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CRUISE REPORT

VESSEL: *Townsend Cromwell*, cruise 90-10 (TC-158)

CRUISE PERIOD: 28 November-13 December 1990

AREA OF OPERATION: Oahu, Molokai, and Maui-Lanai in the main Hawaiian Islands (MHI)

TYPE OF OPERATION: Personnel from the Southwest Fisheries Science Center (SWFSC) Honolulu Laboratory (HL) of the National Marine Fisheries Service (NMFS), NOAA, conducted a combination of bottom trawling and oceanographic operations (CTD casts, bottom grabs), on flat (unconsolidated and pavement) bottoms at one or more of three (200-, 250-, and 300-ft) bottom depths, off windward and leeward regions of the islands of Oahu, Molokai, Maui, and Lanai in the MHI. Routine sampling comprised nighttime trawling, daytime bottom grabs, and day-night CTD casts. Sampling operations proceeded clockwise around Oahu from Snug Harbor, Honolulu, sampling off Waianae-Pokai Bay, Haleiwa, Laie, and Kaneohe Bay. Routine operations next continued off NW Molokai, NE Penguin Bank, SE Penguin Bank (W-SW of Molokai), and off south Molokai, complemented in some regions by baited video camera drops. Operations continued off Kahului, Kaanapali (NW Maui), and Hekili Point-Maalea Bay (W Maui), complemented by video camera drops and hook-and-line stations in lieu of bottom trawls off Hekili Point. Operations next continued west across Auau Channel to off SE Lanai. Sampling off Lanai concluded with stations occupied off south Lanai. A partial day-night series of bottom trawls was next conducted off SW Molokai, followed by a day spent searching for trawlable ground between Maunaloa Bay and Kahe Point, off SE to SW Oahu. Routine sampling was then continued off Lahilahi

Point, SW Oahu. Operations concluded with a partial series of day-night trawls off Haleiwa, after which the *Townsend Cromwell* returned to Snug Harbor.

ITINERARY:

28 November	Departed Snug Harbor, Honolulu, at 1030 and proceeded to Waianae-Pokai Bay. On board David W. Cramer, Edward E. DeMartini, Robert B. Moffitt, Paul M. Shiota, and Gregory Spencer. Seabed off Waianae-Pokai Bay ground-truthed without success through the night of 28 November, despite unusually excellent weather and sea conditions.
29 November	Transited to Haleiwa, where ground-truthed seabed, conducted oceanographic operations, and tested trawl gear during the day, followed by continuing routine oceanography and the start of quantitative bottom trawling that night.
30 November	Transited to off Kaneohe Bay, where began ground-truthing and routine, daytime oceanographic operations. Routine bottom trawling conducted that night.
01 December	Transited back to off Laie, NW Oahu, where conducted ground-truthing, etc., until dusk. Conducted routine bottom trawling that night; trawl series was partial only due to loss of complete set of trawl gear when tow cable snapped near shipside. Transited back to off Kaneohe, where completed seabed ground-truthing started 30 November, while preparing second set of trawl gear.
02 December	Returned to Laie to resume oceanographic observations while preparing the second set of trawl gear. Completed first test trawl at

dusk, followed by completion of quantitative bottom trawls that night. Transited to off Kaneohe Bay again later that night, where unsuccessfully attempted to finish a complete set of quantitative nighttime trawls.

