Recent beach strandings of the Pacific Footballfish on the Pacific coast of the United States

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SHORT COMMUNICATION

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Oceanic anglerfishes of the suborder Ceratioidei (*sensu* Pietsch 2009) are charismatic deep-sea fishes that have captured the public's imagination, appearing in movies, television shows, and popular culture. Living at inaccessible depths with many species displaying large mouths, sharp teeth, and

bioluminescent features, it's easy to see why they are so recognizable. While most people are familiar with anglerfishes generally, many may not realize how diverse these fishes are, both in terms of species diversity but also body shape and life history. The suborder comprises 179 species (Fricke et al. 2025) that occur worldwide in the depths of tropical and temperate oceans, around 20 of which occur in coastal California (Love et al. 2021). Some species are relatively common and well-represented in the literature and museum collections, and several species have been documented *in-situ* giving us a glimpse into their behaviors and life history (Luck and Pietsch 2008; Lundsten et al. 2012; Stewart et al. 2023). However, others are exceedingly rare.

One such species is the Pacific Footballfish, *Himantolophus sagamius* (Tanaka 1918). *Himantolophus* is the only genus in the family Himantolophidae, which comprises 23 species (Fricke et al. 2025), including two species off California: *H. nigricornis* (Bertelsen and Krefft 1988) and *H. sagamius* (Love and Passarelli 2020). When this family was revised by Bertelsen and Krefft (1988), a mere 25 metamorphosed females of the Pacific Footballfishwere known to have been preserved, including two caught off California (Lea 1988). At that time two live observations of this rare species were known: one from a specimen that washed ashore in Japan and was kept in an aquarium for eight days (Haneda 1968), and one from Monterey, California, that was kept alive for 65 hours at the Monterey Bay Aquarium (Lea 1988). Since the revision, new observations have occurred and several specimens have been collected. Although this species is exceedingly rare throughout its range, an unusual number of specimens have washed ashore along the west coast of the United States in the past five years. Here we detail these new records in the context of all known specimens of this species to determine if these new records can reveal additional insights into this rare species.

Information regarding all known specimens of this single species was gathered either from online repositories, such as Fishnet2.net, or by directly contacting museum collections. Data from recent California and Oregon specimens were gathered by direct observation of collected specimens or from photographs of specimens that were not collected, which were identified by diagnostic illicial and escal characters (Pietsch 2009). In total, 41 mature female individuals of this species have been recorded since 1907, seven of which were either lost or not preserved (**Table 1**). No males of this species have been described. Nineteen of the records come from the northwest Pacific (16 from Japan, three from Russia), 15 from the northeast Pacific (11 from California, one from Oregon, one in the northern Pacific, two off Hawai'i), three from the southwest Pacific (all from Indonesia), and four from the southeast Pacific (two from the Galapagos, one from Chile, one from Peru). Three specimens have been reported from the vicinity of Palau, but their identification is tentative due to their small size (14, 32, and 45 mm standard length (SL), respectively) and therefore they are not included in the counts here. While data is not available for every individual documented, specimens range in size from 32–380 mm SL and have been recovered from a variety of depths. Eleven specimens were beach strandings, one was caught in a gill net at approximately 30 m, and the majority were caught in various types of midwater trawls at depths ranging from 60 to >1000 m. All but three specimens were recorded after 1950, with 21 records since 2000 (**Fig. 1**). This highlights two trends: increased activity in deep-sea fishing/sampling and increased access to photographic devices such as cameras and smartphones.

Table 1. All known specimens and observations of the Pacific Footballfish along with their date, location, depth, standard length (SL), and comments. All museum acronyms follow Sabaj 2020. B&K represents Bertelsen and Krefft 1988.

