Marbled Eelpout to Banded Gunnel

Marbled Eelpout (*Lycodes raridens*)

Taranetz & Andriashev, 1937

Family Zoarcidae

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

Ecological Role: Common but not abundant, the Marbled Eelpout is likely of relatively small ecological importance in the U.S. Chukchi and Beaufort Seas.

Marbled Eelpout (*Lycodes raridens*), 102 mm, Chukchi Sea, 2007. Photograph by C.W. Mecklenburg, Point Stephens Research.

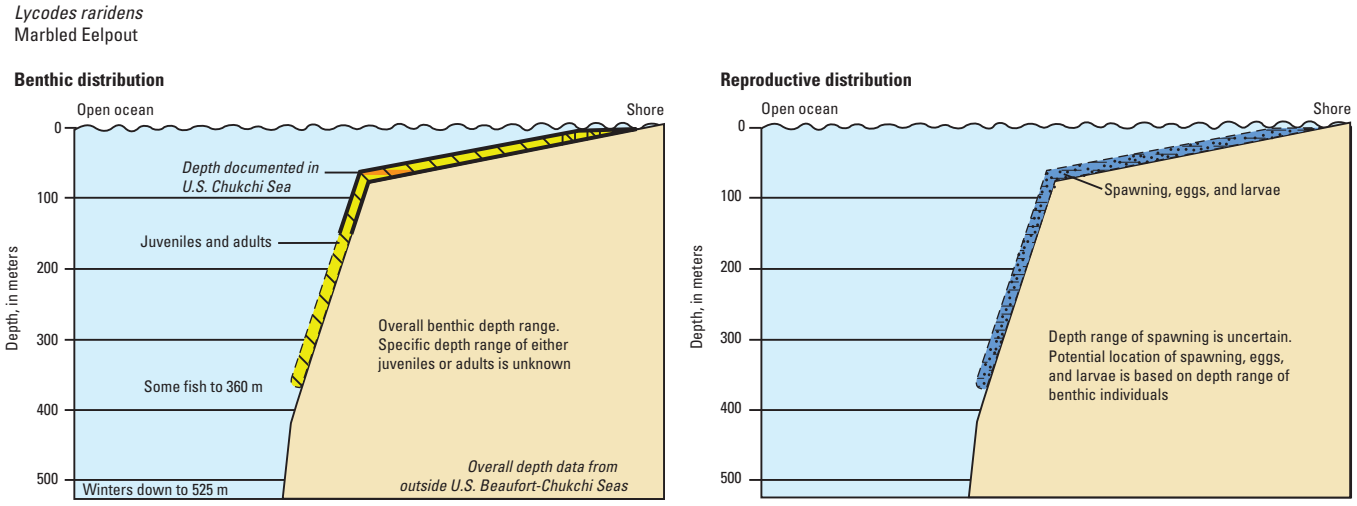
Physical Description/Attributes: Elongate cream to tan body with 7–9 brown or reddish brown bands extending onto dorsal and anal fins; blackish dorsal fin margin at ends of the bands; head, nape, and body bands becoming marbled in appearance in adults. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 711) [1]. Swim bladder: Absent [1]. Antifreeze glycoproteins in blood serum: Unknown.

Range: *U.S. Chukchi and Beaufort Seas. Northernmost record in U.S. Chukchi Sea is at 71°27'N, 158°02'W, and in U.S. Beaufort Sea is at 71°13.5'N, 152°47.9'W; easternmost record in U.S. Beaufort Sea is north of Arey Island at 70°36'N, 143°55'W* [2]. Elsewhere in Alaska, eastern Bering Sea to Bristol Bay and one record north of Near Islands, western Aleutian Islands [1]. Worldwide, in western Bering Sea and Commander Islands to Okhotsk Sea [1] and in East Siberian Sea [2].

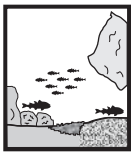
Relative Abundance: *Common in U.S. Chukchi and Beaufort Seas* [2, 4]. Patchily abundant (common) from eastern Sakhalin Island, Russia through Bering Sea and to *Chukchi Sea and Beaufort Seas* [2, 4–9].

Geographic distribution of Marbled Eelpout (*Lycodes raridens*) within Arctic Outer Continental Shelf Planning Areas [3] based on review of published literature and specimens from historical and recent collections [1, 2, 4].

Depth Range: 8–467 m, rarely deeper than 150 m [4]. *Taken in U.S. Chukchi Sea between 55–59 m* [9]. A maximum depth of 525 m was reported for fish wintering off shelf in Sea of Okhotsk [10]. Generally, eelpout spawning and larvae occur at same depths that adults inhabit [1].

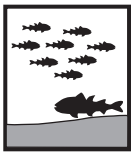


Benthic and reproductive distribution of Marbled Eelpout (*Lycodes raridens*).



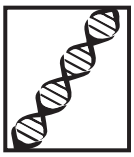
Habitats and Life History

Eggs—Size: Unknown. Time to hatching: Unknown. Habitat: Benthic [1].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Benthic [1].
Juveniles—Age and size: Unknown. Habitat: Benthic [1].
Adults—Age and size at first maturity: Unknown. Maximum age: 7 years in western Bering Sea [7]. Maximum size: To 86 cm TL [7]. Habitat: Benthic [1].
Substrate—Sandy mud and mud [1, 11].
Physical/chemical—Temperature: -1.7–7.9 °C [7, 11, 12]. Salinity: Marine, for example, *32.58 parts per thousand in the U.S. Chukchi Sea* [9] and occasionally in brackish waters [4].



Behavior

Diel—Unknown.
Seasonal—Migrates to deeper water in Sea of Okhotsk in winter [10].
Reproductive—Unknown.
Schooling—Unknown.
Feeding—Unknown.



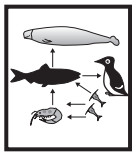
Populations or Stocks

There have been no studies.

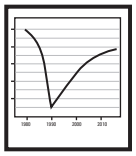
Reproduction

Mode—Separate sexes, oviparous.
Spawning season—Likely in autumn or autumn-winter in western Bering Sea [7].
Fecundity—Unknown.

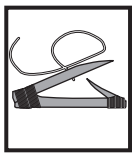
Food and Feeding
Food items—Benthic and epibenthic prey, such as gammarid amphipods, euphausiids, shrimps, polychaetes, and clams [7].
Trophic level—3.6 [13].



Biological Interactions
Predators—Unknown.
Competitors—Likely other benthic-dwelling fishes, including flatfishes, sculpins, snailfishes, and other eelpouts.

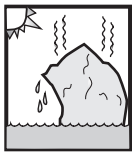


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Fecundity=3,116) [14].

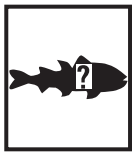


Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Marbled Eelpout are not commercially harvested.



Potential Effects of Climate Change
The Marbled Eelpout is a predominantly Boreal Pacific species. Increases in abundance and interspecific competition are possible outcomes of climate warming.



Areas for Future Research [B]
Little is known about the biology and ecology of this species from the region. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Mecklenburg, C.W., Møller, P.R., and Steinke, D., 2011, Biodiversity of Arctic marine fishes—Taxonomy and zoogeography: Marine Biodiversity, v. 41, no. 1, p. 109–140, Online Resource 1. [2]

Mecklenburg, C.W., Stein, D.L., Sheiko, B.A., Chernova, N.V., Mecklenburg, T.A., and Holladay, B.A., 2007, Russian–American long-term census of the Arctic—Benthic fishes trawled in the Chukchi Sea and Bering Strait, August 2004: Northwestern Naturalist, v. 88, no. 3, p. 168–187. [9]

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Arctic Eelpout (*Lycodes reticulatus*)

Reinhardt, 1835

Family Zoarcidae

Note: *Morphological differences between* L. reticulatus *(Reinhardt, 1835) and* L. rossi *are not clear, making identifications and geographic ranges uncertain* [1].

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

Arctic Eelpout (*Lycodes reticulatus*), 306 mm, Beaufort Sea, 2011. Photograph by C.W. Mecklenburg, Point Stephens Research.

Ecological Role: Because of the lack of taxonomic clarity, uncommon occurrence, and paucity of life history information, the ecological role of this species was not evaluated.

Physical Description/Attributes: Brown body with dark bands that are reticulate in large individuals; light spots on upper side of head. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 713) [2]. Swim bladder: Absent [2]. Antifreeze glycoproteins in blood serum: Unknown.

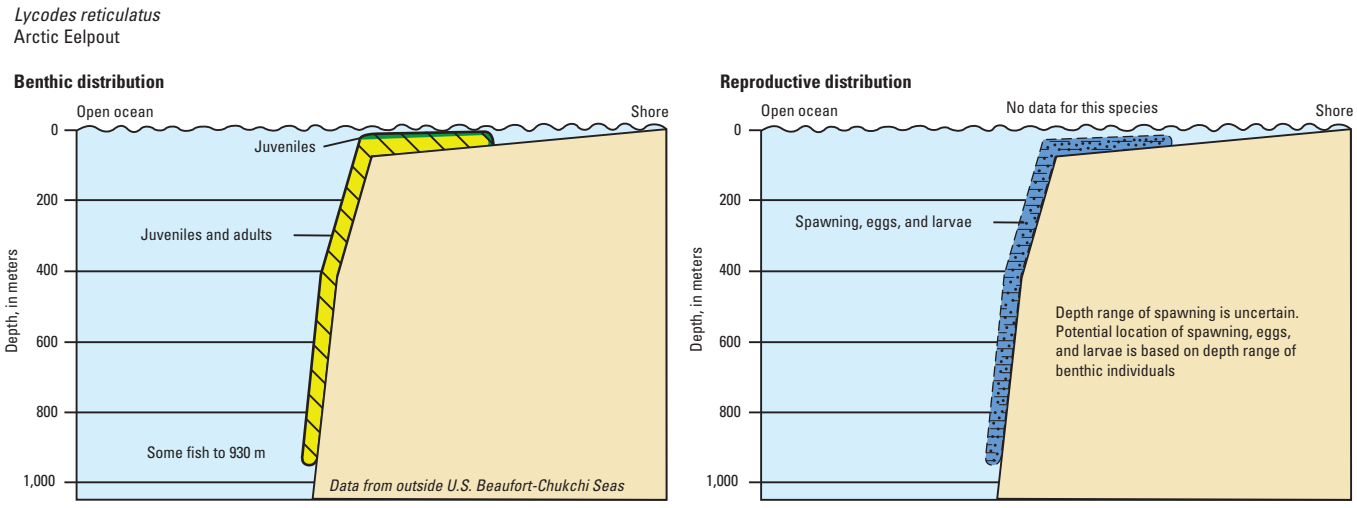
Range: *U.S. Beaufort Sea* [3]. Elsewhere, Arctic Canada to Greenland and east to Barents, Kara, and Laptev Seas [2].

Relative Abundance: *Apparently common in U.S. Beaufort Sea. Abundance estimates are unreliable because of lack of sampling in the offshore waters, and the species is likely common, at least locally, considering the 2012 archived voucher specimens from at least five stations* [3]. Common in Barents Sea [5].

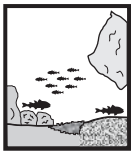
Base modified from USGS and other digital data. U.S.-Russia Maritime Boundary follows the EEZ/200-mile limit line, western edge. Coordinate reference system: projection, Lambert Azimuthal Equal Area; latitude of origin, 75.0°; horizontal datum, North American Datum of 1983.

Geographic distribution of Arctic Eelpout (*Lycodes reticulatus*) within Arctic Outer Continental Shelf Planning Areas [4], based on review of published literature and specimens from historical and recent collections [1-3].

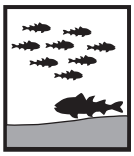
Depth Range: *Taken offshore at 6–930 m in U.S. Beaufort Sea* [3]. 20–930 m, usually 380 m or shallower [1, 2]. Generally, eelpout spawning and larvae occur at same depths that adults inhabit [2].



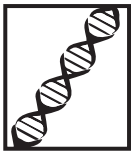
Benthic and reproductive distribution of Arctic Eelpout (*Lycodes reticulatus*).



Habitats and Life History
Eggs—Size: Unknown. Time to hatching: Unknown. Habitat: Benthic [2].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Benthic [2].
Juveniles—Age and size: Unknown. Habitat: Benthic [2].
Adults—Age and size at first maturity: Unknown. Maximum age: 19 years [6]. Maximum size: 76.0 cm [2]. Habitat: Benthic, most often on outer shelf [1].
Substrate—Sand to mud [2].
Physical/chemical—Temperature: -1.5–4.5 °C [7]. Salinity: Marine [2].



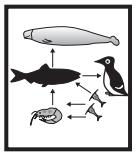
Behavior
Diel—Unknown.
Seasonal—Unknown.
Reproductive—Unknown.
Schooling—Unknown.
Feeding—Unknown.



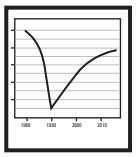
Populations or Stocks
There have been no studies.

Reproduction
Mode—Separate sexes. Oviparous [8].
Spawning season—Unknown.
Fecundity—Unknown.

Food and Feeding
Food items—A wide variety of benthic invertebrates (amphipods, bivalves, brittle stars, gastropods, echinoderms, crustaceans, and polychaetes) and fishes and pelagic crustaceans (euphausids) [6, 9–11].
Trophic level—3.5 ±0.53 standard error [12].



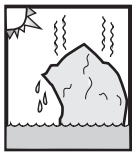
Biological Interactions
Predators—Bearded seals in northeastern Canada [13].
Competitors—Likely other benthic microcarnivores including some sculpins, flatfishes, snailfishes, and other eelpouts.



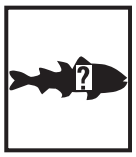
Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Preliminary *K* or Fecundity) [12].

Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Arctic Eelpout are not commercially harvested.



Potential Effects of Climate Change
Arctic Eelpouts have fairly wide depth and temperature tolerances. Thus, it is difficult to speculate about the effects of climate warming. Changes in temperature, species composition of fish assemblages, and productivity can be expected to affect distribution and abundance patterns



Areas for Future Research [B]
Little is known about this species biology and ecology from the region.

Research needs include:

(1) Depth and location of pelagic larvae; (2) depth, location, and timing of young-of-the-year benthic recruitment; (3) preferred depth ranges for juveniles and adults; (4) spawning season; (5) seasonal and ontogenetic movements; (6) population studies; (7) prey; and (8) predators.

References Cited

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Threespot Eelpout (*Lycodes rossi*)

Malmgren, 1865

Family Zoarcidae

Threespot Eelpout (*Lycodes rossi*), Beaufort Sea, 2008. Photograph by E. Akuna, National Oceanic and Atmospheric Administration, Alaska Fisheries Science Center.

Note: *Except for geographic range data, all information is from areas outside of the study area.*

Note on taxonomy: *Morphological differences between* L. reticulatus *(Reinhardt, 1835) and* L. rossi *are not clear, making identifications and geographic ranges uncertain* [1].

Colloquial Name: None within U.S. Chukchi and Beaufort Seas.

Ecological Role: *Uncertain. The life history and ecology of this species and its roles in regional ecosystems and food webs are poorly understood. Issues regarding the taxonomy of this species need to be resolved.*

Physical Description/Attributes: Brown, with dark brown bands on body and dorsal fin; light band across top of head connecting gill openings, often broken into spots. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 713) [1]. Swim bladder: Absent [1]. Antifreeze glycoproteins in blood serum: Unknown.

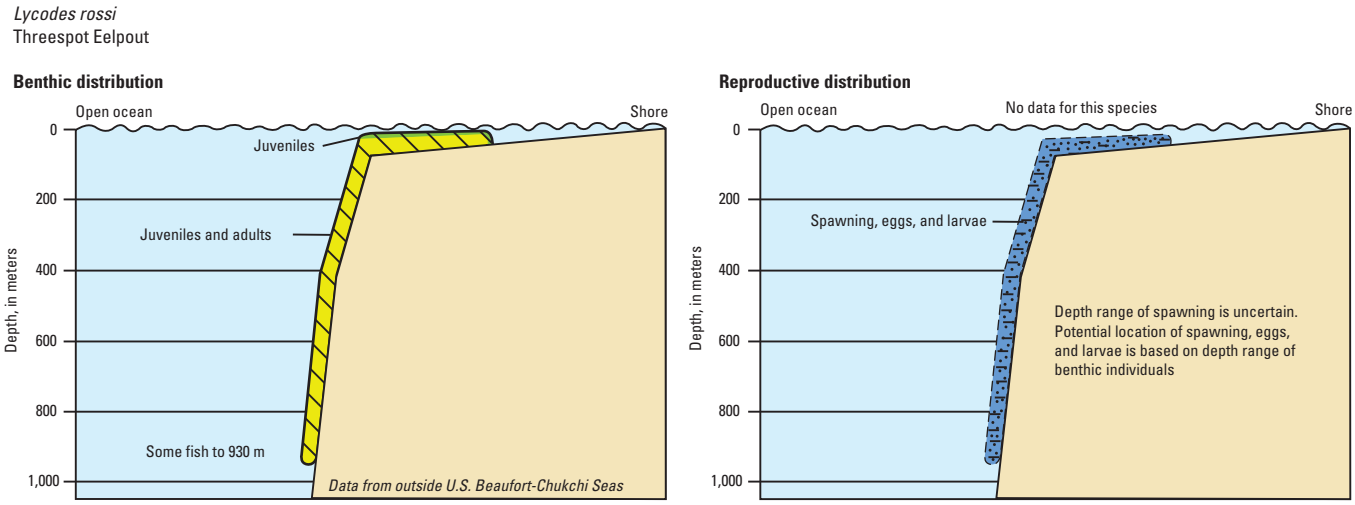
Range: *U.S. Beaufort Sea, at least between 152° and 155°W* [2]. Elsewhere, from Greenland and Norwegian Seas to Kara Sea, including Iceland, Svalbard (Norway), and Barents Sea; and Canadian Beaufort Sea eastward to Dease Strait [1, 2].

Relative Abundance: *Rare in U.S. Beaufort Sea* [2, 4]. Common in Barents Sea [5].

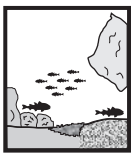
Base modified from USGS and other digital data. U.S.-Russia Maritime Boundary follows the EEZ/200-mile limit line, western edge. Coordinate reference system: projection, Lambert Azimuthal Equal Area; latitude of origin, 75.0°; horizontal datum, North American Datum of 1983.

