological samples from these species.
6. The LHP identified new nursery areas for *P. filamentosus*, confirmed that juvenile *E. carbunculus* likely settle near adults. Significant progress was made in identifying juvenile *P. zonatus* habitat. The LHP also acquired significant samples (otoliths, gonads, etc.) for upcoming life history studies.

**SCIENTIFIC
PERSONNEL:**

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation*	Nationality
Amin, Ruhul	Data Manager	3/8/17	3/22/17	M	NOAA/SOD	USA
Nichols, Ryan	LHP Fisherman	3/8/17	3/15/17	M	NOAA/FRMD	USA
O'Malley, Joseph	LHP Fisherman	3/8/17	3/22/17	M	NOAA/FRMD	USA
Ossolinski, Justin	Operations Lead / Gear Specialist	3/8/17	3/22/17	M	JIMAR/SOD	USA
Reardon, Russell	Project Leader	3/8/17	3/22/17	M	JIMAR/SOD	USA
Richards, Benjamin	Science Advisor	3/8/17	3/20/17	M	NOAA/FRMD	USA
Taylor, Jeremy	Gear Specialist	3/8/17	3/22/17	M	JIMAR/SOD	USA

* Joint Institute for Marine and Atmospheric Research (JIMAR)
National Oceanic and Atmospheric Administration (NOAA)
Pacific Islands Fisheries Science Center:
Fisheries Research and Monitoring Division (FRMD)
Science Operations Division (SOD)

Submitted by: Russell Reardon Digitally signed by Russell Reardon
Date: 2020.01.02 07:04:22 -10'00'

Russell Reardon, Project Leader
Science Operations Division
Pacific Islands Fisheries Science Center

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RICHARDS.BENJAMIN.LEWIS.
Date: 2019.12.31 10:49:11 -10'00'

Benjamin Richards, Ph.D., Science Advisor
Fisheries Research and Monitoring Division
Pacific Islands Fisheries Science Center

Approved by: SEKI.MICHAEL.PAUL YUKIO. Digitally signed by SEKI.MICHAEL.PAUL
YUKIO.
Date: 2020.01.06 09:59:18 -10'00'

Michael P. Seki, Ph.D.
Science Director
Pacific Islands Fisheries Science Center

Tables

Table 1. A list of the Primary Sampling Units (PSU) sampled using the Pacific Islands Fisheries Science Center (PIFSC) Drop Camera Instrument Package (DCIP). DCIP was deployed 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 focusing in the State of Hawaii Bottomfish Restricted Fishing Areas (BRFAs). BRFAs are listed by their designation letter (A-M).

Island	Cell_ID	BRFA	lat_deg	lon_deg	Strata
Big Island	18	M	18.857763	-155.6855399	HB_L_S
Big Island	47	M	18.8756389	-155.6757068	HB_L_S
Big Island	49	M	18.8754691	-155.6662287	HB_H_S
Big Island	64	M	18.8848308	-155.6850073	HB_H_S
Big Island	81	M	18.888747	-155.6517427	HB_H_M
Big Island	104	M	18.8976837	-155.6468235	HB_H_M
Big Island	118	M	18.9021091	-155.6419939	HB_H_S
Big Island	182	M	18.9198092	-155.622673	HB_H_S
Big Island	7731	K	20.121611	-155.4686097	SB_M
Big Island	8038	K	20.1401272	-155.4920792	SB_M
Big Island	8304	K	20.1605999	-155.6158522	SB_S
Big Island	8873	K	20.2068902	-155.6769901	SB_M
Big Island	9720	K	20.2906607	-155.8139076	HB_L_S
Big Island	9721	K	20.2905736	-155.8091263	HB_L_S
Big Island	9723	K	20.2903989	-155.7995639	HB_L_M
Big Island	9783	K	20.2948224	-155.7946898	HB_L_M
Big Island	9954	K	20.3089663	-155.8278838	HB_L_M
Maui Nui	27694	H	21.0539818	-156.6923148	HB_L_M
Maui Nui	27699	H	21.0536533	-156.6682711	HB_H_S
Maui Nui	28260	H	21.0628132	-156.6777484	HB_H_M
Maui Nui	28261	H	21.0627474	-156.6729394	HB_L_M
Maui Nui	28266	H	21.062416	-156.6488946	HB_H_M
Maui Nui	28526	H	21.067393	-156.6824875	HB_H_M
Maui Nui	29510	H	21.0851189	-156.6581588	HB_H_M
Maui Nui	29889	H	21.0944774	-156.6820674	HB_L_M
Maui Nui	31830	G	21.1874726	-156.8876366	HB_H_M
Maui Nui	31832	G	21.1873519	-156.8780092	HB_H_S
Maui Nui	31967	G	21.1918665	-156.8779447	HB_H_S
Maui Nui	32255	G	21.2011965	-156.9018866	HB_H_M
Maui Nui	32398	G	21.2061854	-156.9403384	HB_H_S
Maui Nui	32884	G	21.2199638	-156.9594103	HB_H_M
Niihau	41125	NA	21.8568197	-160.0616915	HB_H_S
Niihau	41611	NA	21.8841341	-160.0280172	HB_H_S
Niihau	42085	NA	21.9187609	-160.2460897	HB_H_S
Niihau	42102	NA	21.9200828	-160.0573192	SB_S
Niihau	42294	NA	21.9369716	-160.2268841	SB_S