No.	Catalog No.	Date	Country/ Location	Lat/Long	Depth (m)	SL (mm)	Comments
1	SCMT 8201 (holotype)	Prior to 1918	Japan	35ºN 139º30’E	ND	200	Specimen lost. Coordinates estimated in B&K.
2	SCMT 8460	Prior to 1918	Japan	ND	ND	274	Specimen lost.
3	MCZ 29854	1 Feb 1907	Japan	34º51.55’N 139°20.69’E	1280	231	—
4	ZMH-ICH-0100258a	1954	Ecuador (Galapagos)	ND	NA	160	Reported in B&K as recovered from sperm whale stomach.
5	ZMH-ICH-0100258b	1954	Ecuador (Galapagos)	ND	NA	240	Reported in B&K as recovered from sperm whale stomach.
6	HUMZ 17738	Prior to 1960	Japan	ND	ND	ND	Reported from Aomori Prefecture. Date estimate provided by F. Tashiro, HUMZ, personal communication.
7	Observation Only	1968	Japan	ND	0	295	Beach stranding kept in aquarium for 7 days. Disposed of after death. Published in Haneda 1968.
8	LACM 42698-1	22 Jun 1971	USA (Hawai’i)	21°20’N 158º20’W	630–670	37	Caught with pelagic closing net. Tentative juvenile – Pietsch 2009.
9	SIO 72-13	25 Sep 1971	North Pacific	27°22.30’N 155º04’E	ND	37	Caught with midwater trawl.
10	LACM 36073-10	5 May 1975	Indonesia	5°1.5’S 130º04.7’E	650–1000	32	Caught with midwater trawl. Tentative juvenile – Pietsch 2009.

No.	Catalog No.	Date	Country/ Location	Lat/Long	Depth (m)	SL (mm)	Comments
11	ZMDVGU IV 7600/1014	4 Jan 1980	Russia (Sakhalin Oblast)	44º20’N 148º37’E	1200	186	Caught with otter trawl. Reported in Kharin 2006.
12	LACM 43760-1	18 Dec 1983	USA (California)	35°13’N 121º16’W	613	111	—
13	HUMZ 103697	30 Apr 1984	Japan	ND	800		Caught with bottom trawl.
14	CAS 57639	3 Jan 1985	USA (California)	36º47’N 122º01’W	914–969	180	Midwater capture over center of Monterey Submarine Canyon.
15	Observation Only	Prior to 1988	Japan	35º45’N 141ºE	ND	128	Caught with bottom trawl. Specimen lost. Unknown date but reported as personal communcation from T. Abe in B&K.
16	CMA 1990.09.0001	14 Nov 1989	USA (California)	32º22’N 118º27’W	30	372	Caught with gill net.
17	MNHNC P. 6848	1991	Chile	29°57’S 71°22’W	ND	111	—
18	NSMT 59015	10 Jul 1996	Japan	40º43.4’N 143º10.6’E	530–558	73	—
19	NSMT 58536	30 Jul 1996	Japan	39º0.2’N 143º29.7’E	650–679	69	—
20	HUMZ 167672	1999	Peru	ND	ND	332.2	Caught with midwater beam trawl.
21	SIO 02-2	15 Dec 2001	USA (California)	32º57.5’N 117º15.9’W	0	380	Beach stranding.
22	NSMT 69976	17 Aug 2004	Japan	40º30’N 170º20’E	60–110	223	—
23	HUMZ 191925	13 Feb 2005	USA (Hawai’i)	13°34.32’N 158º46.32’W	ND	296.2	Caught with drift line.

No.	Catalog No.	Date	Country/ Location	Lat/Long	Depth (m)	SL (mm)	Comments
24	HUMZ 194261	14 May 2005	Indonesia	8°35.04’S 110º43.02’E	605–607	43	Caught with bottom trawl.
25	HUMZ 194599	16 Jul 2005	Indonesia	8°17.52’S 109º44.1’E	612–632	50.9	Caught with bottom trawl.
26	NSMT 90520	1 Nov 2007	Japan	36º30.9’N 141º21.1’E	899	41	—
27	SIOM	Prior to 2009	Russia (Sakhalin Oblast)	ND	ND	45	Caught with midwater trawl. Reported in Pietsch 2009.
28	IMBV	Prior to 2009	Russia (Sakhalin Oblast)	ND	ND	186	Reported in Pietsch 2009.
29	HUMZ 211661	15 Dec 2010	Japan	26°46.62’N 141º57.9’E	570–730	ND	Caught with midwater beam trawl.
30	KPM-NI 28001	16 Feb 2011	Japan	35°1.84’N 138º47.33’E	0	146.8	Beach stranding.
31	LACM 60082-1	5 Jul 2021	USA (California)	33º34.5’N 117º50.52’W	0	295	Beach stranding.
32	Observation Only	13 Nov 2021	USA (California)	32°53.45’N 117º15.25’W	0	ND	Stranding at Black’s Beach, CA, USA. Specimen lost.
33	SIO 21-41	10 Dec 2021	USA (California)	33°02.03’N 117°17.51’W	0	282	Beach stranding.
34	FAKU 149078	Prior to 2022	Japan	ND	1000	ND	While collection date unknown, a tissue of this specimen is used in Kai et al. 2022. Reported from Miyagi Prefecture.
35	FAKU 149647	30 Oct 2022	Japan	36º34.24’N 141º21.42’E	758	208.8	Caught with otter trawl.
36	Observation Only	17 Jun 2023	USA (California)	33º12’N 117º23.44’W	0		Stranding in Oceanside, CA, USA. Specimen lost.