- 03 December Transited to NW Molokai, where conducted routine daytime oceanographic and ground-truthing. Completed quantitative trawl series that night under continuing excellent weather.
- 04 December Transited to NE Penguin Bank, west of Molokai. Conducted routine daytime oceanographic and ground-truthing, followed by quantitative, nighttime trawl series.
- 05 December Transited to SE Penguin Bank, off SW Molokai, where conducted routine daytime operations, followed by usual nighttime trawl series.
- 06 December Transited east to off south Molokai. Conducted daytime ground-truthing, etc., followed by nighttime trawl series.
- 07 December Continued transiting east to off Kahului, NW Maui. Ground-truthed, etc, off Kahului by day, followed by routine nighttime trawl series.
- 08 December Transited W-SW to off Kaanapali coast of Maui. Conducted bottom grabs and baited video camera drops; ground-truthing mostly unsuccessful, coincident with deteriorating weather and sea conditions. Transited south of Lahaina to off Hekili Point, where ground-truthed seabed that night.
- 09 December Completed ground-truthing off Hekili Point without success. Conducted daytime hook-and-line fishing for juvenile opakapaka, plus baited video camera drops, in lieu of bottom trawls that night. With bad sea conditions persisting,

transited Auau Channel that evening to off SE Lanai, where conducted abbreviated ground-truthing, followed by a quantitative, but incomplete, series of bottom trawls. Transited to off south Lanai, where conducted cursory, but partly successful, ground-truthing.

- 10 December Conducted an incomplete, but quantitative, series of nighttime trawls off south Lanai. Hove to until daylight off leeward Lanai. Transited across Kalohi Channel to off south Molokai, thence west to previously occupied SE Penguin Bank, in the lee off SW Molokai. There, made the first (unsuccessful) attempt to conduct a day-night series of bottom trawls over the complete range of sampling depths. The nighttime series was successful (after shipside repair of trawl doors), but the preceding daytime series was incomplete because of warping of trawl doors in heavy seas.
- 11 December Transited back across Kaiwi Channel to Maunaloa Bay, off SE Oahu. Ground-truthed unsuccessfully off Maunaloa Bay until dawn. Made furtive run around Koko Head to verify unsampleable sea conditions around windward SE corner of Oahu. Transited west along south Oahu, unsuccessfully searching for trawlable ground between Pearl Harbor and the southern leeward shore off Barber's Point-Kahe Point. Found limited good ground off Lahilahi Point, where conducted a partial, but quantitative, trawl series that night.
- 12 December Transited upcoast past Kaena Point to off Haleiwa. Conducted ground-truthing between Kaena Point and Haleiwa with only partial success. Made second (unsuccessful) attempt at day-night series of bottom trawls, this time off Haleiwa: (1) The daytime series of trawls

incomplete again because of metal fatigue of trawl doors. (2) The night series aborted when net was badly torn on reef outcropping during second tow. Began transiting back toward Honolulu.

13 December Continued transiting toward Honolulu, stopping to drift fish off Kahe Point later that night, before final departure to port. Arrived Snug Harbor, Honolulu, at 0700; end of cruise. Disembarked Cramer, DeMartini, Moffitt, Shiota, and Spencer.

MISSIONS
AND
RESULTS:

- A. Characterize the depth distributional patterns of juvenile opakapaka, *Pristipomoides filamentosus* (pink snapper) in the MHI, and compare these depth patterns between windward and leeward areas among several of the MHI.
1. Juvenile opakapaka distribution and abundance were characterized using standard-distance (1.25 nmi) tow catches (CPUE) of a 40-ft shrimp trawl. All tows were single warp; tow speeds averaged 2.5-3.5 kn; a tickler chain and 0.25-inch cod end liner were used throughout. A total of 80 bottom trawls were conducted during the day or at night at 11 sites spanning windward and leeward areas of Oahu, Molokai, and Maui-Lanai; 72 (90%) of these 80 trawls quantitatively fished the bottom. One or two nighttime trawls were made at 1 to 3 of 3 bottom depths (200, 250, and 300 ft) at each of the 11 sites as part of routine nighttime sampling (58 tows). A total of only 125 opakapaka were caught: 108 (86%) of these occurred in 5/5 quantitative tows made off Kaneohe Bay, windward Oahu. Overall, juvenile opakapaka (primarily young-of-the-year fish of 9-14 cm fork length (FL), secondarily yearling fish of 17-23 cm FL) occurred in 12 (17%) of the 72 quantitative trawls.

