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#### TARACTES RUBESCENS AND TARACTICHTHYS STEINDACHNERI FROM HAWAIIAN WATERS

The various species of the family Bramidae are mostly high-seas fishes with the possible exception of *Eumegistus*. Although capture records of adult *Taractes rubescens* (Jordan and Evermann, 1887) and *Taractichthys steindachneri* (Döderlein, 1883) are few, Mead (1972) surmises that they are probably widespread in the tropical oceanic Pacific. Most of the documented accounts of the occurrence of these two species in the Pacific Ocean are of juvenile stages taken from stomachs of large predators. In the Pacific, *Taractes rubescens* has been recorded from a few widely separated localities between lat. 05°48'N and 02°26'S and long. 88°46' and 155°W. All except one of the documented captures are of juveniles smaller than 120 mm. The only adult specimen was taken by a Japanese longliner at lat. 05°48'N, long. 126°00'W. *Taractichthys steindachneri* is also known mostly from juveniles. They have been captured

at widely separated localities between lat. 40°48'N and 04°46'S and long. 165°35'W and 98°28'E. Although adult specimens of this species are also taken incidentally by Japanese longliners, documented capture localities are available in the Pacific for only four specimens. This note records the capture of the adults of 10 *Taractes rubescens* and 2 *Taractichthys steindachneri* from Hawaii and also provides some observations on the ecology of the two species.

Within the area around the Hawaiian Islands bounded by lat. 10°-30°N and long. 150°-170°W, *Taractes rubescens* was previously known from one juvenile measuring 27.5 mm in standard length (SL) and *Taractichthys steindachneri* was known from three juveniles measuring 17.0, 42.5, and 130.0 mm SL (Mead, 1972). The latter species was also known from an adult specimen (*Taractes longipinnis* = *Taractichthys steindachneri*) "about 2 feet long" (Gosline and Brock, 1960). However, *T. steindachneri* is probably more common than indicated: Mead (1972) cites a personal communication from W. A. Gosline (December 1963) in which it is indicated that fishermen in Hawaii are familiar with this species. The 12 bramids reported here were captured on longline gear at nine fishing stations during cruise 101 of the NOAA vessel *Charles H. Gilbert* between 17 May and 6 June 1967 (Table 1). The fishing stations were from 14 to 30 km off the coast of Waianae, Oahu, over depths of 1,800-3,000 m. The surface water temperature ranged from 25.5° to 27.4°C and the salinity from 34.5‰ to 34.9‰ at the fishing stations. Other fishes caught together with the bramids, in order of abundance, were *Alepisaurus* sp., *Prionace glauca*, *Thunnus obesus*, *Tetrapturus audax*, *Xiphias gladius*, *Alopias* sp., *Gempylus serpens*, *Katsuwonus pelamis*, *Acanthocybium solandri*, *Thunnus albacares*, *Tetrapturus angustirostris*, and *Isurus* sp.

Three of the *Taractes rubescens* and both of the *Taractichthys steindachneri* were frozen after capture. Approximately 5 yr later, body measurements and counts on two *Taractes rubescens* and two *Taractichthys steindachneri* were made in the laboratory after the specimens thawed out (Table 2). The five preserved specimens are presently in the Southwest Fisheries Center, Honolulu Laboratory's fish collection.

TABLE 1.—Capture locality of *Taractes rubescens* and *Taractichthys steindachneri*.

Date 1967	Position		<i>Taractes rubescens</i>			<i>Taractichthys steindachneri</i>		
	Lat. N	Long. W	Number	Length	Sex <sup>1</sup>	Number	Length	Sex <sup>1</sup>
				<i>mm</i>			<i>mm</i>	
18 May	21°26'	158°22'	1	729	M	—	—	—
19 May	21°34'	158°34'	1	749	M	—	—	—
20 May	21°19'	158°22'	2	781	M	1	611	F
				635	F	—	—	—
21 May	21°23'	158°24'	2	522	F	—	—	—
				662	F	—	—	—
				713	M	—	—	—
22 May	21°16'	158°15'	1	730	M	—	—	—
26 May	21°17'	158°17'	1	730	M	—	—	—
28 May	21°16'	158°16'	1	2—	2—	—	—	—
3 June	21°21'	158°18'	—	—	—	1	644	F
6 June	21°20'	158°26'	1	760	M	—	—	—

<sup>1</sup> M = male, F = female.

<sup>2</sup> Not determined.

The primary purpose of cruise 101 of the *Charles H. Gilbert* was to determine if longline catch rates for *X. gladius* around Hawaii could be improved by fishing at night. Also included in the fishing experiment was a comparison of Pacific saury, *Cololabis saira*, and squid, *Loligo opalescens*, as bait, and a comparison of the effect of 9.1-, 18.3-, and 36.6-m float lines on the catch rates. Although the number of specimens taken was small, it was interesting to examine the fishing results as they pertain to the bramids.