No.	Catalog No.	Date	Country/ Location	Lat/Long	Depth (m)	SL (mm)	Comments
37	FAKU 150947	9 Oct 2023	Japan	40º13.74’N 142º15.54’E	460	84.8	Caught with otter trawl.
38	LACM 61593	13 Oct 2023	USA (California)	33º34.5’N 117º50.52’W	0	310	Beach stranding.
39	Observation Only	18 May 2024	USA (Oregon)	45º53.46’N 123º57.9’W	0	ND	Stranding at Cannon Beach, OR, USA. Specimen lost.
40	SIO 25-10	12 Feb 2025	USA (California)	33º05.07’N 117º18.76’W	0	230	Beach stranding.
41	SIO 25-43	25 Jun 2025	USA (California)	33º15.45’N 117º26.27’W	0	246	Beach stranding found partially desiccated and damaged.

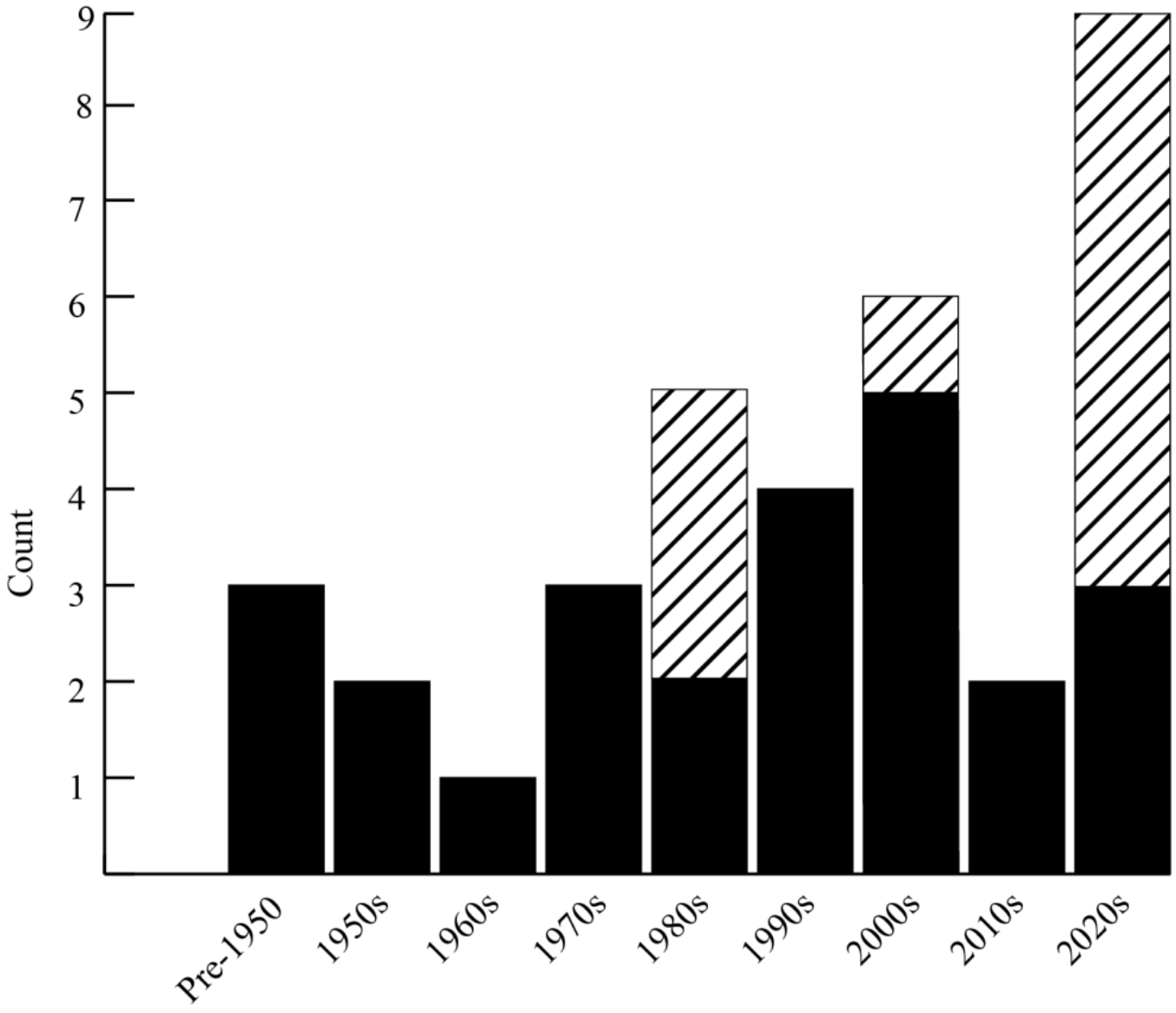


Figure 1. Pacific Footballfish collected or documented per decade. Striped portions represent individuals collected or observed in California. Several individuals were excluded due to missing collection/observation dates.

Eleven specimens have been documented in California, eight of which washed ashore (with seven of those occurring within the last five years; **Table 1**). The first two California specimens, collected using midwater trawls in 1983 and 1985, are the smallest at 111 mm and 180 mm SL, respectively. The remaining beach strandings, and one specimen that was caught in a gill net at 30 m depth, are all 230 mm SL or larger. All California specimens have been documented south of Point Conception with the exception of one individual from Monterey Bay (CAS 57639) and one from Morro Bay (LACM 43760-1; **Fig. 2**). None have shown external damage consistent with predation prior to stranding, or any known cause of death that may have led to their beaching, and all were recovered with empty stomachs.



Figure 2. Locations of all known Pacific Footballfish records in California. White circles represent individuals that have been documented since 2021, while black circles represent individuals documented prior. The location marked by * signifies two individuals documented from the same locality.

Perhaps the most variable external feature of *Himantolophus* anglerfishes is their bioluminescent esca (Pietsch 2009), and with so few specimens known it is important to document the variation that exists within each species as the amount of intraspecific and interspecific variation is still unknown (Kai et al.