Geographic distribution of Threespot Eelpout (*Lycodes rossi*), within Arctic Outer Continental Shelf Planning Areas [3] based on review of published literature and specimens from historical and recent collections [1, 2, 4].

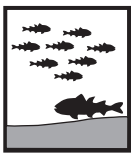
Depth Range: Adults at 42–365 m, usually deeper than 130 m [1, 2, 6]. Juveniles as shallow as 9 m [1, 6]. Generally, eelpout spawning and larvae occur at same depths that adults inhabit [1].



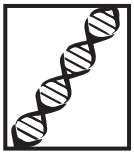
Benthic and reproductive distribution of Threespot Eelpout (*Lycodes rossi*).



Habitats and Life History
Eggs—Size: 3–4 mm [5]. Time to hatching: Unknown. Habitat: Benthic [1].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Benthic [1].
Juveniles—Age and size: Unknown. Habitat: Benthic [1].
Adults—Age and size at first maturity: Unknown. Maximum age: 10 years [5]. Maximum size: 38 cm TL [7]. Habitat: Benthic, most often on outer shelf and upper slope [2].
Substrate—Muddy [1, 8].
Physical/chemical—Temperature: -1.5–1.1 °C [8]. Found mainly at minus temperatures [6, 8]. Salinity: 27.6–35.0 ppt [8]; prefers high salinity, usually not found in less than 34 ppt [6].



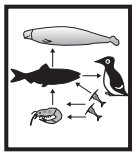
Behavior
Diel—Unknown.
Seasonal—Unknown.
Reproductive—Unknown.
Schooling—Unknown.
Feeding—Unknown.



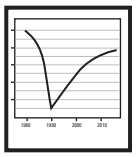
Populations or Stocks
There have been no studies.

Reproduction
Mode—Separate sexes. Oviparous [9].
Spawning season—Probably winter or early spring in Barents Sea [5].
Fecundity—390 eggs [5].

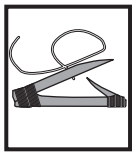
Food and Feeding
Food items—Polychaetes, copepods, amphipods, cumaceans [6, 8].
Trophic level—3.49 ±0.53 standard error [10].



Biological Interactions
Predators—Bearded seals in Ungava Bay, Canada [11].
Competitors—Likely other benthic microcarnivores including some sculpins, flatfishes, snailfishes, and other eelpouts.

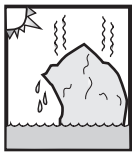


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Preliminary *K* or Fecundity) [10].

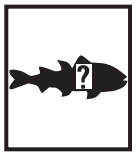


Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Threespot Eelpout are not commercially harvested.



Potential Effects of Climate Change
Because Threespot Eelpout are mainly a deep-water, slope-dwelling Arctic species and little is known about climate change at slope depths in the Arctic, potential effects on this species cannot be estimated.



Areas for Future Research [B]
Little is known about this species biology and ecology from the region. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Mecklenburg, C.W., Møller, P.R., and Steinke, D., 2011, Biodiversity of Arctic marine fishes—Taxonomy and zoogeography: Marine Biodiversity, v. 41, no. 1, p. 109–140, Online Resource 1. [2]

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Archer Eelpout (*Lycodes sagittarius*)

McAllister, 1976

Family Zoarcidae

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

Ecological Role: Likely to be absent over shelve habitats of the U.S. Beaufort Sea. Survey data suggest that this species rarely occurs in slope and deep water habitats. The ecological role of the species is probably minimal.

Archer Eelpout (*Lycodes sagittarius*), 180 mm TL or less from Franklin Bay, Northwest Territories, Canada, (from Mecklenburg and others 2002, p. 717).

Physical Description/Attributes: Elongate, narrow body colored uniformly dark brown; peritoneum black. For specific diagnostic characteristics see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 717) [1]; specimens with white bars and fewer vertebrae illustrated therein [1] and in previous publications, (for example, McAllister and others, 1981) [2], are now known to belong to *L. marisalbi* [3]. Swim bladder: Absent [1]. Antifreeze glycoproteins in blood serum: Unknown.

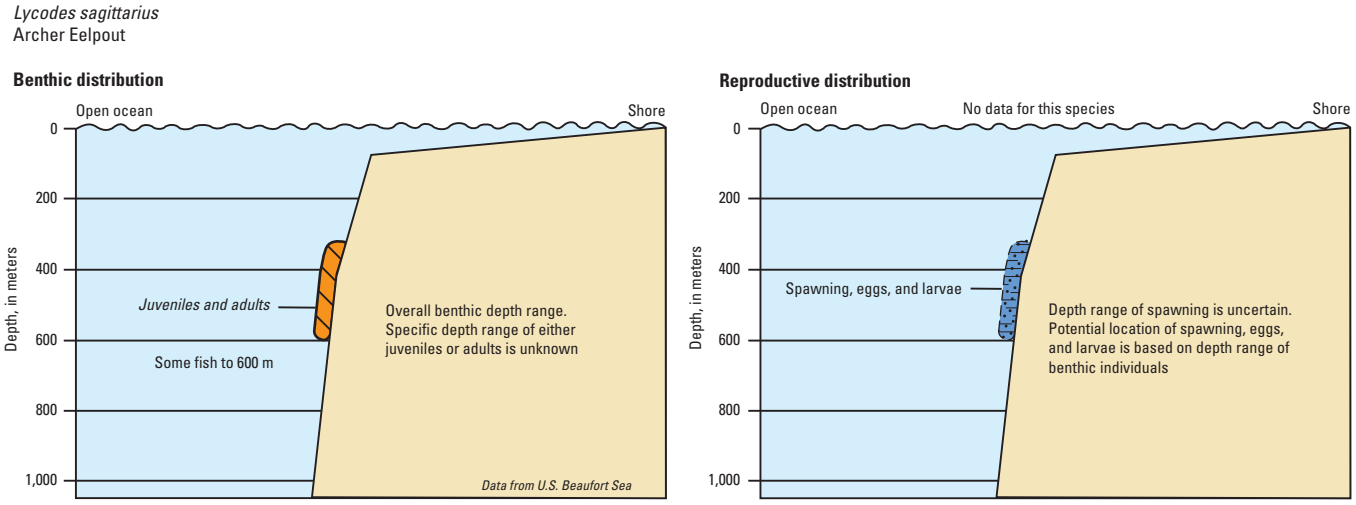
Range: *U.S. Beaufort Sea*, and Beaufort Sea of western Canada and Kara and Laptev Seas [5].

Relative Abundance: *Apprentlly common in Beaufort Sea off Alaska* [5].

Base modified from USGS and other digital data. U.S.-Russia Maritime Boundary follows the EEZ/200-mile limit line, western edge. Coordinate reference system: projection, Lambert Azimuthal Equal Area; latitude of origin, 75.0°; horizontal datum, North American Datum of 1983.

Geographic distribution of Archer Eelpout (*Lycodes sagittarius*), within Arctic Outer Continental Shelf Planning Areas [4] based on review of published literature and specimens from historical and recent collections [3, 5].

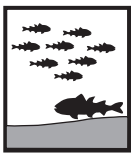
Depth Range: *357–600 m in U.S. Beaufort Sea* [2, 3] otherwise depths of 120 to at least 1,934 m [5]. Generally, eelpout spawning and larvae occur at same depths that adults inhabit [1].



Benthic and reproductive distribution of Archer Eelpout (*Lycodes sagittarius*).

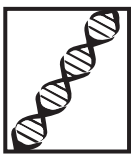
Habitats and Life History

Eggs—Size: Unknown. Time to hatching: Unknown. Habitat: Benthic [1].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Benthic [1].
Juveniles—Age and size: Unknown. Habitat: Benthic [1].
Adults—Age and size at first maturity: Unknown. Maximum age: Unknown. Maximum size: To 27.8 cm TL [2]. Habitat: Benthic [1].
Substrate—Mud [2].
Physical/chemical—Temperature: Range unknown. *Taken at –0.9 °C* [2]. Salinity: *Marine, taken at 34 ppt.* [2].



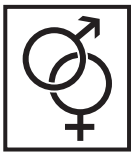
Behavior

Diel—Unknown.
Seasonal—Unknown.
Reproductive—Unknown.
Schooling—Unknown.
Feeding—Unknown.



Populations or Stocks

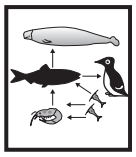
There have been no studies.



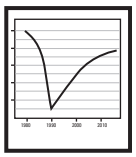
Reproduction

Mode—Separate sexes, oviparous.
Spawning season—*Likely late summer or early autumn* [2].
Fecundity—Unknown.

Food and Feeding
Food items—Annelids, bivalves, gastropods, and crustaceans [2].
Trophic level—3.22 ±0.40 standard error [6].

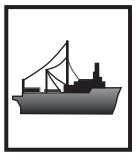


Biological Interactions
Predators—Unknown.
Competitors—Likely other benthic microcarnivorous fishes, including snailfishes, sculpins, flatfishes, and other eelpouts.

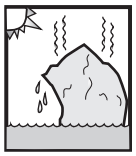


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Preliminary *K* or Fecundity) [6].

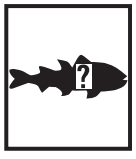
Traditional and Cultural Importance
None reported.



Commercial Fisheries
Currently, Archer Eelpout are not commercially harvested.



Potential Effects of Climate Change
Unknown. The Archer Eelpout is an endemic species occurring rarely in deep water areas of the U.S. Beaufort Sea [3]. Lack of information about this species and understanding of its role in this benthic ecosystem precludes an informed assessment of potential climatic effects.



Areas for Future Research [B]
Little is known about the biology and ecology of this species from the region. Research needs include:
(1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Longear Eelpout (*Lycodes seminudus*)

Reinhardt, 1837

Family Zoarcidae

Note: *Except for geographic range data, all information is from areas outside of the study area.*

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

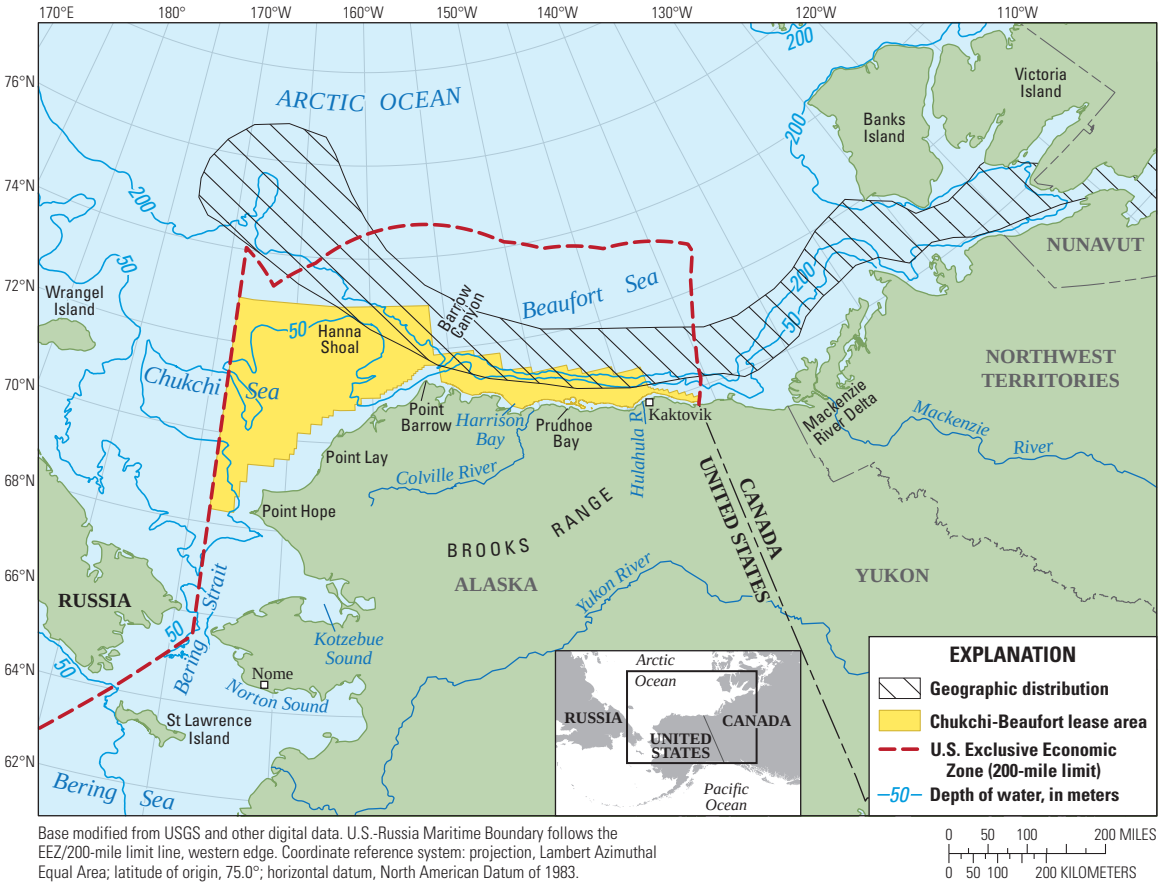
Ecological Role: Because of its apparent rarity in shallow U.S. Arctic waters, this species is likely of little ecological importance in the U.S. Chukchi and Beaufort Sea.

Longear Eelpout (*Lycodes seminudus*), 238 mm TL, Chukchi Borderland, 2009. Photograph by C.W. Mecklenburg, Point Stephens Research.

Physical Description/Attributes: Elongate, dark gray-brown body, sometimes with short, pale bands above lateral line and extending onto dorsal fin. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 707) [1]. Swim bladder: Absent [1]. Antifreeze glycoproteins in blood serum: Unknown.

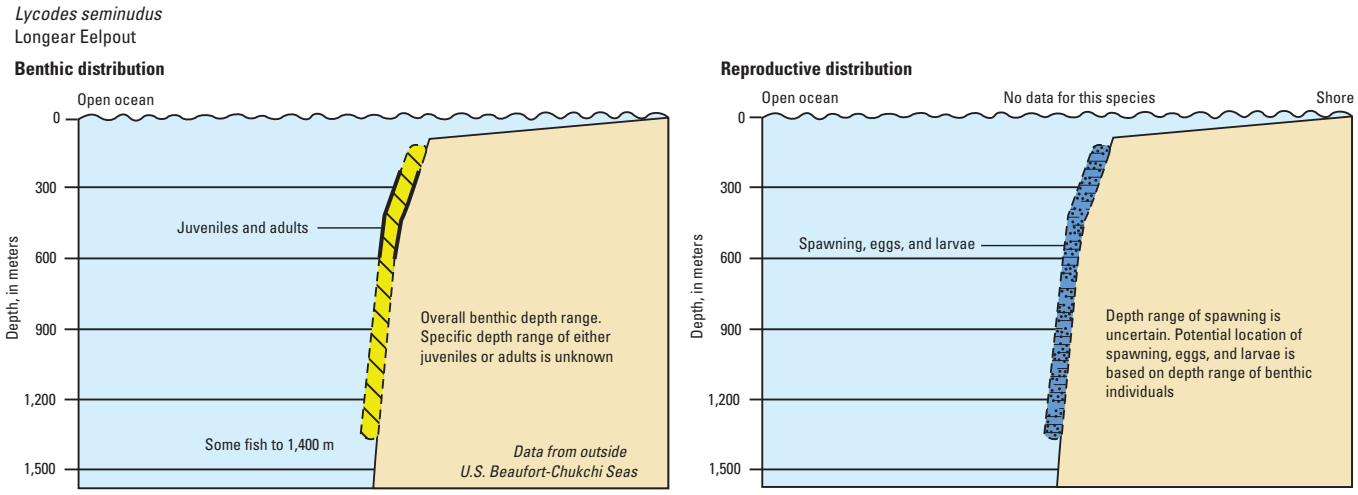
Range: *Continental slope of U.S. Chukchi and Beaufort Seas* [2]. Elsewhere, in Baffin Bay off Canada and northwest Greenland, northeast Greenland, off northern Iceland to Faroe Islands, Svalbard Archipelago, northern Barents Sea, and Kara Sea [2, 3].

Relative Abundance: *Rare in shelf waters of U.S. Chukchi and Beaufort Seas, but potentially more common in deeper waters over the continental slope* [2, 5]. Common off Greenland [2].

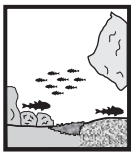


Geographic distribution of Longear Eelpout (*Lycodes seminudus*) within Arctic Outer Continental Shelf Planning Areas [4] based on review of published literature and specimens from historical and recent collections [1, 2, 5].

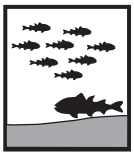
Depth Range: 50–1,400 m, mostly 200–600 m [2, 6]. In general, eelpout spawning and larvae occur at same depths that adults inhabit [1].



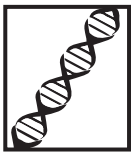
Benthic and reproductive distribution of Longear Eelpout (*Lycodes seminudus*).



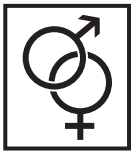
Habitats and Life History
Eggs—Time to hatching: Unknown. Size: Unknown. Habitat: Benthic [1].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Benthic [1].
Juveniles—Age and size: Unknown. Habitat: Benthic [1].
Adults—Age and size at first maturity: Unknown. Maximum age: Unknown. Maximum size: 56 cm TL [3]. Habitat: Benthic [1].
Substrate—Mud or mud-clay [7].
Physical/chemical—Temperature: -1.7–4.9 °C [5]. In Russia, almost exclusively at less than 0 °C [6]. Salinity: Marine, high salinity [6].



Behavior
Diel—Unknown.
Seasonal—Unknown.
Reproductive—Unknown.
Schooling—Unknown.
Feeding—Unknown.

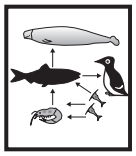


Populations or Stocks
There have been no studies.

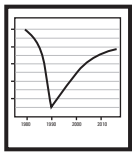


Reproduction
Mode—Separate sexes, oviparous.
Spawning season—Unknown.
Fecundity—Unknown.

