

What are the maximum size and live body coloration of opah (Teleostei: Lampridae: *Lampris* species)?

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Abstract Validity of the largest size accounts is not well documented and most published accounts of body coloration describe dead specimens lacking scales instead of the color of freshly caught opah. Maximum length is at least 163 cm fork length and maximum weight about 89 kg. The body color of fresh specimens is vermilion with white spots.

Keywords Opah · *Lampris* · Maximum size · Life color

Introduction

Opahs (genus *Lampris*) are unique and readily identifiable epi-mesopelagic fishes found in all oceans. The genus has one unspotted species (*Lampris immaculatus* Gilchrist 1904) and may have several spotted, cryptic species (J.R. Hyde, personal communication, Nov. 2011). The spotted species were identified as *Lampris guttatus* (Brünnich 1788), *Lampris regius* (Bonnaterre 1788), or *Lampris luna* (Gmelin 1789) in previous publications, but *L. guttatus* is the accepted name (Palmer and Oelschläger 1976). Spotted opahs are highly prized as food fish, and although considered rare by many authors, they are commonly harvested in the Hawai'i-based pelagic longline fishery.

Problems with the maximum size estimates for spotted opah species began with David Starr Jordan. He gave unverified, excessively large sizes and weights for opah in several publications; these were given as maximum sizes in many publications by other authors, probably because Jordan was considered to be one of the most authoritative ichthyologists in the late nineteenth and early twentieth centuries. Jordan and Evermann (1905a) stated that *L. luna* reaches a length of 3–6 feet and a weight of 50–400 pounds. In 1905, Jordan stated, for *L. guttatus*, that “This species reaches a length of six feet and a weight of 500 to 600 pounds. Fig. 199 (vol. 1) is taken from a photograph of an example weighing 317½ pounds near Honolulu by Mr. E.L. Berndt.” Jordan and Evermann (1905b) referred to the same photograph as a specimen taken off Honolulu by E.L. Berndt and weighing 176 lb. Gudger (1931) postulated this was based on the same fish with a more believable weight. Jordan (1920), in discussing a fossil opah that he had described, wrote that opah reach a weight of 400 lbs. He also included a photograph of a cast that may also be of the 1905 fish, judging from the arrangement of white spots on the undersides of the pectoral fins in both, but reported to weigh 100 lbs this time. Jordan and Jordan (1922) reported an individual once taken at Honolulu that was 6 feet long and weighed 271 lbs.

Substantiated lengths [cm fork length (FL) or standard length (SL)] and weights (kg) are much smaller, as indicated by this sample of moderate to large specimens from the literature: 78 cm SL, 28 kg (Rosenblatt and Johnson 1976); 96.3 cm FL, 71 kg (Bane 1965); 113 cm FL, 49 kg (McKenzie and Tibbo 1963); 119 cm FL, 64 kg (Klawe 1966); and 122 cm SL, 57 kg (Gudger 1930). The all-tackle gamefish record is a fish weighing 73.9 kg (163 lbs) caught in Port Luis Obispo (=Port San Luis), California, in 1998 (IGFA 2011). Hart (1973) stated that the largest

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confirmed record was 137 cm (4.5 ft) long and weighed 73 kg (160 lbs) without giving a specific reference. Many authors (e.g., Thompson 1924; Norman and Fraser 1937, 1949; Leim and Scott 1966; Grosvenor 1965, 1969; Hart 1973; Oelschläger 1981; Olney 1999; Klein-MacPhee 2002; Collette 2003, 2010), apparently based on Jordan, made statements like “there are reports of opah reaching a length of six feet and a weight of 500–600 lbs (228–273 kg).”

Results

No opah over 89 kg has been recorded from the Hawaiian longline fishery (Pepperell 2010). Length measurements taken between 1994 and 2011 showed that approximately 17,590 opahs that were measured of the 196,047 opahs landed ranged in length from 35 to 163 cm FL with a mean of 98.5 ± 10.8 cm. Larger individuals may occur elsewhere but probably are not as large as indicated by Jordan and uncritically copied by a series of authors. Possible differences in the maximum sizes and weights among the cryptic, spotted opah species have not been investigated because of the unresolved taxonomy of the genus.