2022). Of the recent material for the Pacific Footballfish, five were preserved and accessioned into museum collections (**Fig. 3**; two California specimens were lost, presumably to scavengers or to rising tides, and the fate of the Oregon specimen is unknown). The general morphology of the body, illicium and escal bulb of these specimens closely matches those outlined by Bertelsen and Krefft (1988), Lea (1988), Klepadlo et al. (2003), and Pietsch (2009). The esca has two distal appendages with bifurcating, blunt tips, each with a smaller side branch near the base. At the base of the distal appendage are four blunt lobes. There is a simple, unbranched anterior escal appendage, one simple or bifurcating posterior escal appendage, and a variable number of illicial appendages stemming from the illicium. Variation outside the range of previous publications is present in the number of dermal spines as well as the number and branching pattern of illicial appendages. Pietsch (2009) reported a range of 40–75 dermal spines on each side of the body in known specimens at the time. While some recent specimens fall within that range (SIO 21-41 and LACM 60082-1), one individual has 37 dermal spines on each side of its body (SIO 25-10), while another has 35 dermal spines on the left side of the body, and 37 on the right (LACM 61593). Unequal numbers of dermal spines were also reported by Klepadlo et al. (2003). Furthermore, Pietsch (2009) reported four to five dermal spines at the base of each pectoral fin, while we find as few as two in one individual (LACM 61593), and as many as six in another (LACM 60082-1). Regarding the illicium, Bertelsen and Krefft (1988) reported as few as two and as many as eight illicial appendages among the eleven specimens they examined, with some bifurcated and others simple. In the four most recent strandings, one has nine illicial appendages (two bifurcate and seven simple; LACM 61593), one has six (two bifurcate and four simple; LACM 60082-1), two have four (two bifurcate and two simple; SIO 21-41and SIO 25-10) and one has five (two bifurcate and three simple; SIO 25-43). The most recently collected specimen (SIO 25-43) was discovered desiccated and damaged at Marine Corps Base Camp Pendleton, San Diego County, making morphometric and meristic comparisons difficult, however, the IA appear intact without evidence of damage. Complete measurements of the esca and illicial appendages for the four recent specimens (excluding SIO 25-43) can be found in **Table 2**.