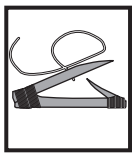
Food and Feeding
Food items—Amphipods, shrimps, isopods, polychaetes [6].
Trophic level—3.45 standard error 0.44 [8].



Biological Interactions
Predators—Unknown.
Competitors—Likely other benthic microcarnivores, including flatfishes, snailfishes, and other eelpouts.

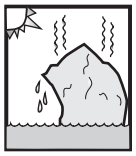


Resilience
Low, minimum population doubling time: 4.5–14 years (Preliminary *K* or Fecundity) [8].

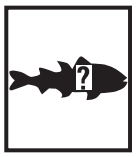


Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Longear Eelpout are not commercially harvested.



Potential Effects of Climate Change
Unknown. The Longear Eelpout is an endemic Arctic species occurring most commonly in deep water habitats over the slope [2]. Not enough is known about this species to predict climate change effects.



Areas for Future Research [B]
Little is known about biology and ecology of this species from the region. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Mecklenburg, C.W., Møller, P.R., and Steinke, D., 2011, Biodiversity of Arctic marine fishes—Taxonomy and zoogeography: Marine Biodiversity, v. 41, no. 1, p. 109–140, Online Resource 1. [2]

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Scalebelly Eelpout (*Lycodes squamiventer*)

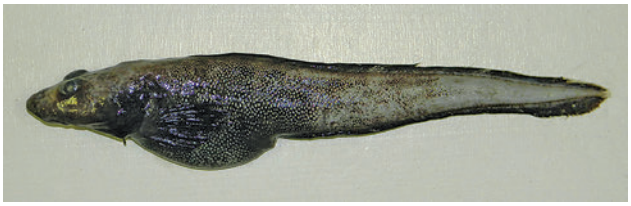
Jensen, 1904

Family Zoarcidae

Note: *Except for geographic range data, all information is from areas outside of the study area.*

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

Ecological Role: This species generally does not occur on the continental shelves in the Arctic Ocean but likely has some ecological significance in the relatively unexplored, deep waters of the U.S. Chukchi and Beaufort Seas.

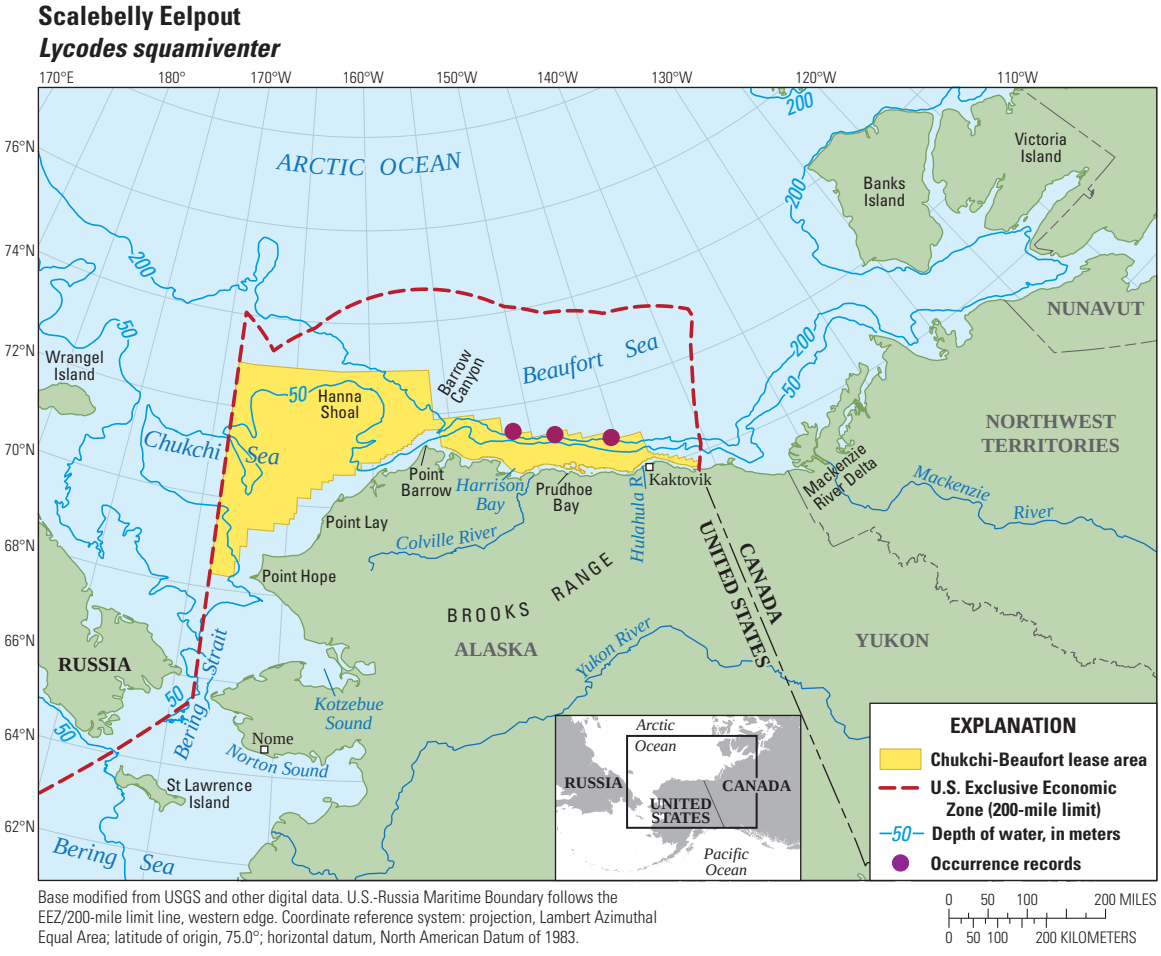


Scalebelly Eelpout (*Lycodes squamiventer*), 358 mm, Beaufort Sea, 2012. Photograph by C.W. Mecklenburg, Point Stephens Research.

Physical Description/Attributes: Light to dark grayish brown body without bands or other marks. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 722)[1]. Swim bladder: Absent [1]. Antifreeze glycoproteins in blood serum: Unknown.

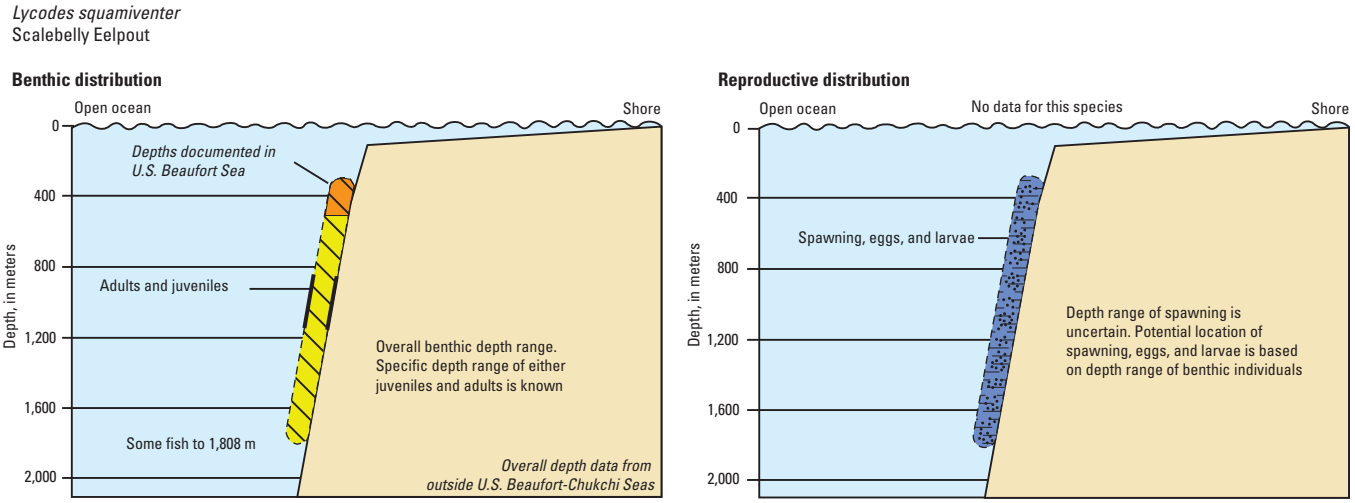
Range: *U.S. Beaufort Sea* [2]. Elsewhere, Canadian Beaufort Sea, Davis Strait off western Greenland; Greenland Sea, Norwegian Sea, Kara Sea, and off Faeroese-Shetland slope, Barents Sea [1, 3].

Relative Abundance: *Common in U.S. Beaufort Sea* and western Canada Beaufort Sea. *Although known from only a few records, this species could be more common on the slope as has been reported elsewhere in the Arctic* [2]. Common in Norwegian Sea and around Håkon Mosby Mud Volcano in Barents Sea [5].

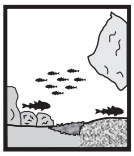


Geographic distribution of Scalebelly Eelpout (*Lycodes squamiventer*) within Arctic Outer Continental Shelf Planning Areas [4] based on review of literature and specimens from historical and recent collections [1-3].

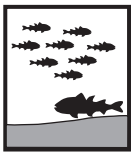
Depth Range: Benthic, 160–1,808 m [2], typically from 1,273–1,546 m in Norwegian Sea [5]. Reported but not confirmed as shallow as 160 m [6]. *Records from U.S. Beaufort Sea are depths of 357–500 m* [2]. In general, eelpout spawning and larvae occur at the same depths that adults inhabit [7].



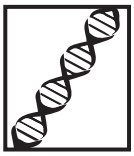
Benthic and reproductive distribution of Scalebelly Eelpout (*Lycodes squamiventer*).



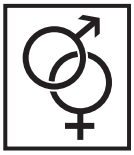
Habitats and Life History
Eggs—Size: 3.5 mm [5]. Time to hatching: Unknown. Habitat: Benthic [1, 5].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Benthic [1].
Juveniles—Age and size: Unknown. Habitat: Benthic [1].
Adults—Age and size at first maturity: Age unknown. Females at 14 cm, males at 17.9 cm [6]. Maximum age: 21 years [5]. Maximum size: 37 cm TL [2]. Habitat: Benthic, in deep waters on the slope [3, 5, 6]. Substrate—Muddy bottoms [1].
Physical/chemical—Temperature: -1.2–0.6 °C [5]. Salinity: Marine.



Behavior
Diel—Unknown.
Seasonal—Unknown.
Reproductive—Unknown.
Schooling—Unknown.
Feeding—Unknown.

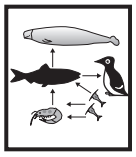


Populations or Stocks
There have been no studies.

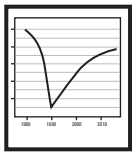


Reproduction
Mode—Separate sexes. Oviparous [8].
Spawning season—Autumn, but ripe females have been found in June [5, 6].
Fecundity—50–60 eggs [5, 6].

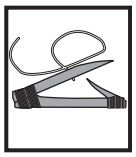
Food and Feeding
Food items—Various benthic species such as pogonophores, gastropods, amphipods, polychaetes, copepods, ophiuroids, bivalves, and crustaceans [5, 6].
Trophic level—3.4 ±0.4 standard error [9].



Biological Interactions
Predators—Unknown.
Competitors—Likely other benthic microcarnivores including some sculpins, flatfishes, snailfishes, and other eelpouts.

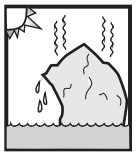


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Preliminary *K* or Fecundity) [9].

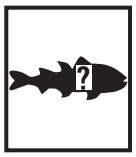


Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Scalebelly Eelpout are not commercially harvested.



Potential Effects of Climate Change
Unknown. The Scalebelly Eelpout is a predominantly Arctic, slope and deep-water species. Not enough information is available to evaluate potential climatic effects.



Areas for Future Research [B]
Little is known about the biology and ecology of this species from the region. Research needs include:
(1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Mecklenburg, C.W., Møller, P.R., and Steinke, D., 2011, Biodiversity of Arctic marine fishes—Taxonomy and zoogeography: Marine Biodiversity, v. 41, no. 1, p. 109–140, Online Resource 1. [3]

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Estuarine Eelpout (*Lycodes turneri*)

Bean, 1879

Family Zoarcidae

Estuarine Eelpout (*Lycodes turneri*), juvenile, 145 mm TL, Chukchi Sea, 2009. Photograph by C.W. Mecklenburg, Point Stephens Research. Fish shown is a juvenile.

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

Ecological Role: Unknown. Could be important in coastal food webs as this eelpout could be prey for piscivorous fishes and birds of the nearshore community.

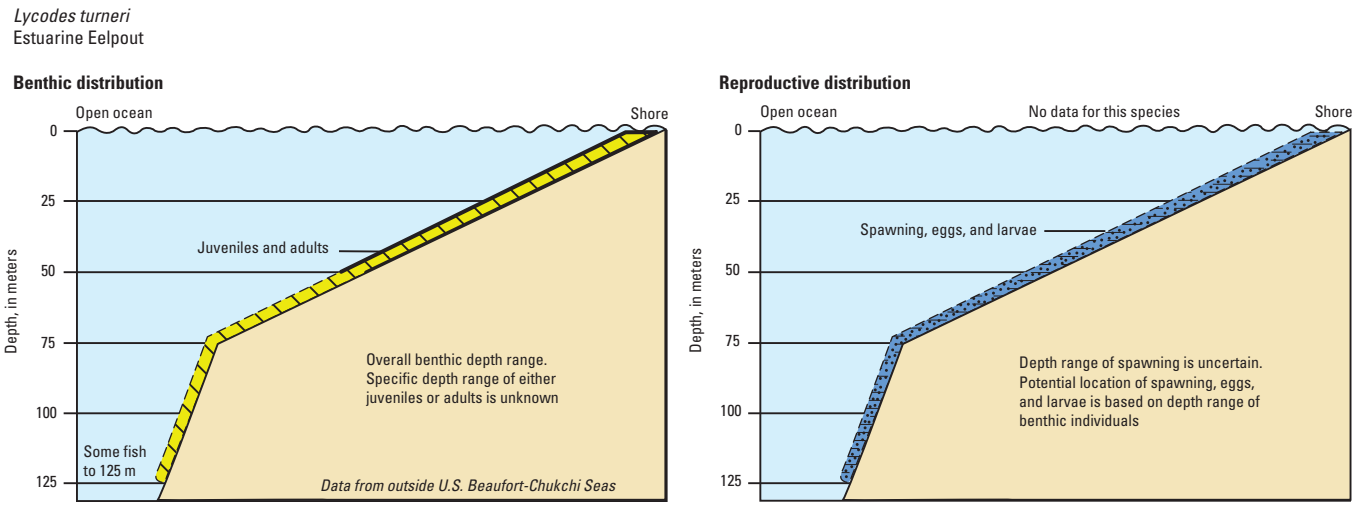
Physical Description/Attributes: Elongate, body with 10–12 bands. Color in adults is purple with bluish white bands bordered with purplish olive, or umber with creamy white bands and dark umber borders. Juveniles are creamy white with blackish bordered brown bands. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 709) [1]. Swim bladder: Absent [1]. Antifreeze glycoproteins in blood serum: Unknown.

Range: *U.S. Chukchi Sea and western U.S. Beaufort Sea in vicinity of Point Barrow.* Elsewhere in Alaska, southward in eastern Bering Sea to Bristol Bay. Worldwide, southward in western Bering Sea to Cape Olyutorskiy, Russia [2].

Relative Abundance: *Uncommon in U.S. Chukchi and Beaufort Seas* [2, 5, 6]. *A record from the eastern U.S. Beaufort Sea off Point Franklin was recently shown to be in error because of a mistake in a museum catalog; the fish were actually captured in the Chukchi Sea* [1].

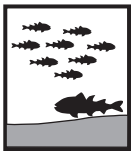
Geographic distribution of Estuarine Eelpout (*Lycodes turneri*) within Arctic Outer Continental Shelf Planning Areas [3] based on review of literature and specimens from historical and recent collections [1, 2, 4].

Depth Range: 1–125 m, typically less than 50 m [2]. Generally, eelpout spawning and larvae occur at same depths that adults inhabit [1].

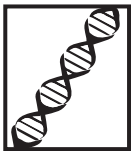


Benthic and reproductive distribution of Estuarine Eelpout (*Lycodes turneri*).

Habitats and Life History
Eggs—Size: Unknown. Time to hatching: Unknown. Habitat: Benthic [1].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Benthic [1].
Juveniles—Age and size: Unknown. Habitat: Benthic [1].
Adults—Age and size at first maturity: Unknown. Maximum age: Unknown. Maximum size: 64 cm TL [7]. Habitat: Benthic [1], limited to inner and mid-shelf [5].
Substrate—Soft bottoms [1].
Physical/chemical—Temperature: Not reported. Salinity: Taken mostly in or near estuaries [4].



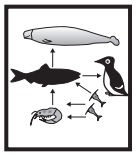
Behavior
Diel—Unknown.
Seasonal—Unknown.
Reproductive—Unknown.
Schooling—Unknown.
Feeding—Unknown.



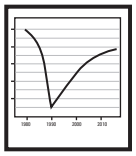
Populations or Stocks
There have been no studies.

Reproduction
Mode—Unknown.
Spawning season—Unknown.
Fecundity—Unknown.

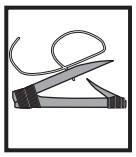
Food and Feeding
Food items—Unknown.
Trophic level—3.36 standard error 0.44 [8]



Biological Interactions
Predators—Unknown.
Competitors—Unknown.

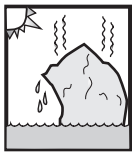


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Preliminary *K* or Fecundity) [8].

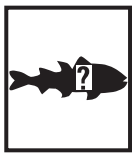


Traditional and Cultural Importance
Reported in the late 1800s to be an important food fish at Saint Michael, a village on the coast of Norton Sound in the Alaskan Bering Sea [9].

Commercial Fisheries
Currently, Estuarine Eelpout are not commercially harvested.



Potential Effects of Climate Change
Unknown. Range expansions are possible with expansion of brackish water conditions.



Areas for Future Research [B] Little is known about the biology and ecology of this species from the region. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Allen, M.J., and Smith, G.B., 1988, Atlas and zoogeography of common fishes in the Bering Sea and northeastern Pacific: National Oceanic and Atmospheric Administration Technical Report NMFS 66, 151 p. [5].