2. Over 80 taxa of benthic and epibenthic fishes occurred in the trawls. Pending completion of identification of voucher specimens, these data will provide the basis for a publishable account of the fish fauna at 200- to 300-ft depths off the MHI.
 3. A total of seven baited video camera drops and two hook-and-line stations were occupied either in lieu of, or in addition to, routine nighttime bottom trawls, as another means of characterizing the presence of juvenile opakapaka. Camera drops were made at certain sites. One camera drop plus two fishing stations replaced trawls off Hekili Point, Maui, where predominantly live coral bottom precluded trawling.
- B. Compare catch patterns to bottom substrate type and water temperature-depth relations.
1. A total of 68 sediment samples were collected using a Van Veen bottom grab, operated off the ship's foredeck A-frame trap-hauler; samples were collected near trawl lines at 8 of the 11 sites. CTD casts were made using a portable unit (Applied Microsystems Ltd.), also operated off the foredeck A-frame. A total of 112 quantitative CTD casts were conducted at 6 sites off windward and leeward Oahu and Molokai, prior to malfunction of the unit. Sediment samples and CTD profiles are unanalyzed at present, but observations suggest the following qualitative patterns: (1) Juvenile opakapaka occur in areas whose bottom sediments range from soft silt and coarse sand to dead coral pavement, but trawl catch data likely will not allow discrimination of abundance differences among sediment types. (2) Thermocline depths shift appreciably during spring-neap tides at multiple sites off windward and leeward Oahu and Molokai, suggesting that prior, analogous observations off Kaneohe Bay on the February 1990 cruise (TC-90-02) may be generalizable.

- C. Collect otoliths of juvenile opakapaka for potential, continued age-growth studies.
 - 1. All 125 specimens of opakapaka collected were measured (FL, 0.1 cm), immediately frozen aboard ship, then transferred frozen to freezers at the HL for potential future studies.

- D. Compare diel patterns of catch-at-depth off Kaneohe Bay.
 - 1. Adverse sea conditions off windward Oahu prevented the scheduled day-night series off Kaneohe Bay. Of the grand total of 72 quantitative bottom trawls that were conducted, 6 daytime and 8 nighttime tows were completed at two other, sheltered sites--off SW Molokai (at the SE Penguin Bank site) and off Haleiwa--in attempts at day-night comparison series. Trawl series were incomplete at each of these two sites because of damage or loss of trawl gear. Only three tows (two at 200 ft and one at 250 ft) were completed during the day at SE Penguin Bank, before the trawl doors warped because of pounding in heavy seas. Doors were repaired, and day tows were followed by a full set of six nighttime tows. Prior to further damage to the doors, three tows (two at 300 ft and one at 250 ft) were completed during the day off Haleiwa. Another two nighttime tows (both at 200 ft) were made there before the net was irreparably torn on a coral outcrop.

- E. Miscellaneous observations and activities.
 - 1. Occurrence of Birds, Aquatic Mammals, and Fish Schools Log was maintained by ship's officers and crew during the cruise.
 - 2. Standard weather observations were made at 0000, 0600, 1200, and 1800 (G.m.t.) by the ship's officers and crew.
 - 3. XBT casts were made once daily, at approximately 1400 local time, on 29 November-12 December.

4. The RD Instruments ADCP, subsequent to initialization problems on 28 November, was used to monitor water column current structure while in bottom tracking mode, during most of the cruise.
5. Samples of bottom sediment and associated sessile and motile epifauna and infaunal invertebrates were saved from all trawls and frozen aboard ship. Samples were then transferred to the care of Beatrice Burch of the Bishop Museum at cruise's end.
6. *Scyllarus modestus*, a miniature species of slipper lobster, was discovered in coralline algae-encrusted coral cobble in trawls made at Penguin Bank and off Haleiwa. Specimens included berried females, some of which were returned alive for larval rearing at the Kewalo facility.

SCIENTIFIC
PERSONNEL:

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Attachments