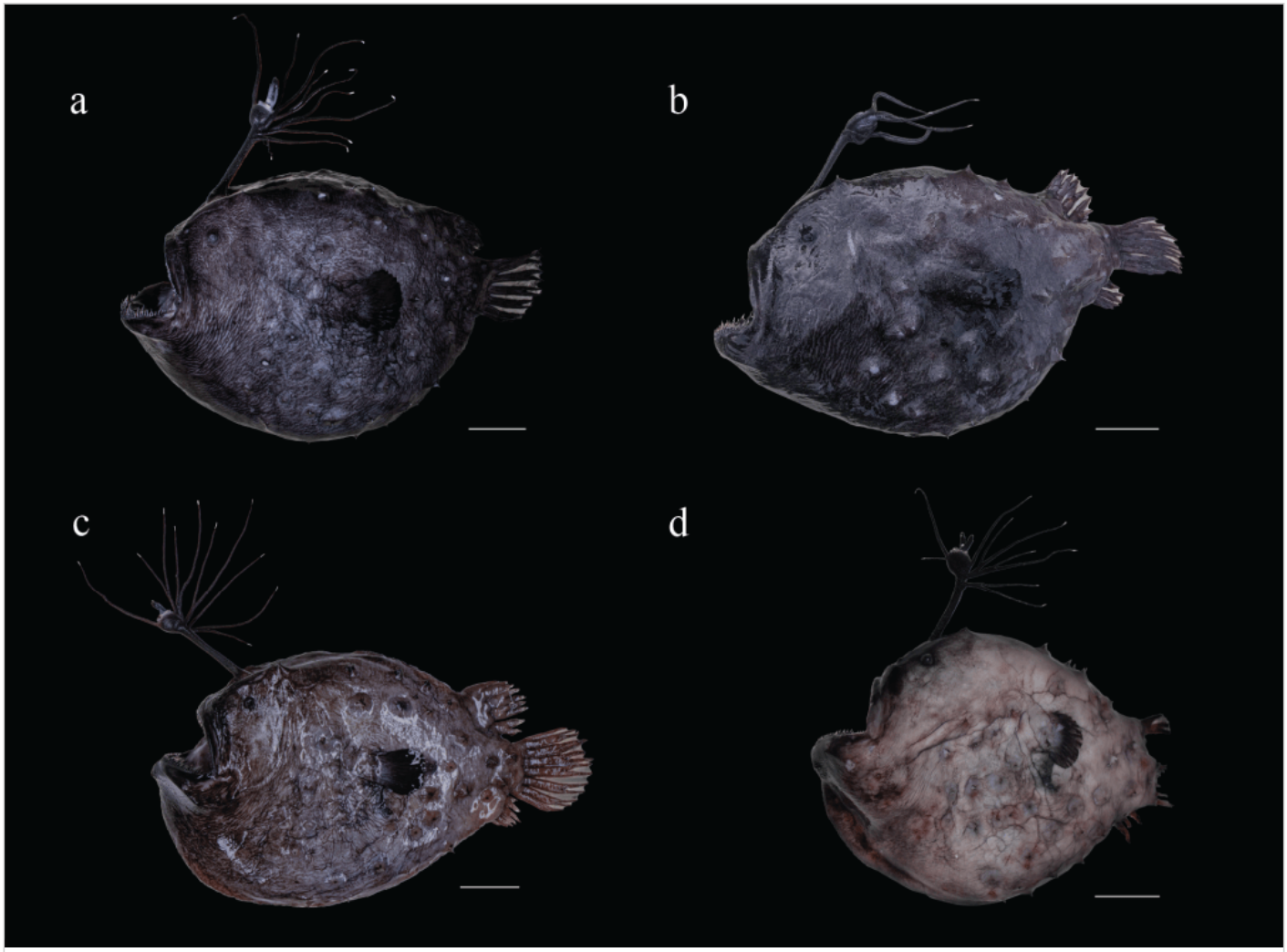


Figure 3. Images of Pacific Footballfish specimens that have washed ashore and been subsequently catalogued in natural history museums in Southern California since 2021. (a) LACM 60082-1, 295 mm SL, beached 5 Jul 2021 (b) SIO 21-41, 282 mm SL, beached 10 Dec 2021 (c) LACM 61593, 310 mm SL, beached 13 Oct 2023 (d) SIO 25-10, 230 mm SL, beached 12 Feb 2025. The scale bar represents 50 mm in all panels. Not shown is SIO 25-43, 246mm SL, as it is desiccated and was discovered well after it initially washed ashore.

Table 2. Counts and measurements of four recent specimens that were catalogued into natural history museums. All measurements are in millimeters followed by percent of standard length (SL) in parentheses. DA – distal appendage, AA – anterior escal appendage, PA – posterior escal appendage, IA – illicial appendage. Illicial appendages abbreviated as documented by Klepadlo et al. (2003). Not included is SIO 25-43, as it was discovered dried and damaged, but with 5 intact IA and no evidence of others missing.

Catalog Number	LACM 60082-1	SIO 21-41	LACM 61593	SIO 25-10
Year Cataloged	2021	2021	2023	2025
SL	310	282	325	217

Catalog Number	LACM 60082-1	SIO 21-41	LACM 61593	SIO 25-10
Length of illicium	97 (31.3)	114.3 (40.5)	98 (30.2)	93.9 (43.3)
Diameter of escal bulb	16 (5.7)	14.2 (5.0)	18 (5.5)	12.4 (5.7)
Length of DA	29 (9.4)	17.3 (6.1)	17 (5.2)	14.8 (6.8)
Length of AA	100 (32.3)	100.9 (35.8)	90 (27.7)	59.4 (27.4)
Length of PA	88 (28.4)	103.5 (36.7)	95 (29.2)	70.2 (32.3)
Length of longest IA	129 (41.6)	119.6 (42.4)	122 (37.5)	88.8 (40.9)
No. of IA	7	4	7	4