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Blackline Prickleback (*Acantholumpenus mackayi*)
(Gilbert, 1896)

Family Stichaeidae

Blackline Prickleback (*Acantholumpenus mackayi*), 125 mm TL, Norton Sound, Bering Sea, 2004. Photograph by C.W. Mecklenburg, Point Stephens Research.

Note: *Except for physical description, relative abundance, and geographic range data, all information is from areas outside of the study area.*

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

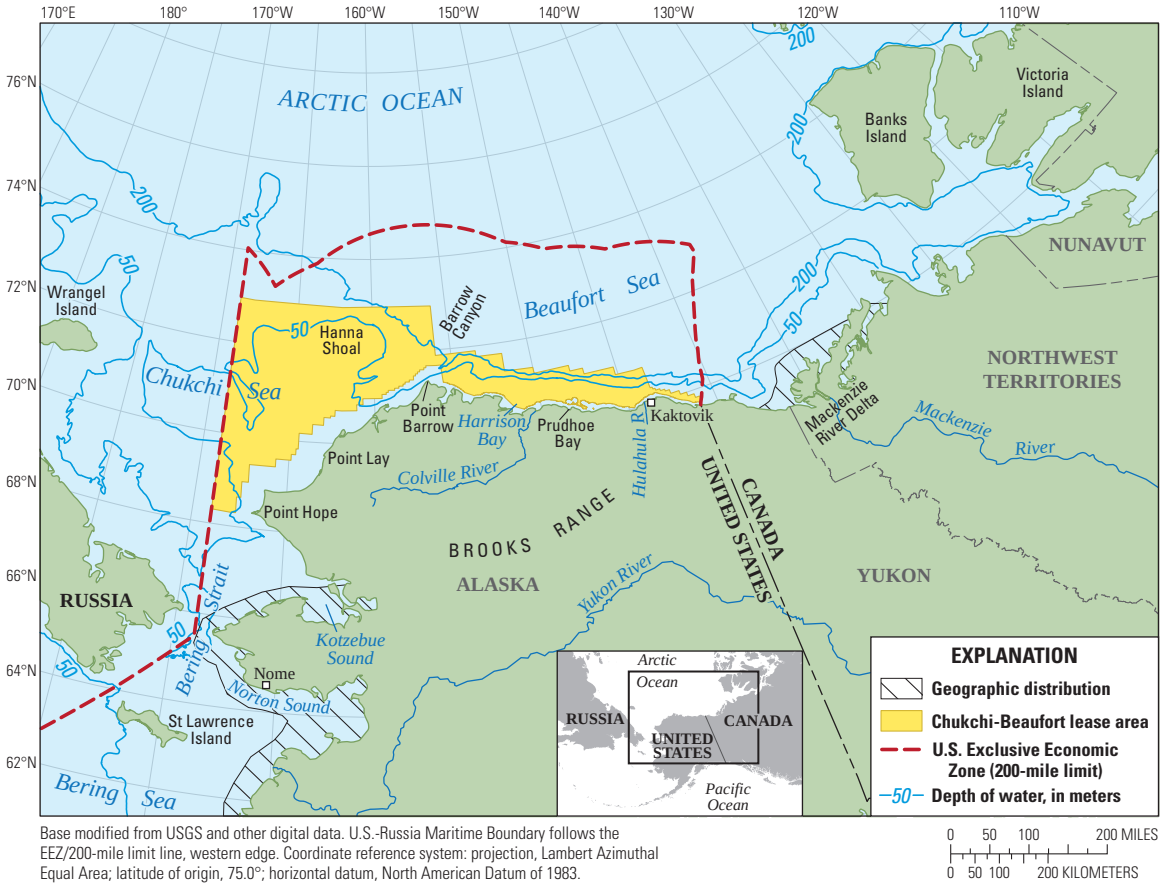
Ecological Role: Blackline Pricklebacks are uncommon in the U.S. Chukchi Sea and have not been reported from the U.S. Beaufort Sea. They are probably of relatively little ecological importance in U.S. Arctic waters.

Physical Description/Attributes: Elongate, compressed, slightly eel-like body colored yellow or brown with a dark line on back at base of dorsal fin and two dark broken lines below. Caudal fin is dark and unbanded. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 761) [1]. Swim bladder: Absent [2]. Antifreeze glycoproteins in blood serum: Unknown.

Range: *Southern U.S. Chukchi Sea, documented by one record from Kotzebue Sound and one from northern Bering Strait* [1, 3]. No other records off Arctic Alaska, but presence is assumed from occurrence in Canadian Beaufort Sea off the Mackenzie Delta. Elsewhere in Alaska, in eastern Bering Sea, Aleutian Islands, and Gulf of Alaska. Worldwide, in Sea of Japan and Sea of Okhotsk, along Pacific coast of Hokkaido, Japan, and southeastern Kamchatka Peninsula, Russia; in Canadian Beaufort Sea between Phillips Bay, Yukon Territory, and Wood Bay, Northwest Territories, Canada [3, 4].

Relative Abundance: *Uncommon in U.S. Chukchi Sea with patchy distribution mainly in vicinity of river mouths and deltas* [1]. Common in Sea of Japan and Sea of Okhotsk off Sakhalin Island, Russia [6, 7]. Common in Tuktoyaktuk Harbor and other brackish nearshore waters off the Mackenzie River Delta, Canadian Beaufort Sea [8].

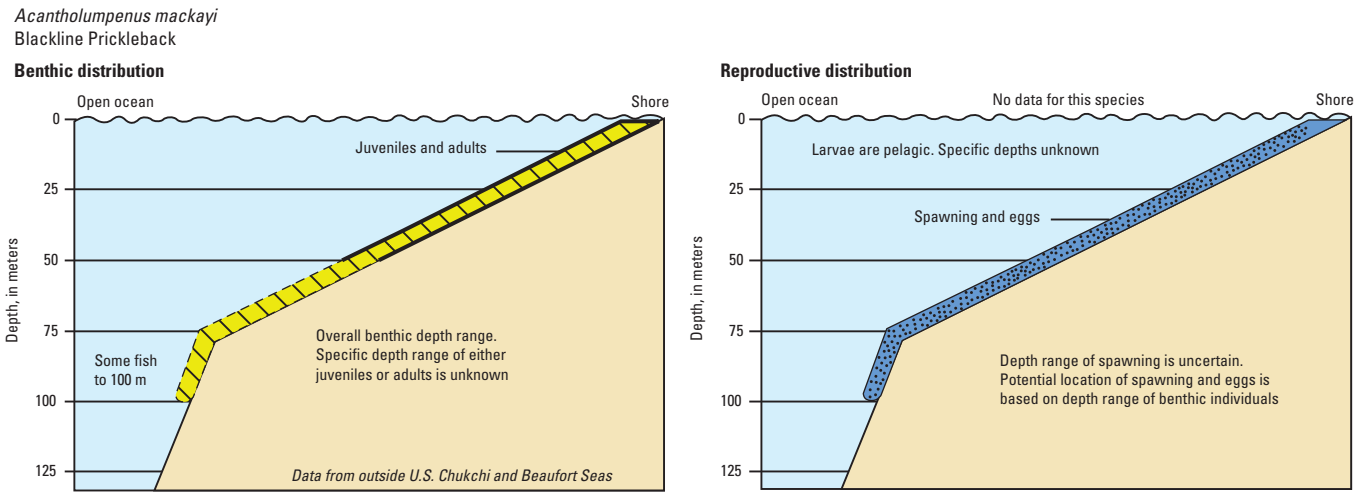
Blackline Prickleback
Acantholumpenus mackayi



Base modified from USGS and other digital data. U.S.-Russia Maritime Boundary follows the EEZ/200-mile limit line, western edge. Coordinate reference system: projection, Lambert Azimuthal Equal Area; latitude of origin, 75.0°; horizontal datum, North American Datum of 1983.

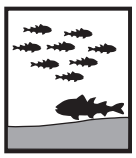
Geographic distribution of Blackline Prickleback (*Acantholumpenus mackayi*) within Arctic Outer Continental Shelf Planning Area [5] based on review of published literature and specimens from historical and recent collections [1, 3, 4].

Depth Range: 0.5–100 m, typically less than 50 m in Sea of Okhotsk [4]. In Alaska, documented from shallow water nearshore to depths of 66 m [4].

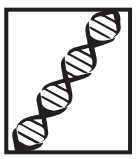


Benthic and reproductive distribution of Blackline Prickleback (*Acantholumpenus mackayi*).

Habitats and Life History
Eggs—Size: 1.0–1.4 mm in diameter [9]. Time to hatching: Unknown. Habitat: Benthic and adhesive [6, 10].
Larvae—Size at hatching: 15.8 mm [11]. Size at juvenile transformation: 21.5 mm [11]. Days to juvenile transformation: Unknown. Habitat: Pelagic [12].
Juveniles—Age and size: Age unknown. From 21.5 to 30–40 cm TL [6, 11]. Habitat: Benthic [12].
Adults—Age and size at first maturity: Off Sakhalin Island in Sea of Japan, both males and females mature between 30 and 40 cm TL [6] and, assuming fishes in Northwest Territories, Canada, have similar growth rates, at around 6 years. Males may be larger at age than females; however, females may be heavier at length than males [11]. Maximum age: 6 years for males and 14 years for females in Northwest Territories [11]. Maximum size: 70 cm SL. Habitat: Benthic [1–3, 6, 8].
Substrate—Sand, silt, or mud [1, 6, 8].
Physical/chemical—Temperature: 2.4–15.0 °C [4]. Salinity: Marine and brackish water (as low as 8 ppt) [6, 8].



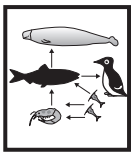
Behavior
Diel—Unknown.
Seasonal—Unknown.
Reproductive—Mature fish may move into shallow waters to spawn [6]. In general, prickleback adults brood their eggs [10].
Schooling—A non-schooling species [6].
Feeding—Feeds on bottom and occasionally in water column [13].



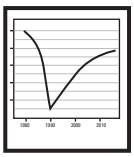
Populations or Stocks
There have been no studies.

Reproduction
Mode—Oviparous [10].
Spawning season—Likely September off the Northwest Territories, Canada [13]. In Sea of Japan off Sakhalin Island, Russia, fish in post-spawning condition were observed June and July [6].
Fecundity—Unknown.

Food and Feeding
Food items—Primarily amphipods, oligochaetes, and polychaetes, and the occasional clam, copepod, mysids, snail, fish egg, and fish in Canadian Arctic [14, 15].
Trophic level—3.1 standard error 0.31 [16].



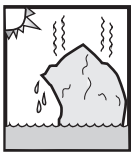
Biological Interactions
Predators—Off Kamchatka Peninsula, Russia, they are eaten by Great and Plain Sculpins [17].
Competitors—Unknown. Although likely other benthic species, such as smaller sculpins, eelpouts, and flatfishes.



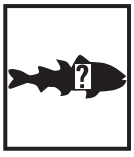
Resilience
Very low, minimum population doubling time: more than 14 years (Preliminary *K* or Fecundity) [16].

Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Blackline Prickleback are not commercially harvested.



Potential Effects of Climate Change
Blackline Prickleback are a predominantly Boreal species with an affinity for brackish waters, and could become more abundant in or expand into the U.S. Chukchi and Beaufort Seas as Arctic Ocean temperatures increase and the water freshens from increased ice melting.



Areas for Future Research [B]
Little is known about the ecology of this species. In particular, basic life history and habitat information is lacking; however, the species distribution and abundance in the region is limited, thus a need for directed studies is unwarranted at the present time.

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Stout Eelblenny (*Anisarchus medius*)

(Reinhardt, 1837)

Family Stichaeidae

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

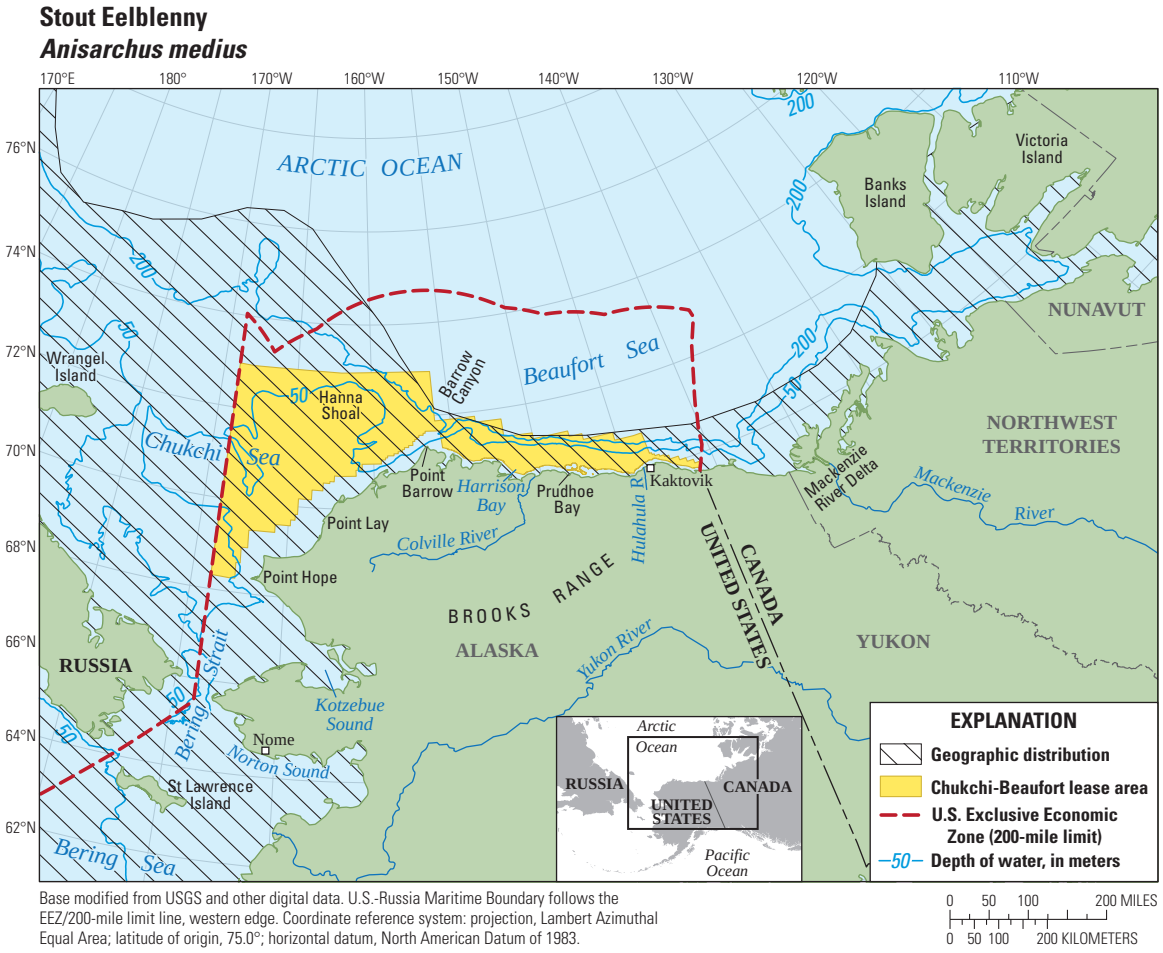
Ecological Role: Although this species has not been reported in the stomach contents of other organisms, its abundance in the U.S. Chukchi Sea and food habits observations elsewhere (for example, Black Guillemots in Hudson Bay) suggests this species could be of modest importance in regional food webs.

Stout Eelblenny (*Anisarchus medius*), 129 mm TL, Chukchi Sea, 2004. Photograph by C.W. Mecklenburg, Point Stephens Research.

Physical Description/Attributes: Elongate, compressed, slightly eel-like body colored creamy white, yellowish or reddish, marked with darker spots. Dorsal fin has oblique brownish orange bars and caudal fin is finely banded. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 758) [1]. Swim bladder: Absent [2]. Antifreeze glycoproteins in blood serum: Unknown.

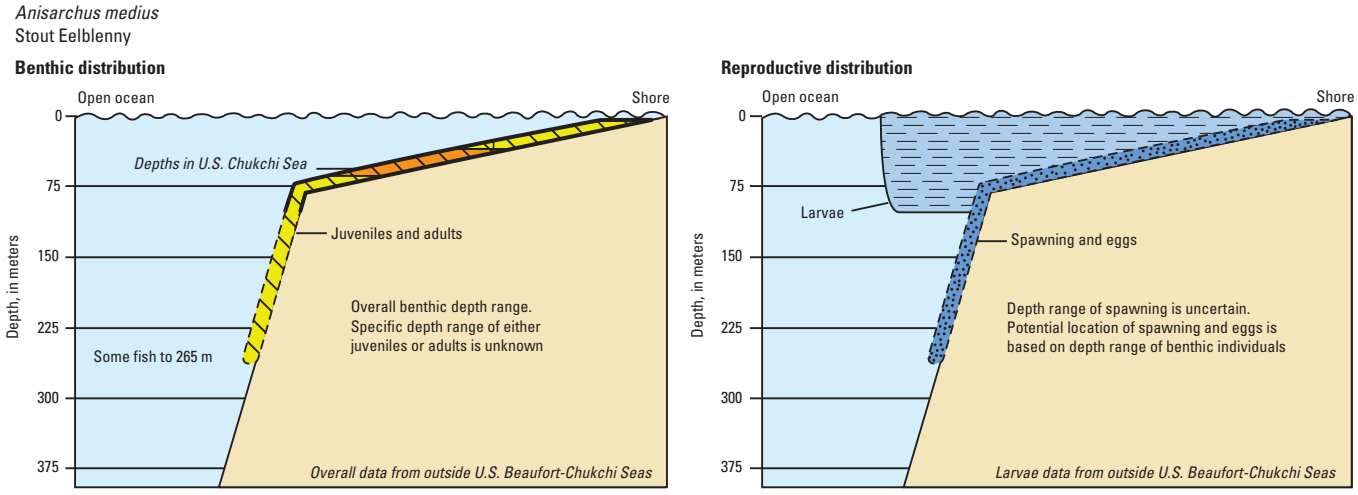
Range: *U.S. Chukchi Sea and Beaufort Seas, northward to the shelf edge and a little beyond* [3–5]. Elsewhere in Alaska, in Bering Sea and Gulf of Alaska. Worldwide, nearly circumpolar in the Arctic Ocean, also found from southern Greenland to the Gulf of St. Lawrence, the Barents Sea and along Siberian coasts to the Tatar Strait (northern Sea of Japan) and Sea of Okhotsk [4].