Although the color description of opah by Pennant (1776) that was the basis of the original description of *L. regius* (Bonnaterre 1788) presented the live coloration accurately, later descriptions seem to be of dead specimens with scales missing. Pennant’s description stated that “its general color was a vivid transparent scarlet varnish, over burnish gold, bespangled with oval silver spots of various sizes.” Later published accounts of body coloration of opah seem to have been based on dead specimens (e.g., Tinker 1944, 1982; Wheeler 1969; Hart 1973; Heemstra 1986). For example, Norman and Fraser (1937, 1949) include a color frontispiece and describe the body color as “steel blue to bottle-green, the sides are bluish or greenish, with brilliant reflections of purple and gold, and the lower parts are rose red; the whole of the body is covered with round silvery spots;” Palmer (1986) “black blue shading to green, belly silvery, opaque whitish spots over body;” Olney (1999) “pink, blue, or purple, and covered in white spots;” Mecklenburg et al. (2002) “iridescent blue and red dorsally shading to silver flushed with light red ventrally; body covered with silver spots;” Collette (2003) “back steel blue to bottle green, upper sides bluish or greenish with reflections of purple and gold;” and Pepperell (2010) “silvery-pink sides covered with silver spots.” The variations of color described by the aforementioned authors become visible after the loss of scales, which are deciduous and easily sloughed during capture, harvest, and storage. The body color of fresh intact opahs is a rather uniform, solid golden orange to vermilion with white spots (Fig. 1). The



Fig. 1 Large male opah (*Lampris* species) 59 kg, 107.0 cm FL, landed by the commercial longliner *F/V Sea Pearl* northeast of the main Hawaiian Islands with scales: body coloration *solid golden orange to vermilion with white spots* (color figure online)

stark differences in appearance of opahs with and without scales can be viewed at NOAA (2011). As with size, possible differences in the color among fresh, intact specimens of the various cryptic, spotted opah species have not been investigated because of the unresolved taxonomy of the genus.

Discussion

A 2006 field study conducted in the Hawai‘i fishing grounds on cranial endothermic tissue (Runcie et al. 2009) revealed morphometric differences (i.e., eye diameter) of opah suggesting two similarly sized species may occur in the central North Pacific, and J.R. Hyde (personal communication, 2011) confirmed with DNA sequencing that the two morphotypes are in distinct clades. A second described species of opah, *Lampris immaculatus* Gilchrist 1904 (Fig. 2), is found in the high and middle latitudes of the Southern Hemisphere (Parin and Kukuyev 1983; Duhamel et al. 2005). *Lampris immaculatus* is not as brilliantly colored and lacks the white spots characteristic of *L. guttatus*, and appears to be somewhat smaller, up to 125 cm TL and 30 kg (Duhamel et al. 2005). There are also a couple of fossil opahs. Jordan and Gilbert (1919) originally described *Diatomocea zatima* as a flatfish from some vertebrae from the diatom beds at Lompoc in Santa Barbara County, California. Jordan (1920) later decided that it was not generically different from the living opah and so referred to it as *Lampris zatima* when he had a 3-foot, nearly complete skeleton. Recently, a “giant” fossil opah, *Megalampris keyesi* (Gottfried et al. 2006) was described from the approximately 4-m holotype from the Late Oligocene of New Zealand.



Fig. 2 Mature female southern opah (*Lampris immaculatus*), 30 kg, 91.0 cm FL, taken by the commercial trawler *F/V Austral* south of the Kerguelen Islands, French Territories. Damage to the left side including the head and body resulted in extensive scale loss, but some live coloration can be seen in patches from anterior to the pelvic fin base and below the lateral line extending posterior to the caudal peduncle as *golden orange* to *vermilion* (color figure online)

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