While little is still known about this species, it is clear that an increasing frequency of observations is becoming available, and every single specimen can teach us things not only about this species, but anglerfishes more generally (Ludt and Clardy 2022). One of the most puzzling things about this species is that a significant portion of California records are associated with individuals that have washed ashore, far from the depth they usually inhabit. No seasonal trends to specimen strandings are detected in this dataset, however these beached individuals are some of the largest specimens known, with the exception of one smaller individual (SIO 25-10). It is possible that these beached individuals are malnourished and nearing the end of their lives as a recent video shows a disoriented large female (presumably KPM-NI 28001) moving uncharacteristically three days prior to it washing ashore (H. Senou, Kanagawa Museum, pers. comm.). While there is no known cause for why this species occasionally washes ashore, additional specimens or observations may reveal important life history characteristics that explain this phenomenon.

These new records have already increased the known number of illicial appendages present on this species and updated our understanding of the range of dermal spines this species can have. They have also increased the known distribution of the Pacific Footballfish, as the 2024 Cannon Beach, Oregon, specimen represents the northern-most documented individual of this species. Additionally, no known males of this species have ever been reported and are awaiting description from future collections. While the range of this species is vast, occurring across the entire Pacific Ocean, the most common areas where it is reported are also some of the most densely populated: California and Japan. As such, we look forward to future specimens and the knowledge we can glean from them, and encourage beachgoers and fishermen to report unique fishes they encounter to their local fish and game office, natural history museum or university.

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