Relative Abundance: Common in western Chukchi Sea [3, 7] *and U.S. Chukchi Sea in some years* [5]. *Abundance in U.S. Beaufort Sea is unknown.* Common in eastern Bering Sea [8] but rare in Sea of Japan [9].

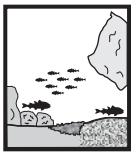


Geographic distribution of Stout Eelblenny (*Anisarchus medius*) within Arctic Outer Continental Shelf Planning Areas [6] based on review of published literature and specimens from historical and recent collections [1, 3–5].

Depth Range: *From nearshore to 150 m, typically less than 100 m in Chukchi and Beaufort Seas* [1, 3, 5, 7, 10]. Intertidal to 265 m in the northern Sea of Okhotsk [11]. Off Kodiak Island, Gulf of Alaska, larvae were found in 10–90 m of water during day and night [12].

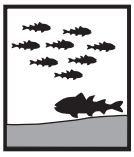


Benthic and reproductive distribution of Stout Eelblenny (*Anisarchus medius*).



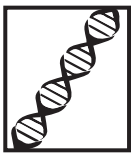
Habitats and Life History

Eggs—Size: Unknown. Time to hatching: Unknown. Habitat: Benthic and adhesive [13].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Off Kodiak Island, larvae were taken from March to July with densities peaking in April [12]. Off Kamchatka Peninsula, Russia, larvae were taken in June [14]. Habitat: Pelagic [12].
Juveniles—Age and size: Unknown. Habitat: Benthic [15].
Adults—Age and size at first maturity: Unknown. Maximum age: Unknown. Maximum size: 18 cm TL [1]. Habitat: Benthic, coastal species [5]
Substrate—Sand and mud [3, 7, 15].
Physical/chemical—Temperature: *-1.8–7.9 °C* [3, 16], but may prefer temperatures near 0 °C [7, 15]. Salinity: Marine or brackish-water [3, 7, 15].



Behavior

Diel—Off Kodiak Island larvae were found in water column during day and night [12].
Seasonal—Unknown.
Reproductive—Unknown. In general, Stout Eelblenny adults brood their eggs [13].
Schooling—Unknown.
Feeding—Unknown.



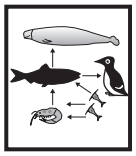
Populations or Stocks

There have been no studies.

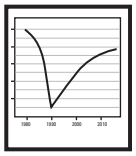
Reproduction

Mode—Oviparous.
Spawning season—Unknown.
Fecundity—Unknown.

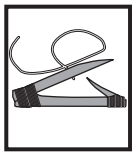
Food and Feeding
Food items—Primarily benthic prey such as polychaetes, bivalves, cumaceans, and amphipods [7].
Trophic level—3.22 standard error 0.36 [17].



Biological Interactions
Predators—In Hudson Bay, Canada, they are eaten by Black Guillemots [18].
Competitors—Unknown, but likely include other small benthic fishes, such as snailfishes, flatfishes, sculpins, and other pricklebacks.

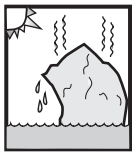


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Preliminary *K* or Fecundity) [17].

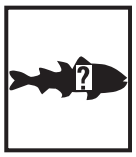


Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Stout Eelblenny are not commercially harvested.



Potential Effects of Climate Change
Stout Eelblenny are widely distributed in Boreal and Arctic waters. It is unclear how populations may shift in response to climate change or respond to marine ecosystem changes.



Areas for Future Research [B]
Little is known about the ecology of this species. In particular, research needs for this species in the study area include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Bearded Warbonnet (*Chirolophis snyderi*)

(Taranetz, 1938)

Family Stichaeidae

Note: *Except for geographic range data, all information is from areas outside of the study area.*

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

Ecological Role: Bearded Warbonnet are likely of minor ecological significance in the U.S. Arctic.

Bearded Warbonnet (*Chirolophis snyderi*), 122 mm TL, Chukchi Sea, 2010. Photograph by C.W. Mecklenburg, Point Stephens Research. The fish shown had been frozen and thawed before it was photographed, with consequent loss of color.

Physical Description/Attributes: Elongate, compressed, slightly eel-like body colored pinkish orange with lilac-red bands and vague spots on dorsal fins. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 752) [1]. Swim bladder: Absent [2]. Antifreeze glycoproteins in blood serum: Unknown.

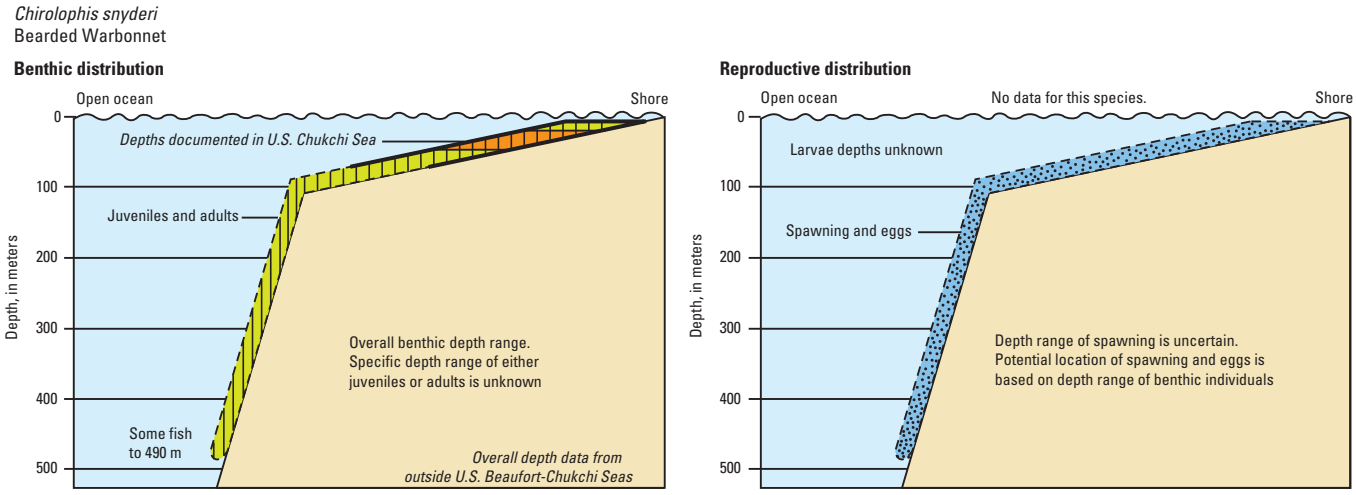
Range: *Point Barrow, Alaska* [6]. Elsewhere in Alaska, Bering Sea, Aleutian Islands west to Adak Island, and to northwestern Gulf of Alaska [4]. Worldwide, Sea of Okhotsk, west coast of Sakhalin Island, Russia (northern Sea of Japan), and Pacific coast of Hokkaido, Japan [1, 2, 4].

Relative Abundance: *Uncommon in U.S. Chukchi Sea, at least in offshore waters typically sampled, documented by single voucher specimens from five locations* [6]. Possibly common in shallower, nearshore waters, although uncommon north and rare south of the Alaska Peninsula [1].

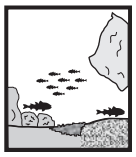
Base modified from USGS and other digital data. U.S.-Russia Maritime Boundary follows the EEZ/200-mile limit line, western edge. Coordinate reference system: projection, Lambert Azimuthal Equal Area; latitude of origin, 75.0°; horizontal datum, North American Datum of 1983.

Geographic distribution of Bearded Warbonnet (*Chirolophis snyderi*) within Arctic OCS Planning Areas [5] based on review of literature and specimens from historical and recent collections [1, 3, 6].

Depth Range: 3–490 m, typically nearshore and less than 70 m [2]. *The five known records from U.S. Chukchi Sea are from 17 to 46 m* [6].

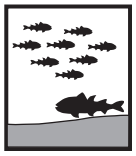


Benthic and reproductive distribution of Bearded Warbonnet (*Chirolophis snyderi*).



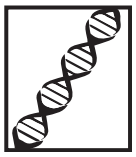
Habitats and Life History

Eggs—Size: Unknown. Time to hatching: Unknown. Habitat: Benthic and adhesive [7].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Unknown.
Juveniles—Age and size: Unknown. Habitat: Benthic [1].
Adults—Age and size at first maturity: Unknown. Maximum age: Unknown. Maximum size: To 41.7 cm TL [4]. Habitat: Benthic, coastal species [1].
Substrate—Soft and rocky bottoms [1].
Physical/chemical—Temperature: 2.4–10.6 °C [6]. Salinity: Unknown.



Behavior

Diel—Unknown.
Seasonal—Unknown.
Reproductive—Unknown. In general, warbonnet adults brood their eggs [7].
Schooling—Unknown.
Feeding—Unknown.



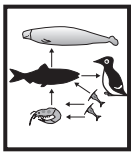
Populations or Stocks

There have been no studies.

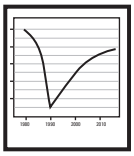
Reproduction

Mode—Oviparous[7].
Spawning season—Unknown.
Fecundity—Unknown.

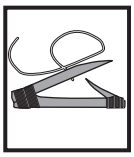
Food and Feeding
Food items—Unknown. Likely, small benthic invertebrates [2].
Trophic level—3.48 standard error 0.43 [8].



Biological Interactions
Predators—Unknown.
Competitors—Unknown, but likely to be other pricklebacks, as well as such diminutive benthic species as sculpins, snailfishes, and some eelpouts.

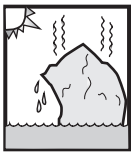


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Preliminary *K* or Fecundity) [8].

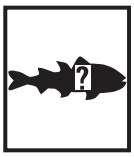


Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Bearded Warbonnet are not commercially harvested.



Potential Effects of Climate Change
Bearded Warbonnet, as a predominantly a Boreal Pacific species already having some presence in the Arctic marine environment [3], would be expected to increase in abundance and expand its distribution in the U.S. Chukchi and Beaufort Seas, wherever suitable shallow nearshore habitat occurs.



Areas for Future Research [B]
Limited information is available regarding the biology and ecology of this species in the U.S. Arctic. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

References Cited

Mecklenburg, C.W., Mecklenburg, T.A., and Thorsteinson, L.K., 2002, Fishes of Alaska: Bethesda, Maryland, American Fisheries Society, 1,116 p. [1]

Mecklenburg, C.W., Møller, P.R., and Steinke, D., 2011, Biodiversity of Arctic marine fishes—Taxonomy and zoogeography: Marine Biodiversity, v. 41, no. 1, p. 109–140, Online Resource 1. [3]

Mecklenburg, C.W., and Sheiko, B.A., 2004, Family Stichaeidae Gill 1864—Pricklebacks: California Academy of Sciences Annotated Checklists of Fishes no. 35, 36 p. [2]

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3. Mecklenburg, C.W., Møller, P.R., and Steinke, D., 2011, Biodiversity of Arctic marine fishes—Taxonomy and zoogeography: Marine Biodiversity, v. 41, no. 1, p. 109–140, Online Resource 1.
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Fourline Snakeblenny (*Eumesogrammus praecisus*)

(Krøyer, 1836)

Family Stichaeidae

Note: *Except for physical description, relative abundance, and geographic range data, all information is from areas outside of the study area.*

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

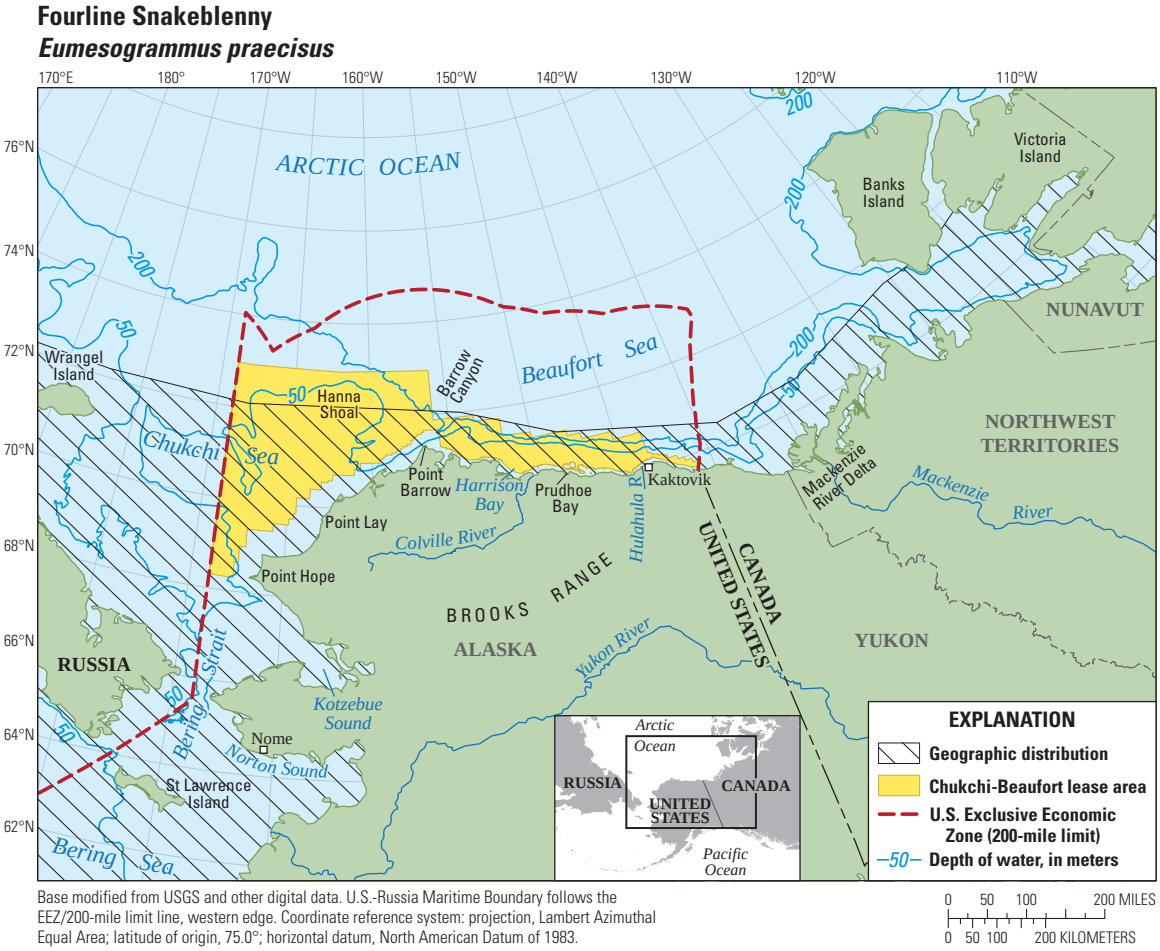
Ecological Role: Unknown, although its abundance in the U.S. Chukchi and western U.S. Beaufort Seas implies potential ecological significance in benthic ecosystems.

Fourline Snakeblenny (*Eumesogrammus praecisus*), 150 mm TL, Bering Strait, 2007. Photograph by C.W. Mecklenburg, Point Stephens Research.

Physical Description/Attributes: Elongate, compressed, slightly eel-like chocolate brown to gray body with vague, darker bands; 1–3 black spots, often ringed with white, near front of dorsal fin. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 746) [1]. Swim bladder: Absent [2]. Antifreeze glycoproteins in blood serum: Unknown.

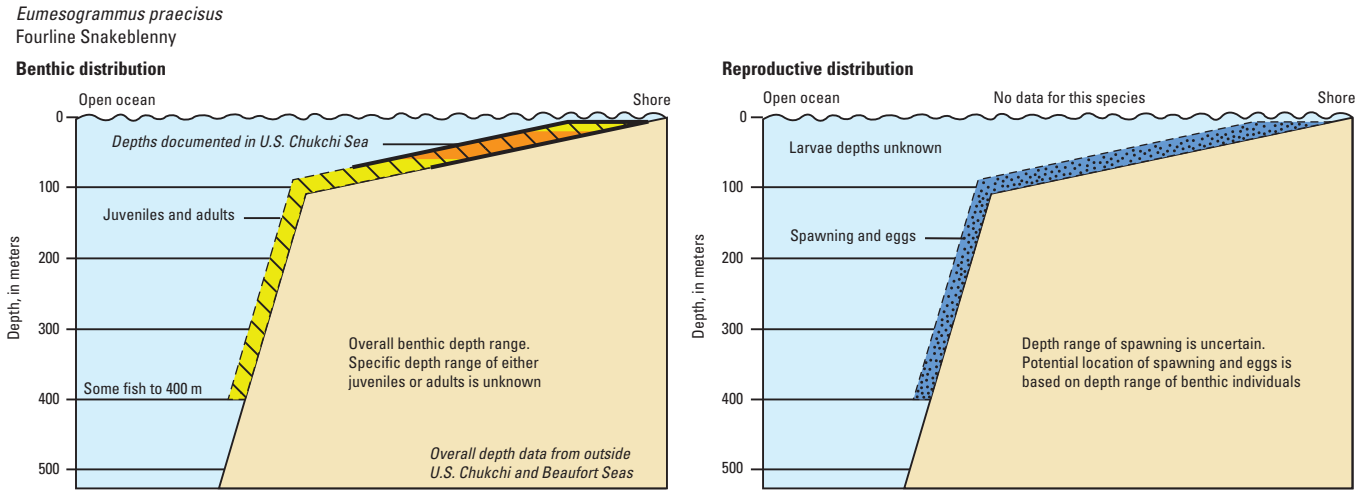
Range: *U.S. Chukchi and Beaufort Seas* [3]. Elsewhere in Alaska, in northeastern Bering Sea. Worldwide, East Siberian Sea through North American Arctic to west Greenland and south to Sea of Okhotsk and Gulf of St. Lawrence [1, 3].

Relative Abundance: *Uncommon in U.S. Chukchi and Beaufort Seas* [5]. Common off northwest and southwest Greenland [3].



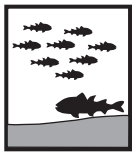
Geographic distribution of Fourline Snakeblenny (*Eumesogrammus praecisus*) within 2008–09 lease areas [4] based on review of published literature and specimens from historical and recent collections [1, 3, 5].

