

by Paul M. Shiota

Valid name *Selar crumenophthalmus* (Bloch 1793) (Fig. 57)
Synonymy *Scomber crumenophthalmus* Bloch 1793
Caranx crumenophthalmus Lacepède 1802
Caranx mauritanus Quoy and Gaimard 1824
Caranx macrophthalmus Rüppell 1828
Trachurops crumenophthalmus Gill 1863
Selar mauritanus Wakiya 1924
Selar macrophthalmus Wakiya 1924
Trachurops mauritanus Jordan and Hubbs 1925
 (from Jordan and Evermann 1905; Williams 1958)

Common and vernacular names Bigeye scad; paaa (5.1-7.6 cm); hahalalu (7.6-22.8 cm); akule (>22.8 cm)

Distribution

Distributed throughout the entire Hawaiian Archipelago. Found from Necker Island to Midway in the NWHI.

In the main islands, bigeye scad inhabit coastal waters of all islands from shoreline to depths of about 100 m (Kawamoto 1973; Kazama¹¹) and form schools numbering from a few to tens of thousands of individuals.

Distinguishing characteristics

D. VIII+I, 25-27 (usually 26); A. II+I, 20-22 (usually 22); P1. I, 19-20; P2. I, 5; LLs. 81-95 of which 28-37 are modified into scutes; Gr. 10-11+27-28 (Schultz et al. 1953). Body oblong, moderately slender, typically mackerel-like. Eye diameter contained three times or less in head length; adipose eyelids well developed and extend to pupil, leaving the eye as a narrow slit; portion of pectoral girdle that forms posterior margin of gill opening has a deep furrow; teeth in both jaws uniserial; vomer and palatines toothed; lower jaw projecting; maxillary of moderate width, ending under anterior margin of pupil; first dorsal fin high, spines connected by membranes; two anal spines well developed; pectoral fin reaching origin of soft anal fin, soft dorsal and anal fins slightly elevated anteriorly, fin bases equal in length; anterior portion of lateral line with a long low arch, becoming straight below middle of soft dorsal fin; scutes only on straight portion of lateral line.

In life, bluish to greenish silver on the upper third of the body and silvery white on the lower two-thirds. Attains a maximum size of about 38.0 cm (Gosline and Brock 1960); the majority range from 21.0 to 26.5 cm FL (Kawamoto 1973).

Life history

The species is relatively fast-growing. Bigeye scad is 10.2-17.5 cm when it first appears in shallow coastal waters in large schools and grows to 22.9 and 30.5 cm by the end of the first and second year,

respectively. Results from tagging experiments indicate that akule is not migratory and tends to remain in very localized areas (Kawamoto 1973).

Bigeye scad is heterosexual without obvious external sexual dimorphism, has a sex ratio of 50:50 in mature adults, and is believed to be promiscuous (Kawamoto 1973). Spawning is pelagic and eggs are spherical, with a single oil globule, nonadhesive, and free-floating (Kawamoto 1973; Johnson 1978). Females reach sexual maturity and begin spawning at about 23.5-25.0 cm when they are 10-12 months old, and males mature at about 22.0-23.0 cm when they are about 8-9 months old (Kawamoto 1973).

Samples collected during NMFS cruises indicate that the reproductive cycle is seasonal in the NWHI, similar to that of bigeye scad in the main islands. Specimens collected at Kure Atoll and Midway in June were mature; whereas fish from Laysan Island, Maro Reef, French Frigate Shoals, and Necker Island were mature in July. Sampling at Nihoa and French Frigate Shoals in November produced a predominance of juveniles. This is in agreement with results of studies in the main islands where gonads were predominantly mature or spent in April-November (Kawamoto 1973), and fish under 15.0 cm appeared in shallow coastal waters in large schools in July-December (Gosline and Brock 1960). The evidence suggests that spawning occurs in the spring and summer (February-August).

The NMFS surveys have demonstrated that before spawning, mature fish move into shallow water, similar to spawning adults which form large schools in shallow, sandy, or flat-bottomed areas <22 m in the main islands (Gosline and Brock 1960). For example, at Midway, sampling in the lagoon in June in waters <3.6 m produced large numbers of bigeye scad with mature gonads. Similarly, schools of large bigeye scad with mature gonads occurred in July in shallow water on the leeward side of Laysan Island.

Although in the main islands juveniles are caught by recreational fishermen with pole and line during daylight, bigeye scad are primarily night feeders. The bulk of their diet is composed of small fishes such as anchovies and holocentrids, and crustaceans such as copepods, crab megalops, stomatopods, and shrimps (Kawamoto 1973). This indicates that the species feeds primarily in the water column.

¹¹Kazama, T. K. 1977. The "akule" fishery of Hawaii. Southwest Fish. Cent. Honolulu Lab., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Admin. Rep. 1H, 1977, 5 p.

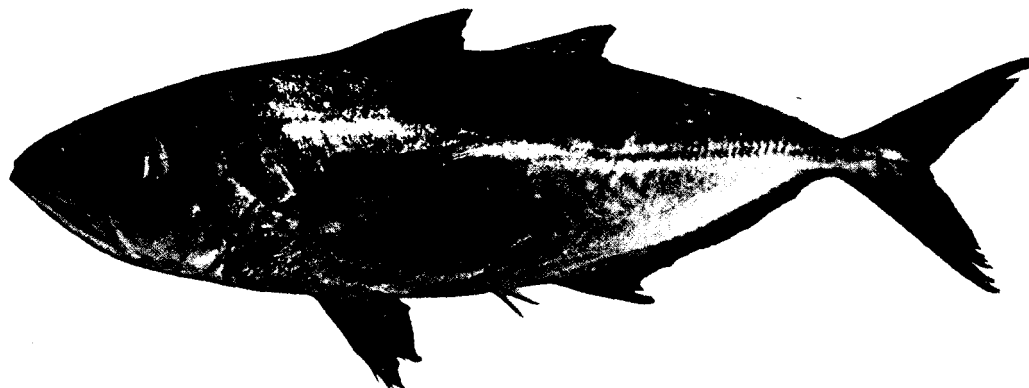


Figure 57.—*Selar crumenophthalmus*.

Gear and catch

In Hawaii, handlines, surround nets, and gill nets are the principal gear used to harvest bigeye scad. Handlining depends on the positive phototactic response of the akule (Powell 1968). Fishing is conducted at night from small boats in coastal waters to a depth of 100 m. The fish that accumulate under the light are jigged with a handline rigged with three to five baited hooks or artificial lures. Fishing is best during the new moon.

Landings of bigeye scad in Hawaii have fluctuated widely. From 1961 through 1979, the annual catch ranged from 68,342 to 444,556 kg and averaged 276,404 kg.

Presently, harvesting of bigeye scad occurs only in the main islands, although NMFS surveys have demonstrated the presence of large concentrations of this species at Necker Island, French Frigate Shoals, and Maro Reef. For the immediate future, it is unlikely that this species will be commercially harvested in the NWHI since there are adequate stocks in the main islands in close proximity to Honolulu where the largest demand for fresh fish exists.