During cruise 101 longline fishing operations were conducted in two general areas: one off the coast of Hilo, Hawaii, and the other, as noted earlier, off the coast of Waianae, Oahu. The 3 days of fishing off Hilo did not produce any bramids. Off Waianae, bramids were taken on 9 of the 19 days fished in that area. Although the data are too few to make definitive conclusions, it is of interest that slight environmental differences existed in the two areas, which may in part account for the fact that no bramids were taken off Hilo. The surface water temperature was slightly cooler off Hilo, ranging from 24.7° to 25°C as compared with 25.5° to 27.4°C off Waianae. The salinity of the water at the surface ranged from 34.4‰ to 34.6‰ off Hilo and 34.4‰ to 34.9‰ off Waianae.

As far as I know, *Taractichthys steindachneri* and *Taractes rubescens* are not commonly caught by the Hawaiian longline fishermen. This may be because longlines are usually set

and retrieved during daylight hours. The fact that they were taken on cruise 101 of the *Charles H. Gilbert* when the longlines were fished at night suggests that they may be nocturnal feeders. The results of the experimental use of the float lines of different lengths suggest that they may also be subsurface feeders: More were taken when the longline gear fished deeper, i.e., had longer float lines. Considering only the stations off the Waianae coast, 2,340

TABLE 2.—Measurements and counts on two specimens of *Taractes rubescens* and two specimens of *Taractichthys steindachneri*.

Measurements and counts	<i>Taractes rubescens</i>		<i>Taractichthys steindachneri</i>	
Standard length (mm)	660	663	538	568
Measurements (in percent of standard length)				
Head length	31.8	32.3	29.2	30.8
Depth of body at origin of dorsal fin	40.0	40.3	45.7	48.9
Least depth of caudal peduncle	7.7	7.5	6.5	7.2
Horizontal diameter of eye	6.4	6.6	6.3	6.5
Snout to origin of dorsal fin	38.6	39.5	36.0	41.9
Snout to origin of anal fin	62.7	60.5	51.1	51.6
Snout to origin of pectoral fin	32.6	31.7	29.4	31.7
Length of pectoral fin	42.7	43.4	42.4	42.1
Length of ventral fin	—	15.2	7.4	8.4
Length of longest dorsal ray	34.1	32.1	38.8	—
Length of longest anal ray	28.8	27.3	30.5	37.8
Counts:				
Dorsal fin	30	30	35	35
Anal fin	20	20	29	28
Pectoral fin	21	20	20	20
Gill rakers	2+8	2+8	4+7	2+8
Scales in horizontal series	<sup>2</sup> 45	<sup>2</sup> 47	37	37

<sup>1</sup> Damaged.

<sup>2</sup> Excluding the enlarged keel scales.

hooks were fished on longline baskets with 9.1-m float lines, 2,160 hooks on baskets with 18.3-m float lines, and 2,340 hooks on baskets with 36.6-m float lines. No specimens were taken on longline gear with 9.1-m float lines. One *Taractichthys steindachneri* and seven *Taractes rubescens* were taken on longline gear with 18.3-m float lines. One *Taractichthys steindachneri* and three *Taractes rubescens* were taken on longline gear with 36.6-m float lines.

Saury and squid were used as bait on alternate baskets on each fishing station. More bramids were taken on hooks baited with saury than with squid. Nine *Taractes rubescens* were caught on hooks baited with saury, and two on hooks baited with squid. Both of the *Taractichthys steindachneri* were caught on hooks baited with saury. These results would indicate that fish constitute an important part of the diet of these bramids. However, only one of five stomachs (4 *Taractes rubescens* and 1 *Taractichthys steindachneri*) had fish remains. Squid and shrimp remains were more frequent in the stomachs.

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## UPWELLING INDICES AND ANNUAL CATCHES OF DUNGENESS CRAB, *CANCER MAGISTER*, ALONG THE WEST COAST OF THE UNITED STATES<sup>1</sup>

The Pacific Coast Dungeness crab, *Cancer magister*, fishery shows yearly fluctuations in the catch. For example, since the 1948-49 season, the Oregon catch averaged 8.3 million pounds, with a range of 3.1 to 15.0 million pounds. Variations between seasons are characteristic of the fishery, however, long persistence of below average catches causes alarm in the industry. The years 1962-64 were such a period of low catches. The Pacific Marine Fisheries Commission (1964) noted that these fluctuations in abundance occurred uniformly along the entire west coast of the United States. Therefore, they concluded that some coast-wide environmental changes were responsible for the fluctuating crab catches.

Cleaver (1949) felt that the fishery had a strong dependence upon the survival of the young and that the abundance of the adult animals will fluctuate widely with conditions affecting the earlier stages. The Pacific Marine Fisheries Commission (1964) suggested that perhaps seasonal changes in water circulation patterns could sweep the pelagic crab larvae into unfavorable settling habitats, causing high larval mortality, thus accounting for fluctuations in abundance of the marketable adult crabs. Reed (1969) looked into the effects of temperature and salinity on survival of crab larvae. He concluded that these factors were unable to cause large fluctuations in larval survival.

Upwelling is a coastwide environmental phenomenon that varies from year to year. It has not been mentioned in any reports discussing the Dungeness crab fishery and its fluctuations. Yearly strength of upwelling is known to fluctuate (Hubbard and Percy, 1971). It is hypothesized that annual upwelling fluctuations are related to annual variations in fishery strength, since the west coast's resident commercial species (bottom fishes, shrimp, Dungeness crab, and mollusks) must depend in large part upon the increased food production during summer upwelling for their growth and sur-