Depth Range: 5–6 m [5] to 400 m, typically less than 70 m [1–3]. *Taken in U.S. Chukchi Sea at 14–60 m* [5, 6] *and in U.S. Beaufort Sea at 183 m* [5].

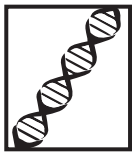


Benthic and reproductive distribution of Fourline Snakeblenny (*Eumesogrammus praecisus*).

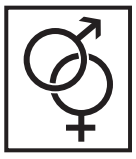
Habitats and Life History
Eggs—Size: Unknown. Time to hatching: Unknown. Habitat: Benthic and adhesive [6].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Unknown.
Juveniles—Age and size: Unknown. Habitat: Benthic [3].
Adults—Age and size at first maturity: Unknown. Maximum age: Unknown. Maximum size: 23 cm TL [1]. Habitat: Benthic [3]. Coastal algae-rock areas off Greenland [7].
Substrate—Sand or slightly silty bottom mixed with stones, pebbles, and gravel [1, 7].
Physical/chemical—Temperature: From -1.3–4 °C [5], to 2 °C or more in the Bering Sea [7]. Salinity: Marine [7].



Behavior
Diel—Unknown.
Seasonal—Unknown.
Reproductive—In general, Fourline Snakeblenny adults brood their eggs [9].
Schooling—Unknown.
Feeding—Unknown.

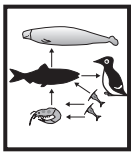


Populations or Stocks
There have been no studies.

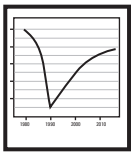


Reproduction
Mode—Oviparous [9].
Spawning season—Unknown.
Fecundity—Unknown.

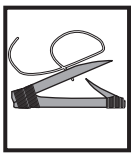
Food and Feeding
Food items—Amphipods in Greenland [7]. Likely, small benthic invertebrates [2].
Trophic level—3.5 standard error 0.50 [10].



Biological Interactions
Predators—Black Guillemots in Hudson Bay [11].
Competitors—Unknown, but likely other small and benthic fishes, such as sculpins, snailfishes, and flatfishes.

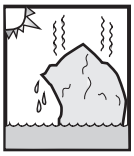


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Preliminary *K* or Fecundity) [10].

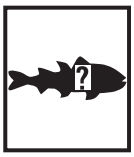


Traditional and Cultural Importance
None reported.

Commercial Fisheries
Fourline Snakeblenny are not commercially harvested currently.



Potential Effects of Climate Change
Fourline Snakeblenny reproduce in Arctic and Boreal Pacific waters and in the western North Atlantic. The species appears to be reestablishing a circumpolar distribution in response to long-term climate change (believed to be circumpolar in pre-Bering Land Bridge times) [3].



Areas for Future Research [B]
Little is known about the ecology of this species. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Mecklenburg, C.W., and Sheiko, B.A., 2004, Family Stichaeidae Gill 1864—Pricklebacks: California Academy of Sciences Annotated Checklists of Fishes no. 35, 36 p. [2]

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Daubed Shanny (*Leptoclinus maculatus*)

(Fries, 1838)

Family Stichaeidae

Daubed Shanny (*Leptoclinus maculatus*), 155 mm TL, Chukchi Sea, 2007. Photograph by C.W. Mecklenburg, Point Stephens Research.

Note: *Except for physical description, relative abundance, and geographic range data, all information is from areas outside of the study area.*

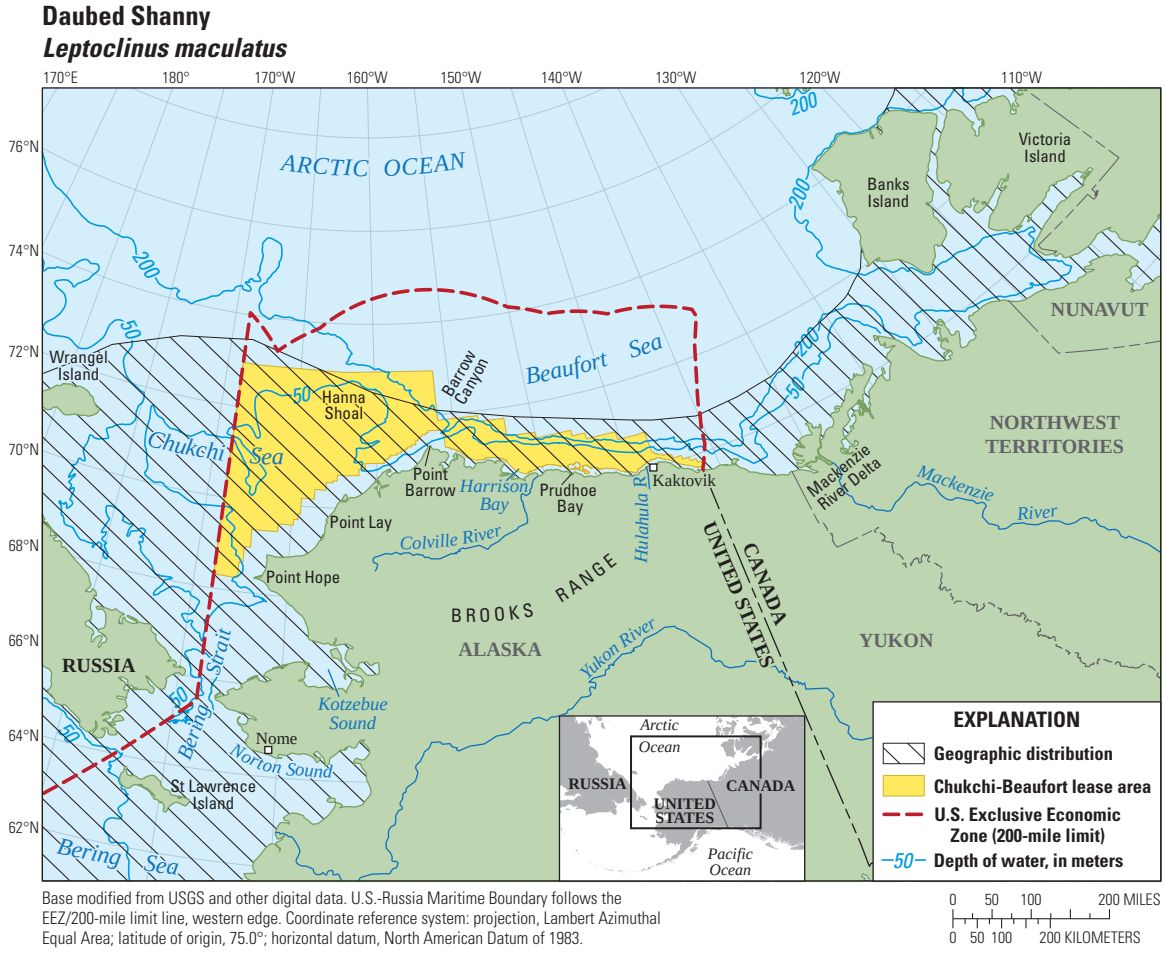
Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

Ecological Role: Unknown, but its scarcity in the U.S. Arctic implies it is of minimal ecological importance.

Physical Description/Attributes: Elongate, compressed, slightly eel-like body colored creamy white to yellowish brown with dark blotches, including four or five blackish brown saddles. Dorsal fin has dark spots or oblique bars, the caudal fin has three to five narrow dark bands, and other fins are unmarked and yellowish [1]. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 756) [1]. Swim bladder: Absent [2]. Antifreeze glycoproteins in blood serum: Present [3].

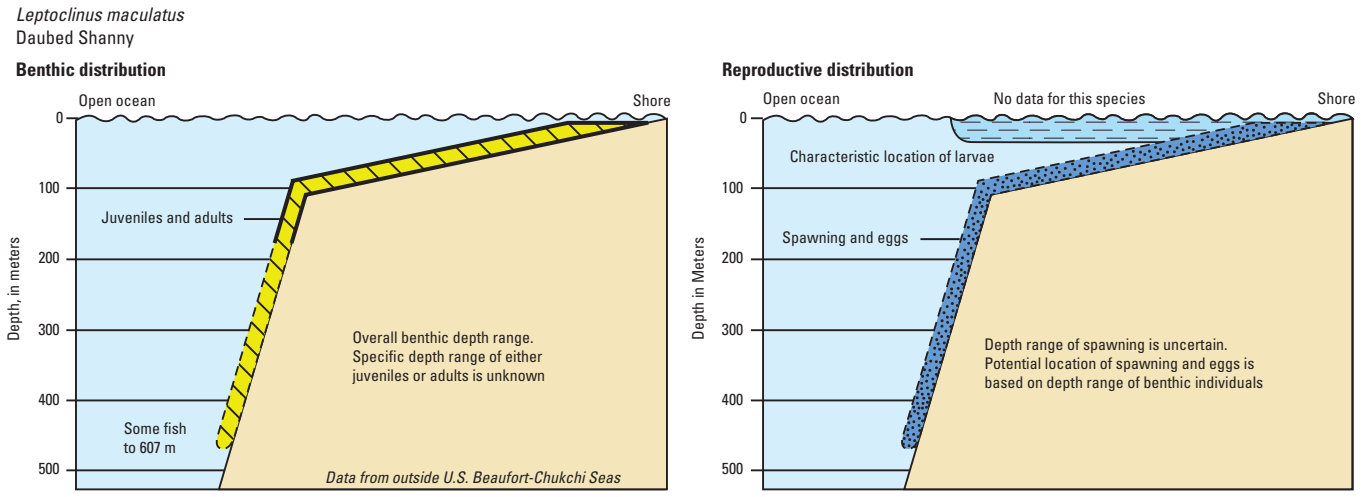
Range: *U.S. Chukchi and Beaufort Seas* [4]. Elsewhere in Alaska, from Bering Sea to Gulf of Alaska. Worldwide, from East Siberian and western (Russian) Chukchi Seas to Arctic Canada and southward to Sea of Okhotsk and Tatar Strait, Sea of Japan and Puget Sound, Washington. In the Atlantic Ocean, they also are found from Barents Sea, Svalbard Island and White Sea, Iceland and southward to southern Greenland, and Cape Cod, Massachusetts [4].

Relative Abundance: *Common in U.S. Chukchi and Beaufort Seas* [6]. Common in the eastern Bering Sea [7].



Geographic distribution of Daubed Shanny (*Leptoclinus maculatus*) within Arctic OCS Planning Areas [5] based on review of literature and specimens from historical and recent collections [1, 4, 6].

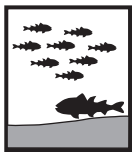
Depth Range: 2–773 m, usually less than 170 m [1, 4, 6], and possibly to 607 m [8]. Larvae were taken in near-surface waters off Kodiak Island [9]. May spawn in shallow waters [10].



Benthic and reproductive distribution of Daubed Shanny (*Leptoclinus maculatus*).

Habitats and Life History

Eggs—Size: 1.5 mm [3]. Time to hatching: Unknown. Habitat: Benthic and adhesive [3, 11].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: 7–8 cm [3, 12] Days to juvenile transformation: 2–3 years [3]. Habitat: Pelagic [3]. Off Kodiak Island, larvae were taken from April to August, with highest densities in April [9].
Juveniles—Age and size: At least 2 years and 7 cm [3]. Habitat: Young juveniles are pelagic [3] and older juvenile are benthic [3, 4].
Adults—Age and size at first maturity: Unknown. Maximum age: Unknown. Maximum size: 22 cm TL [13]. Habitat: Benthic, soft and low-relief hard sea floors [1, 3, 4, 14].
Substrate—Mud, sand, or stone and pebble bottoms [1].
Physical/chemical—Temperature: -1.6–11.5 °C [6]. Salinity: Marine and slightly brackish (as low as 26 ppt) [14, 15].



Behavior

Diel—Unknown.
Seasonal—Unknown.
Reproductive—May come into shallow waters to spawn [10]. In general, Daubed Shanny adults brood their eggs [11].
Schooling—Unknown.
Feeding—Unknown.

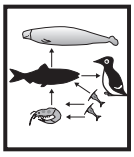
Populations or Stocks

There have been no studies.

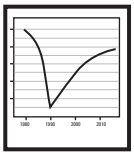
Reproduction

Mode—Oviparous [11].
Spawning season—Perhaps winter in Russia [14]. December–February in North Atlantic [16].
Fecundity—One female contained 970 eggs [14].

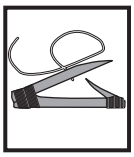
Food and Feeding
Food items—Small crustaceans and polychaetes [14]. Post-larval fish feed primarily on copepods [3].
Trophic level—3 standard error 0.00 [17].



Biological Interactions
Predators—In Canadian Arctic waters, Daubed Shanny are eaten by Black Guillemots and Thick-billed Murres [18]. In the North Pacific and Bering Sea, predators include Arrowtooth Flounder, Kamchatka Flounder, Greenland Halibut, Pacific Cod, Arctic Cod, skates, Walleye Pollock, Steller sea lions, and seals [3, 19–24].
Competitors—Unknown, but likely other small, benthic fishes (for example, sculpins, snailfishes, eelpouts, and pricklebacks).

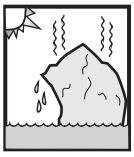


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Preliminary *K* or Fecundity) [17].

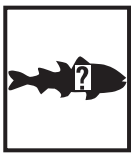


Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Daubed Shanny are not commercially harvested.



Potential Effects of Climate Change
Daubed Shanny have an Arctic-Boreal pattern of distribution. Populations are located in the North Pacific and North Atlantic Oceans. A possible effect of climate warming could be an increase in abundance of the species in Arctic seas as it reestablishes its former circumpolar Arctic distribution of pre-Bering Land Bridge times [3].



Areas for Future Research [B]
Little is known about the species from the region. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Slender Eelblenny (*Lumpenus fabricii*)

Reinhardt, 1836

Family Stichaeidae

Slender Eelblenny (*Lumpenus fabricii*), 136 mm TL, Chukchi Sea, 2004. Photograph by C.W. Mecklenburg, Point Stephens Research.

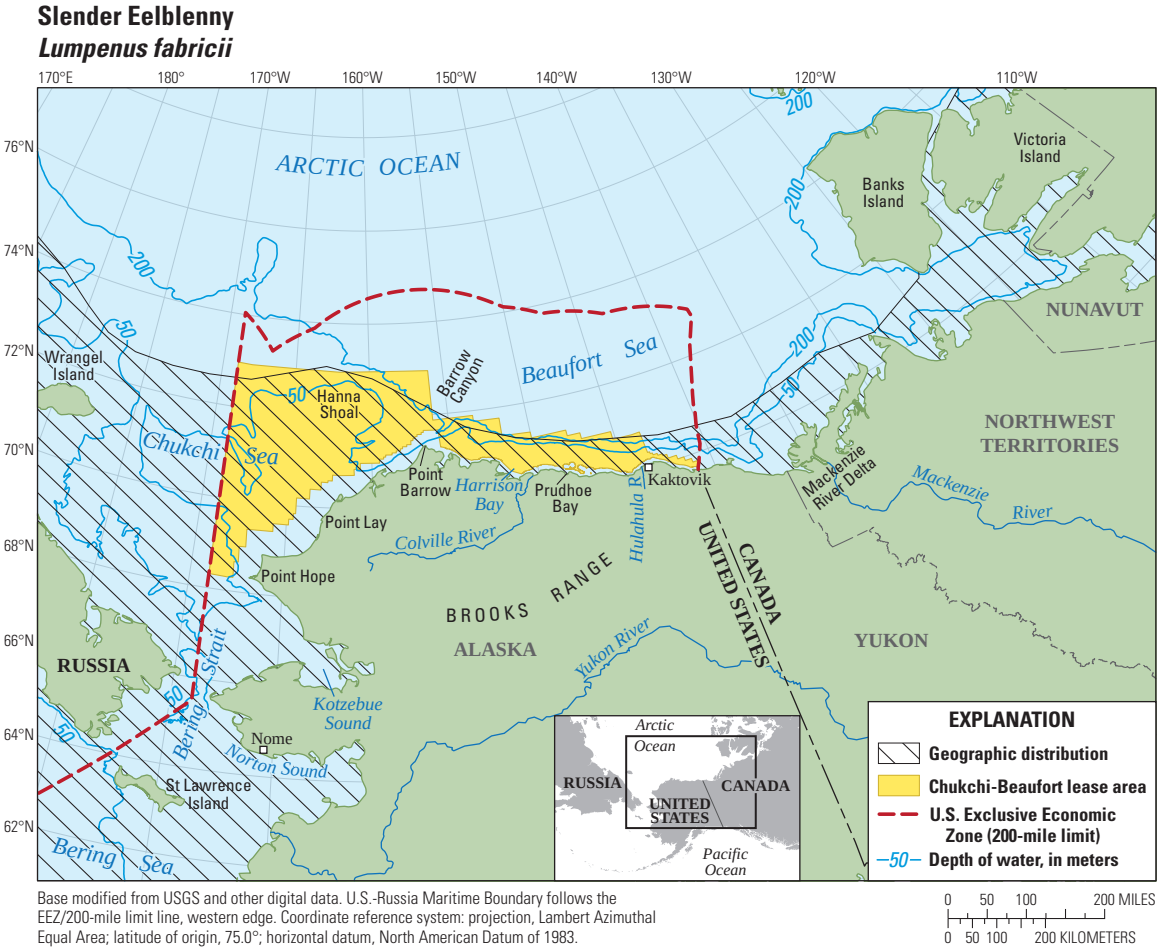
Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

Ecological Role: Unknown in U.S. Chukchi and Beaufort Seas. However, this species is common in these waters and is important prey for seabirds, marine mammals, and fishes in other parts of its range.

Physical Description/Attributes: Elongate, compressed, eel-shaped tan or cream colored body with irregular brown blotches or broken diagonal bars extending from the back to the lower sides. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 759) [1]. Swim bladder: Absent [2]. Antifreeze glycoproteins in blood serum: Unknown.