Island	Cell_ID	BRFA	lat_deg	lon_deg	Strata
Niihau	42937	NA	21.9871436	-160.159516	HB_H_S
Niihau	43164	NA	22.0099284	-160.1306396	SB_M
Niihau	43320	NA	22.0239941	-160.0532446	HB_H_M
Niihau	43472	NA	22.041966	-160.067912	HB_L_S
Niihau	43502	NA	22.046225	-160.1067033	HB_H_S
Kauai	43599	NA	22.0587469	-159.2878788	HB_H_M
Kauai	43666	NA	22.0722985	-159.2879062	HB_H_S
Kauai	43795	NA	22.0949094	-159.2734106	HB_H_S
Kauai	43822	NA	22.0994266	-159.2734193	HB_H_S
Kauai	44110	NA	22.1473492	-159.8068841	HB_H_S
Kauai	44329	NA	22.1746371	-159.7682429	HB_L_S
Kauai	44451	NA	22.1881875	-159.7683165	HB_H_S
Kauai	44494	NA	22.192727	-159.763491	HB_H_M
Kauai	44532	NA	22.1942616	-159.2881542	HB_H_S
Kauai	44542	NA	22.1973336	-159.7441142	HB_H_S
Kauai	44555	NA	22.1976095	-159.6810596	HB_H_S
Kauai	45085	NA	22.2430115	-159.6230541	HB_H_S
Kauai	45299	NA	22.2569518	-159.5115059	SB_S
Kauai	45425	NA	22.2704718	-159.5212612	HB_H_M
Kauai	45438	NA	22.2747209	-159.5989285	HB_H_S
Kauai	45499	NA	22.2839265	-159.5504324	HB_H_M

Table 2. A count of the sampled Primary Sampling Units (PSU) by habitat strata including the relative and target weighting for each strata.

Strata	Total	%
HB_H_M: hardbottom, High Slope, Medium Depth	28	25%
HB_H_S: Hardbottom, High Slope, Shallow Depth	46	41%
HB_L_M: Hardbottom, Low Slope, Medium Depth	12	11%
HB_L_S: Hardbottom, Low Slope, Shallow Depth	10	9%
SB_M: Softbottom, Medium Depth	8	7%
SB_S: Softbottom, Shallow Depth	8	7%
Grand Total	113	

Table 3. A count of the sampled Primary Sampling Units (PSU) by habitat strata within each Bottomfish Restricted Fishing Area (BRFA).

Strata	Total
G	12
HB_H_M: hardbottom, High Slope, Medium Depth	6
HB_H_S: Hardbottom, High Slope, Shallow Depth	6
H	16
HB_H_M: hardbottom, High Slope, Medium Depth	8
HB_H_S: Hardbottom, High Slope, Shallow Depth	2
HB_L_M: Hardbottom, Low Slope, Medium Depth	6
K	16
HB_L_M: Hardbottom, Low Slope, Medium Depth	6
HB_L_S: Hardbottom, Low Slope, Shallow Depth	2
SB_M: Softbottom, Medium Depth	6
SB_S: Softbottom, Shallow Depth	2
M	16
HB_H_M: hardbottom, High Slope, Medium Depth	4
HB_H_S: Hardbottom, High Slope, Shallow Depth	8
HB_L_S: Hardbottom, Low Slope, Shallow Depth	4
NA	52
HB_H_M: hardbottom, High Slope, Medium Depth	10
HB_H_S: Hardbottom, High Slope, Shallow Depth	30
HB_L_S: Hardbottom, Low Slope, Shallow Depth	4
SB_M: Softbottom, Medium Depth	2
SB_S: Softbottom, Shallow Depth	6
Grand Total	113

Table 4. A count of fish species caught by the PIFSC Life History Program during hook and line fishing operations for juvenile bottomfish.