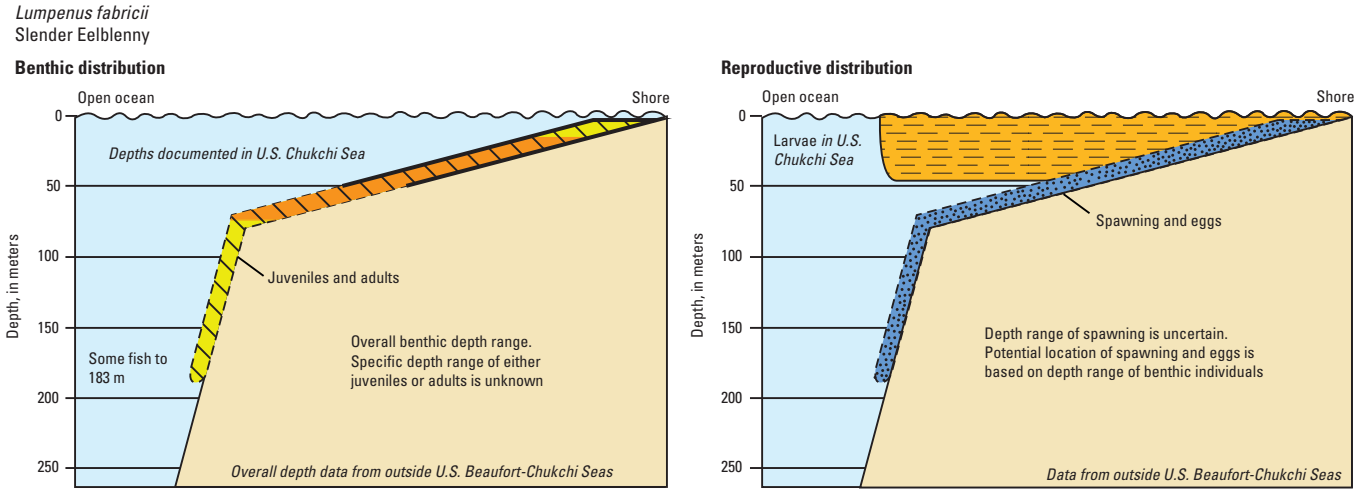
Range: *U.S. Chukchi and Beaufort Seas* [1, 3]. Elsewhere in Alaska, from eastern Bering Sea to Auke Bay, Alaska, in the eastern Gulf of Alaska [1] and Unalaska Island in the Aleutian Islands [4]. Worldwide, from the Barents Sea, eastward across Siberia and Arctic North America to western Greenland and south to Nova Scotia and southward in Pacific Ocean to western Bering Sea (off Pavla and Nataliya Bays) and northern Sea of Okhotsk; not in the eastern North Atlantic and Canadian High Arctic archipelago [3, 4].

Relative Abundance: *Common throughout central and eastern U.S. Chukchi Sea, and U.S. Beaufort Sea* [6–9]. Common in Canadian Beaufort Sea at least as far eastward as Tuktoyaktuk Harbor, Yukon Territory, Canada, [10] and in eastern Bering Sea [11]. Uncommon in Gulf of Alaska [12].

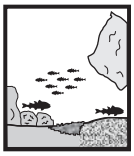


Geographic distribution of Slender Eelblenny (*Lumpenus fabricii*) within Arctic Outer Continental Shelf Planning Areas [5] based on review of published literature and specimens from historical and recent collections [1, 3, 4].

Depth Range: From subtidal to 183 m, typically less than 50 m; rarely intertidal [12–14]. Primarily inhabits the inner continental shelf [12]. *Taken in U.S. Chukchi Sea at less than 14–72 m* [6, 9, 13]. Pelagic larvae were found between surface and 48 m in western Chukchi Sea [13].

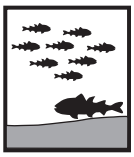


Benthic and reproductive distribution of Slender Eelblenny (*Lumpenus fabricii*).



Habitats and Life History

Eggs—Size: Unknown. Time to hatching: Unknown. In James Bay, eastern Arctic Canada, eggs are reported to hatch in May and June [15]. Habitat: Benthic [14].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Pelagic [13].
Juveniles—Age and size: Unknown. *Juveniles as small as 50 mm TL have been taken in bottom trawls* [6]. Habitat: Pelagic to benthic [1, 3, 13].
Adults—Age and size at first maturity: Unknown. One Kara Sea female with ripe eggs was 16.4 cm [14]. Maximum age: 17 years [10]. Maximum size: 36.5 cm TL [1]. Males may be larger at age (particularly in older fish) and may live longer [10]. Habitat: Benthic [1, 3], fish as large as 20.9 cm TL have been taken in water column [16]. Substrate-oriented, living among eelgrass, in algal beds, over rocky reefs [17, 18], and on relatively featureless seafloors of rock, sand, mud, and even anoxic mud [9].
Substrate—Rock, sand, mud, and *mixed bottoms* [9, 17, 18].
Physical/chemical—Temperature: *-1.8–15.6 °C* [9, 17]. Salinity: Marine and estuarine (to as low as 12 ppt [19, 20].



Behavior

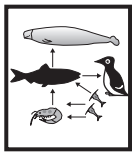
Diel—Unknown.
Seasonal—Unknown**.**
Reproductive—Lays its eggs among algae [14]. In general, adults of the Stichaeidae family brood their eggs [21].
Schooling—Unknown.
Feeding—Unknown.

Populations or Stocks

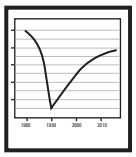
There have been no studies.

Reproduction
Mode—Oviparous.
Spawning season—Autumn in Russian Arctic and in southeastern Beaufort Sea [19, 22] and July off west Greenland [14].
Fecundity—One female contained 490 eggs [19].

Food and Feeding
Food items—In southeastern Beaufort Sea, a diverse array of benthic and epibenthic prey including polychaetes, amphipods, snails, fish eggs, clam siphons, insects, bryozoans, and priapulids [23, 24].
Trophic level—3.28 standard error 0.37 [25].



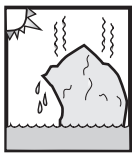
Biological Interactions
Predators—In the eastern Canadian, Arctic Cod, ringed seals, and Black Guillemots [26–28]. Elsewhere, Great and Plain Sculpins, Pacific Cod, Pacific Halibut, Starry Flounder, and Walleye Pollock [29–32].
Competitors—Unknown, but likely many small, benthic fishes (for example, sculpins, snailfishes, flatfishes, and pricklebacks).



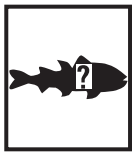
Resilience
Very low, minimum population doubling time: more than 14 years (Preliminary *K* or Fecundity) [25].

Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Slender Eelblenny are not commercially harvested.



Potential Effects of Climate Change
Slender Eelblenny reproduce in Arctic and Boreal waters. Warming Arctic waters appear to be reestablishing the circumpolar distribution they perhaps enjoyed in pre-Bering Land Bridge times [3].



Areas for Future Research [B]
Little is known about the ecology of this species from the region. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Snake Prickleback (*Lumpenus sagitta*)

Wilimovsky, 1956

Family Stichaeidae

Snake Prickleback (*Lumpenus sagitta*), 201 mm, northern Bering Sea, 2011. Photograph by C.W. Mecklenburg, Point Stephens Research.

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

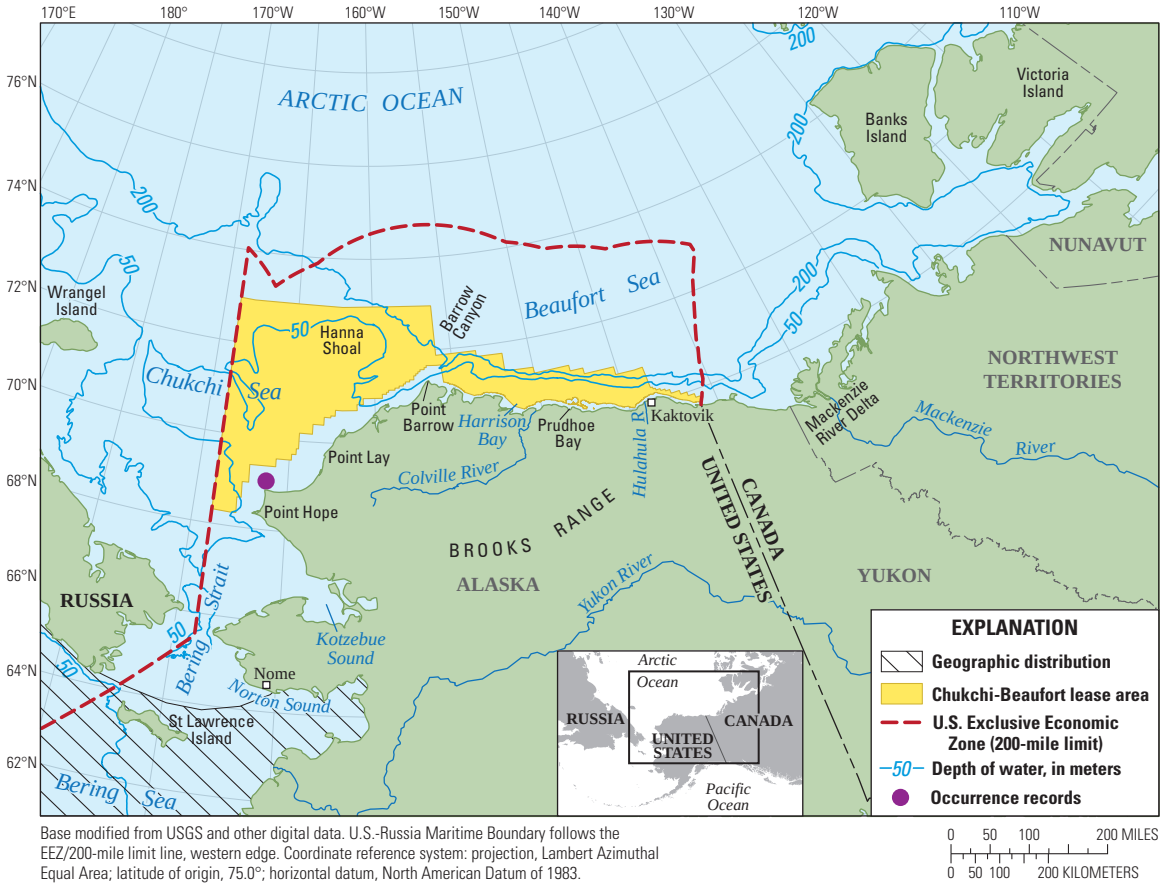
Ecological Role: Unknown. This species is known in the U.S. Chukchi Sea from only one record. It has not been reported from the Beaufort Sea. In these Arctic waters, it is replaced by the Slender Eelblenny (*L. fabricii*).

Physical Description/Attributes: Elongate, compressed, slightly eel-like body colored light green to tannish or gray dorsally and cream ventrally. Midbody has row of dark, dash-like or oval marks and upper body has small dark blotches or streaks. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 760) [1]. Swim bladder: Absent [2]. Antifreeze glycoproteins in blood serum: Unknown.

Range: *One (uncertain) record from U.S. Chukchi Sea north of Cape Lisburne at 69°04'N, 166°12'W* [3, 4]. Elsewhere in Alaska, from Bering Sea to eastern Aleutian Islands and southeastern Gulf of Alaska. Worldwide, in Sea of Japan and Sea of Okhotsk to Commander Islands, Russia, and south to Humboldt Bay, northern California [1, 3].

Relative Abundance: *If present, rare in U.S. Chukchi Sea* [3]. Common in southeastern Alaska [6]. Common in Sea of Japan [7].

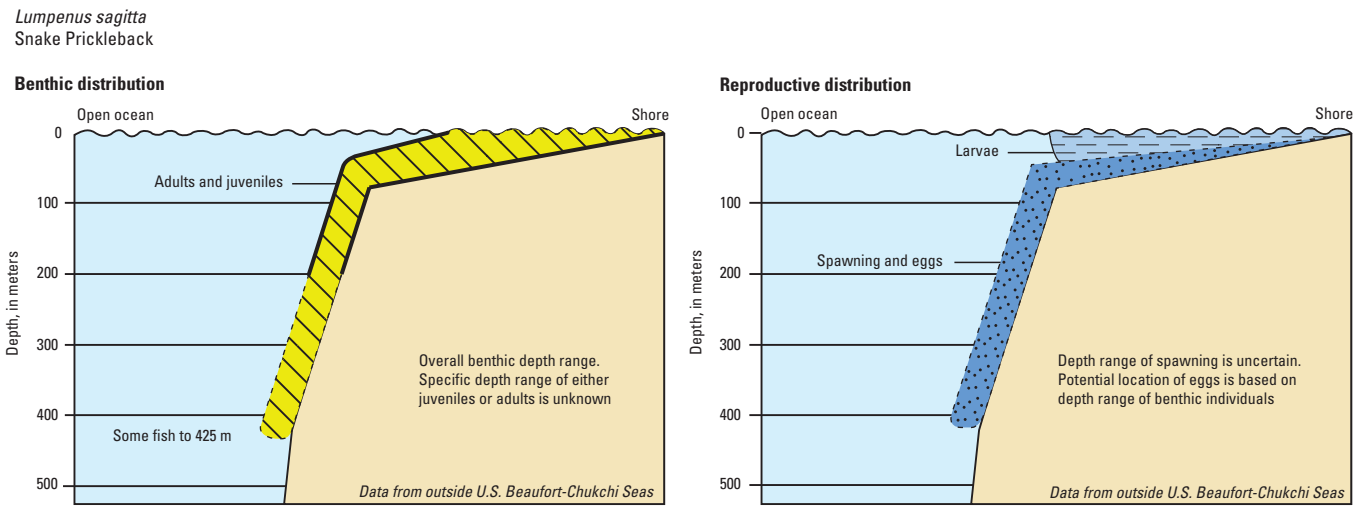
Snake Prickleback
Lumpenus sagitta



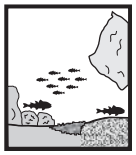
Base modified from USGS and other digital data. U.S.-Russia Maritime Boundary follows the EEZ/200-mile limit line, western edge. Coordinate reference system: projection, Lambert Azimuthal Equal Area; latitude of origin, 75.0°; horizontal datum, North American Datum of 1983.

Geographic distribution of Snake Prickleback (*Lumpenus sagitta*) within Arctic Outer Continental Shelf Planning Areas [5] based on review of published literature and specimens from historical and recent collections [3, 4].

Depth Range: Nearshore at intertidal depths to 425 m [1, 3], typically shallower than 200 m [3]. Larvae are pelagic, in surface waters [8, 9].

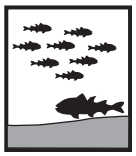


Benthic and reproductive distribution of Snake Prickleback (*Lumpenus sagitta*).



Habitats and Life History

Eggs—Size: Unknown. Time to hatching: Unknown. Larvae have been taken as early as February in Gulf of Alaska [8]. Habitat: Likely benthic [8].
Larvae—Size at hatching: 5 mm [10]. Size at juvenile transformation: 48–52 mm SL [10, 11]. Days to juvenile transformation: Unknown. Habitat: Pelagic [8, 9].
Juveniles—Age and size: Habitat: Benthic, among eelgrass, kelp, and bare bottoms [1, 3, 6].
Adults—Age and size at first maturity: Unknown. Maximum age: Unknown. Maximum size: 51 cm TL [1]. Habitat: Benthic, shelf species [1], among eelgrass, kelp, and over bare bottoms [3, 6, 8].
Substrate—Sand and mud bottoms, sometimes with small pebbles or broken shells, and cobble [11, 12].
Physical/chemical—Temperature: Unknown. Salinity: Nearly fresh water to marine [13].



Behavior

Diel—Unknown.
Seasonal—Migrates into shallow waters in summer and early autumn off British Columbia, Canada [14].
Reproductive—Unknown. In general, adult prickleback brood their eggs [15].
Schooling—Unknown.
Feeding—Mostly benthic feeder [16].

Populations or Stocks

There have been no studies.

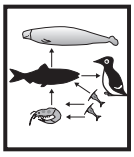
Reproduction

Mode—Oviparous [15].
Spawning season—Unknown.
Fecundity—Unknown.

Food and Feeding

Food items—Mainly benthic organisms. In Puget Sound and the Strait of Juan de Fuca, bivalves dominated, followed by tanaids and polychaetes, and then gammarids and harpacticoids [16]. Juveniles in the nearshore zone of Kodiak Island, Alaska, fed on polychaetes, gammarids, clam siphons, ostracods, and fish eggs [17]. Larval diets consist almost entirely of copepods [9]

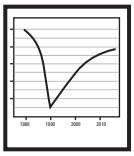
Trophic level—3.1 standard error 0.32 [18].



Biological Interactions

Predators—A wide variety of fishes including Pacific Halibut, Pacific Cod, Flathead Sole, Pacific Staghorn Sculpin, Okhotsk Snailfish, Chinook Salmon, Sand Sole, and Spotted Spiny Dogfish [19–24]; harbor and ribbon seals [25, 26]; and cormorants, pigeon guillemots, and common murres [27–29].

Competitors—Unknown, but likely to be various small benthic-feeding taxa, including other pricklebacks, sculpins, and flatfishes.



Resilience

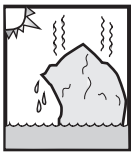
Very low, minimum population doubling time: more than 14 years (Preliminary *K* or Fecundity) [18].

Traditional and Cultural Importance

None reported.

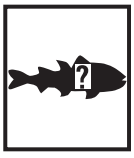
Commercial Fisheries

Currently, Snake Prickleback are not commercially harvested.



Potential Effects of Climate Change

The Snake Prickleback are predominantly a Boreal Pacific species. A northward shift if the species distribution could be expected.



Areas for Future Research [B]

Little is known about this species from the region. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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Arctic Shanny (*Stichaeus punctatus*)

(Fabricius, 1780)

Family Stichaeidae

Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

Ecological Role: *Unknown in the U.S. Chukchi and Beaufort Seas.* In the eastern Bering Sea and Hudson Bay, they are preyed upon by Black Guillemots and Thick-billed Murres [1, 2].

Physical Description/Attributes: Elongate, compressed, slightly eel-like body colored yellowish brown to bright scarlet with brown streaks and blotches. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 747) [3]. Swim bladder: Absent [4]. Antifreeze glycoproteins in blood serum: Unknown.

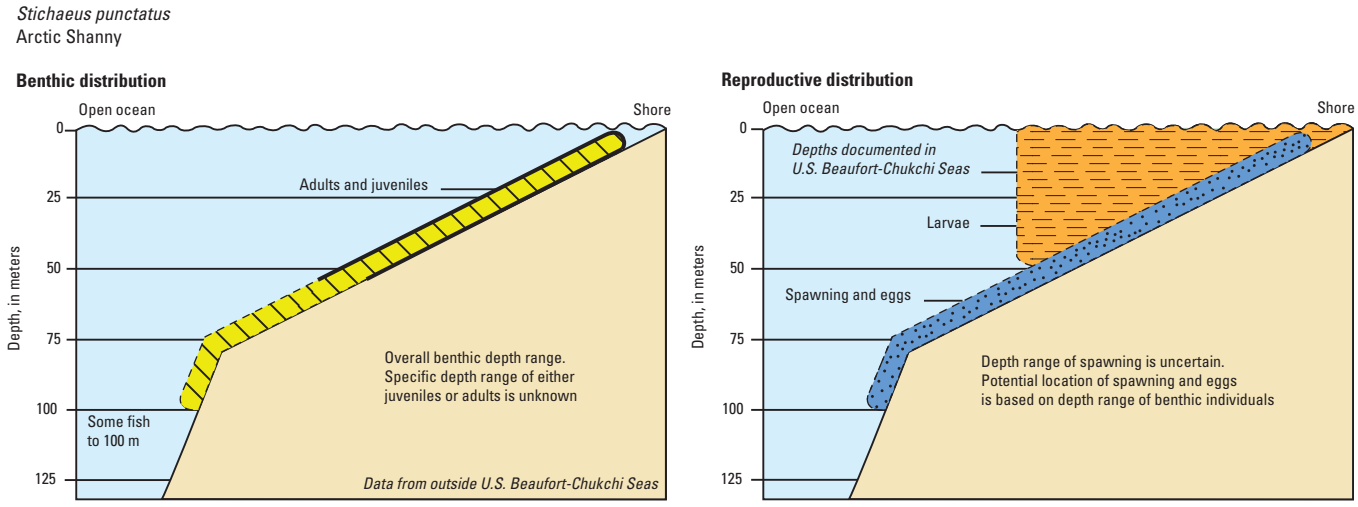
Arctic Shanny (*Stichaeus punctatus*), 105 mm, Chukchi Sea, 2009. Photograph by C.W. Mecklenburg, Point Stephens Research.

Range: *U.S. Chukchi and Beaufort Seas* [5]. Found in all Alaskan marine waters. Worldwide, from East Siberian Sea through Canadian Arctic to west Greenland, southward to Okhotsk and Japan Seas, northern British Columbia, Hudson Bay, Gulf of St. Lawrence, and banks off Newfoundland and Nova Scotia to Gulf of Maine [5].

Relative Abundance: *Common in U.S. Chukchi and Beaufort Seas* [5, 8]. In Pacific region, common at least in Cook Inlet, eastern and northern Bering Sea, and in northern Sea of Okhotsk, [9–11].

Geographic distribution of Arctic Shanny (*Stichaeus punctatus*) within Arctic Outer Continental Shelf Planning Areas [6] based on review of published literature and specimens from historical and recent collections [3, 5, 7].

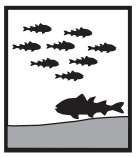
Depth Range: Shallow subtidal to 100 m, typically less than 55 m [3, 4, 11, 12]. Larvae have been taken from the surface to 110 m [13]. *In U.S. Chukchi Sea, 3 pelagic larvae were collected between the surface and 48 m* [14].



Benthic and reproductive distribution of Arctic Shanny (*Stichaeus punctatus*).

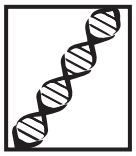
Habitats and Life History

Eggs—Size: 1.7 mm [13]. Time to hatching: Unknown. Habitat: Benthic [13].
Larvae—Size at hatching: Unknown. Size at juvenile transformation: As small as 2.5–3.0 cm TL [15, 16]. Days to juvenile transformation: Unknown. Habitat: Pelagic [16].
Juveniles—Age and size: 2.5 to at least 11 cm [16]. Habitat: Benthic [3, 5], structure-covered, nearshore sea floors among eelgrass beds and understory kelps [15, 17–19].
Adults—Age and size at first maturity: Age unknown. A few mature at 11.0 cm SL [15]. Maximum age: 5 years [15]. Maximum size: 22 cm TL [3]. Habitat: Benthic [3, 5], structure-covered, nearshore sea floors and eelgrass beds [15, 17–19], as well as offshore [3, 11].
Substrate—In the northwest Atlantic Ocean, juveniles are found most often in pebble and fine cobble and adults in coarse cobble and boulders [15]. *In U.S. Chukchi Sea, juveniles and adults were collected on shell hash, gravel, rock, sand, and mud* [11].
Physical/chemical—Temperature: 1.4–10.5 °C [11, 20]. Salinity: Marine and, at least occasionally brackish waters [9, 15]. Collected from Bering Strait at salinities of 30.62–32.56 ppt [11].



Behavior

Diel—Off Newfoundland, Canada, juveniles are territorial, a behavior which appears to decrease with age [13].
Seasonal—*Larvae have been collected in August in U.S. Chukchi Sea* [14] and small larvae are present in Gulf of Alaska in spring [16]. Off Newfoundland, larger fish move into shallow waters in June and July and by November, most fish of all sizes appear to migrate out of those waters [13].
Reproductive—*Unknown*. In general, members of the Stichaeidae family brood their eggs [21].
Schooling—Unknown.
Feeding—Unknown.



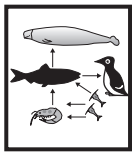
Populations or Stocks

There have been no studies.

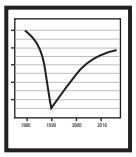
Reproduction

Mode—Oviparous.
Spawning season—Off Newfoundland, probably in mid-winter, perhaps in February and March [15].
Fecundity—At least 1,624–2,475 eggs, based on two females taken off Newfoundland and off Greenland [15].

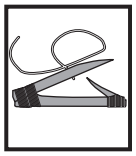
Food and Feeding
Food items—Off Newfoundland, fish up to 2 years feed on copepods, amphipods, and smaller quantities of polychaetes, isopods, mysids, and ostracods [15].
Trophic level—3.08 standard error 0.23 [22].



Biological Interactions
Predators—In eastern Bering Sea and Hudson Bay, Black Guillemots and Thick-billed Murres [1, 2].
Competitors—Unknown, but likely to be a range of small, benthic fishes, including various sculpins, flatfishes, and eelpouts.

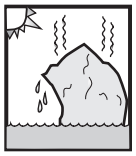


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (K=0.24) [22].

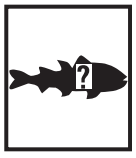


Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Arctic Shanny are not commercially harvested.



Potential Effects of Climate Change
Arctic Shanny reproduce in Arctic and Boreal Pacific waters. Changes in marine habitat conditions with climate warming may allow the species to reestablish the circumpolar distribution it is believed to have held in the past [5].



Areas for Future Research [B]
Little is known about the biology and ecology of this species from the region. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

Remarks

Farwell and others (1976) [15] give a maximum age of 6 years. However, they labeled individuals that are less than 1 year old (young-of-the-year) as "1 year olds." Thus, the three fish designated as 6 years old are actually age-5 fish.

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Banded Gunnel (*Pholis fasciata*)

(Bloch & Schneider, 1801)

Family Pholidae

Note: *Except for geographic range data, all information is from areas outside of the study area.*

Banded Gunnel (*Pholis fasciata*), 159 mm, eastern Bering Strait, 2004. Photograph by C.W. Mecklenburg, Point Stephens Research.

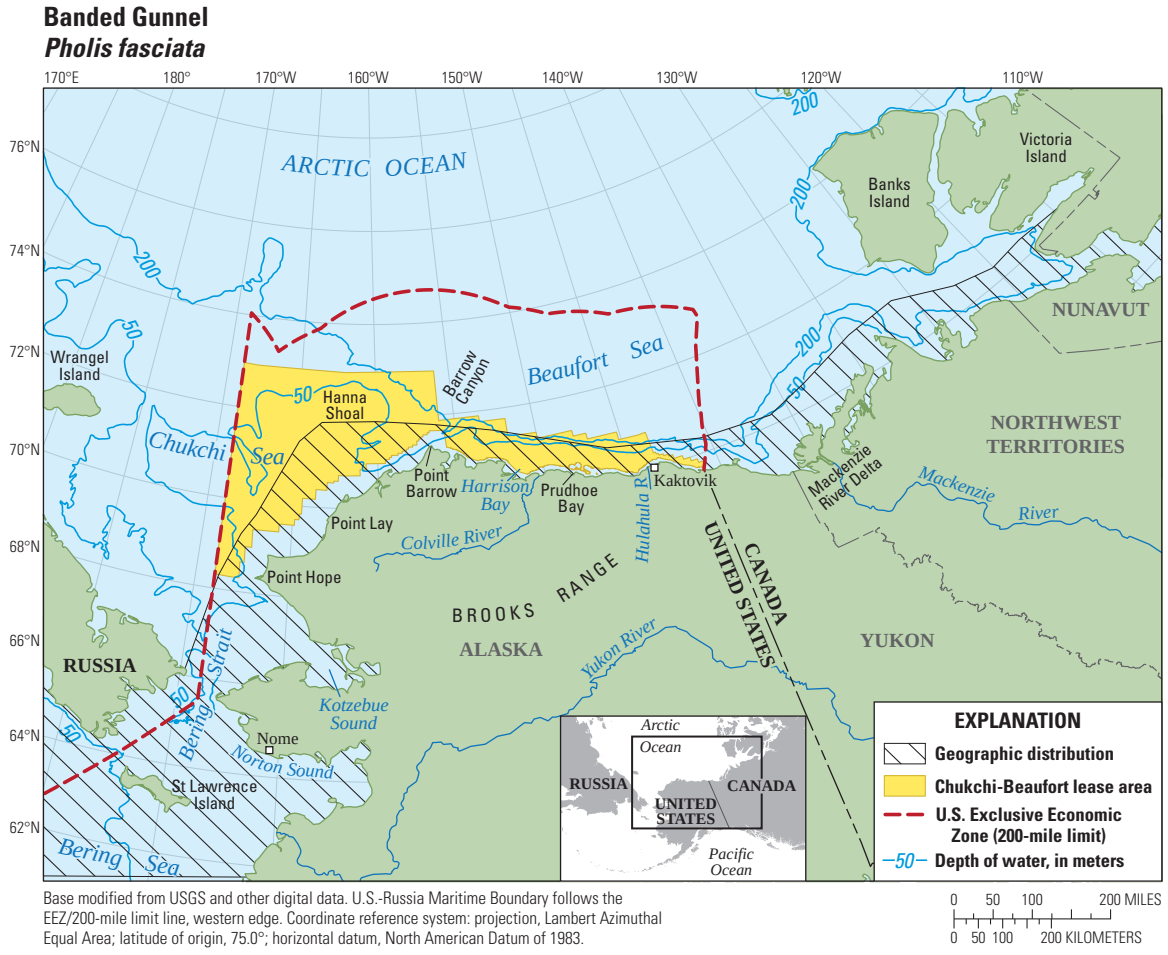
Colloquial Name: *None within U.S. Chukchi and Beaufort Seas.*

Ecological Role: Its apparent scarceness in the U.S. Chukchi and Beaufort Seas implies this species is of little ecological importance.

Physical Description/Attributes: Body elongate and strongly compressed. Bright reddish orange to greenish yellow with sinuous reddish black bands reaching the ventral surface, white blotches along the back and dorsal fin containing black spots [1]. For specific diagnostic characteristics, see *Fishes of Alaska* (Mecklenburg and others, 2002, p. 777) [1]. Swim bladder: Absent [1]. Antifreeze glycoproteins in blood serum: Unknown.

Range: *U.S. Chukchi Sea (and presumably U.S. Beaufort Sea* [4]. Elsewhere in Alaska, Bering Sea to western Gulf of Alaska at Kodiak Island. Worldwide, Canadian Beaufort Sea eastward to west Greenland, southward to Bay of Fundy and banks off Nova Scotia, and southward to Seas of Okhotsk and Japan [2].

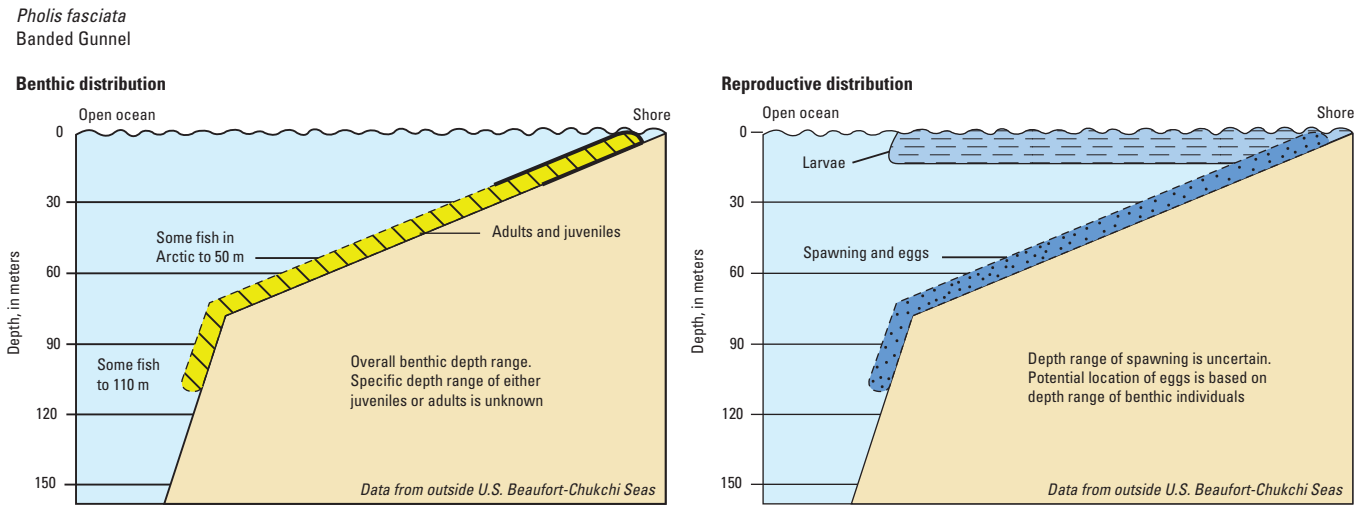
Relative Abundance: *Occasional in U.S. Chukchi Sea. As yet, no records from the U.S. Beaufort Sea* [2]. Common off Greenland [5].



Base modified from USGS and other digital data. U.S.-Russia Maritime Boundary follows the EEZ/200-mile limit line, western edge. Coordinate reference system: projection, Lambert Azimuthal Equal Area; latitude of origin, 75.0°; horizontal datum, North American Datum of 1983.

Geographic distribution of Banded Gunnel (*Pholis fasciata*) within Arctic Outer Continental Shelf Planning Areas [3] based on review of published literature and specimens from historical and recent collections [1, 2, 4].

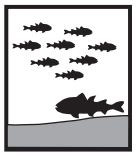
Depth Range: Shallow subtidal to 110 m [1, 5]. Less than 50 m in the Arctic Ocean, typically shallower than 20 m [1]. Documented in Bering Strait at 50 m [6, 7] Pelagic larvae were taken from 0 to 7 m in James Bay, Canada [8].



Benthic and reproductive distribution of Banded Gunnel (*Pholis fasciata*).

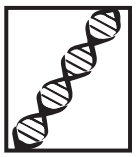
Habitats and Life History

Eggs—Size: Unknown. Time to hatching: Unknown. Habitat: Benthic, adhesive [9].
Larvae—Size at hatching: Unknown. Yolk-sac larvae taken in James Bay were 11–14 mm TL [8]. Size at juvenile transformation: Unknown. Days to juvenile transformation: Unknown. Habitat: Pelagic [9].
Juveniles—Age and size: Unknown. Habitat: Benthic, over rocky substrate and among clumps of algae [1].
Adults—Age and size at first maturity: Unknown. Maximum age: Unknown. Maximum size: 30 cm TL [1]. Habitat: Benthic, over rocky substrate and among clumps of algae [1].
Substrate—Sand, broken shell, gravel, and rock [1, 7].
Physical/chemical—Temperature: -1.0–10.5 °C [7, 8]. Salinity: Marine. Pelagic larvae were taken between 4.0 and 17.0 ppt [8].



Behavior

Diel—Unknown.
Seasonal—Unknown.
Reproductive—Unknown. Gunnels in general tend to guard their eggs [9].
Schooling—Unknown.
Feeding—Unknown.



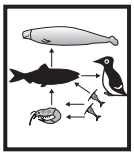
Populations or Stocks

There have been no studies.

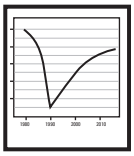
Reproduction

Mode—Oviparous [9].
Spawning season—May and early June in James Bay, Canada [8].
Fecundity—Unknown.

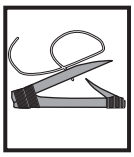
Food and Feeding
Food items—Unknown. Small crustaceans and mollusks for gunnels in general [10].
Trophic level—3.27 standard error 0.39 [11].



Biological Interactions
Predators—Black Guillemots in Hudson Bay in summer [12]. Sculpins, cods, other bottom fishes, and seabirds [13].
Competitors—Likely other microcarnivores, including sculpins, gunnels, and flatfishes.

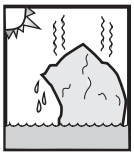


Resilience
Medium, minimum population doubling time: 1.4–4.4 years (Preliminary *K* or Fecundity) [11].

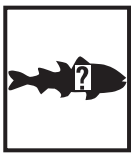


Traditional and Cultural Importance
None reported.

Commercial Fisheries
Currently, Banded Gunnel are not commercially harvested.



Potential Effects of Climate Change
Unknown.



Areas for Future Research [B]
Little is known about the ecology and life history of this species. Research needs include: (1) depth and location of pelagic larvae, (2) depth, location, and timing of young-of-the-year benthic recruitment, (3) preferred depth ranges for juveniles and adults, (4) spawning season, (5) seasonal and ontogenetic movements, (6) population studies, (7) prey, and (8) predators.

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