Species	Total
<i>Etelis carbunculus</i>	28
<i>Pristipomoides filamentosus</i>	14
<i>Pristipomoides zonatus</i>	5
<i>Hyporthodus quernus</i>	4
<i>Pristipomoides sieboldii</i>	4
<i>Aphareus rutilans</i>	1
<i>Iniistius pavo</i>	1
Grand Total	57

Figures

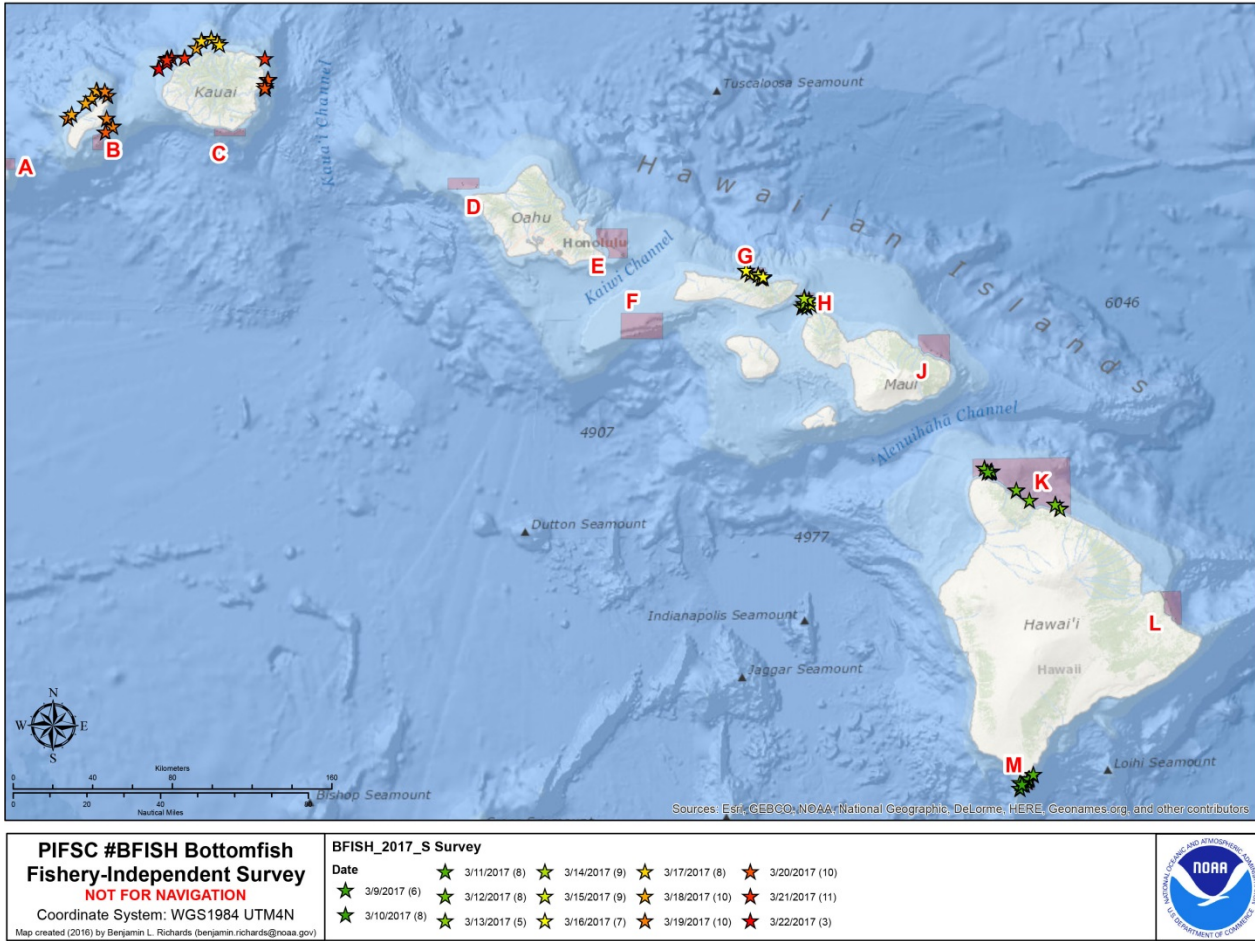


Figure 1. A map showing the daily deployment location of Pacific Islands Fisheries Science Center (PIFSC) Drop Camera Instrument Package (DCIP). DCIP were deployed to collect stereoscopic video data to support fishery-independent estimates of species-specific, size-structured abundance for the main Hawaiian Islands Deep-7 bottomfish stock focusing in the State of Hawaii Bottomfish Restricted Fishing Areas (BRFAs). BRFAs are listed by their designation letter (A–M).



Figure 2. Example images from the Pacific Islands Fisheries Science Center (PIFSC) Drop Camera Instrument Package (DCIP) showing (clockwise from upper left) *Hyporthodus quernus*, *Etelis coruscans*, *Carcharodon carcharias*, and the large conical mounds of unknown origin sighted off the north shore of Molokai.