

Descriptions three rare and little known of *Neptunea* (Gastropoda; Buccinidae) from the Eastern Bering Sea slope, one new to science

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ABSTRACT Three rare and little known species of the genus *Neptunea* Röding, 1798 from continental slope of the eastern Bering Sea are discussed. The rediscovery of the enigmatic *Neptunea insularis* (Dall, 1895), a range extension for *Neptunea alabaster* Alexeyev & Fraussen, 2005, and a new species, unique amongst *Neptunea* in having five cusps on the lateral teeth, of the radula, opposed to three found in nearly all other *Neptunea*. The three species are described herein and their distributions defined.

KEY WORDS Bering Sea, *Neptunea*, *Neptunea insularis*, *Neptunea alabaster*, *Neptunea mcleani*, Alaska, gastropod, biodiversity

INTRODUCTION

The genus *Neptunea* in the North Pacific area is very large and diverse and a number of complexes have yet to be worked out. Fraussen & Terry, 2007 reviewed the genus in “A Conchological Iconography” and illustrated several as yet undescribed species from the region, mostly from the western Bering Sea. The mollusk fauna of the bathyal depths of the eastern Bering Sea is poorly known and includes numerous species of *Neptunea*, many of them undescribed. In 2010, while participating on a National Marine Fisheries resource assessment survey numerous specimens of the genus *Neptunea* were taken at depths ranging from 200-1200 m. Along with the recognized *N. pribiloffensis* (Dall, 1919), *N. amianta* (Dall, 1890), and *N. aleyxyevi* Fraussen & Terry, 2007, the enigmatic *N. insularis* (Dall, 1895) was rediscovered, as well as specimens of several undescribed species, including four specimens of an unusual, weakly ribbed, uniformly white shelled species. Two years later,

in 2012 Dr. Duane Stevenson (NMFS) recovered a specimen of *Neptunea alabaster* Alexeyev & Fraussen, 2005 from Pervenets Submarine Canyon on a subsequent survey.

Abbreviations

NMFS - National Marine Fisheries Service
NOAA - National Oceanic and Atmospheric Administration

LACM - Los Angeles County Museum of Natural History

SBMNH - Santa Barbara Museum of Natural History

ZMMU - Zoological Museum Moscow State University

SYSTEMATICS

Superfamily: Buccinoidea Rafinesque, 1815

Family: Buccinidae Rafinesque, 1815

Subfamily: Colinae Gray, 1857

Genus: *Neptunea* Röding, 1798

Type species: “*Murex*” *antiquus* Linnaeus, 1798 (by subsequent designation)

Neptunea insularis (Dall, 1895)
(Figures 1A-G)

Type locality. Bering Sea, near Pribilof Islands, 336 m. Albatross station 3489 (57° N, 173°).

Type. USNM 107000. (Figure 1A), illustrated by Kosuge (1972).

Material studied. Type, USNM 10700; 1, SBMNH 169023, 128.4 mm. Zhemchug Canyon (58°17.41 N, 175°05.32 W), 642 m. (NMFS 94-201001-72); 1, SBMNH 169023, 102.3 mm. S of Zhemchug Canyon (57°08.34 N, 173°57.05 W), 638 mm. (NMFS 94-201001-4); 1, RNC 4145, 123.7 mm. Zhemchug Canyon (58°20.56 N, 175°04.21 W), 574 m. (NMFS 94-201001-73); 2, LACM 182155, 99.0 & 90.8 mm. NW of Pribilof Canyon (56°30.75 N, 172°22.42 W), 616 m. (94-201001-97); 2, RNC 4146, 127.5 & 97.2 mm. NW of Pribilof Canyon (56°29.62 N, 171°57.08 W), 519 m. (NMFS 94-201001-100); 2, RNC 4147, 116.7 & 95.1 mm. Bering Canyon, N of Akutan Island, Aleutian Is. (54°27.51 N, 165°56.31 W), 505 m. (94-201001-197); 1, RNC 4148, 131.2 mm. SE of Pervenets Canyon (58°37.02 N, 175°07.62 W), 410 m. (NMFS 94-201001-11); 2, RNC 4672, 147.4 & 127.3 mm. Zhemchug Canyon (58°20.46 N, 174°16.86 W), 175 m. (NMFS 89-201201-168).

Description. “Shell large, solid, rather thin, with about six whorls (excluding the nucleus); whorls full, rounded, slightly excavated in front of the appressed suture; (spiral) sculpture (see Figure 1E) of, on the last whorl, three sizes of flattish, rounded threads, alternating regularly in size, but on the upper whorls of only two sizes separated only by shallow grooves; transverse (axial) of moderately prominent incremental lines; aperture ample, the pillar lip blotched with livid pink and white, the pillar twisted, with a solid white inner edge and strong

siphonal fasciole; canal moderate, slightly recurved; outer lip slightly crenulated by the sculpture, sharp, very slightly expanded; throat smooth, pinkish; epidermis (periostracum) very thin and translucent, closely adherent to the surface; operculum normal, light brown. Length of shell 100 mm; max. diameter 56 mm. (after Dall, 1895).” (from Oldroyd, 1927) (Emphasis added)

Color. Pink to pale tan, primary spiral cords often darker. Radula (Figure 1G): Rachidean tooth very broad and short, with three short, stout triangular cusps of equal size. Lateral teeth stout, with three cusps, the outer cusp thick, curved, almost twice as long as middle and inner cusps, which are subequal in length.

Distribution. Eastern Bering Sea, along the upper continental slope, from SE of Pervenets Canyon south to Bering Canyon, N of Akutan Island, at depths of 175-638 m, but typically below 400 m.

Habitat. Found on mud bottoms with a bottom temperature of 2.6°C to 3.6°C.

Remarks. The nucleus of this species (Figure 1F) is about 4.5 mm in diameter, and early whorls have two faint cords. Specimens illustrated by Koen & Terryn, 2007, and Kantor & Syseov, 2007 are mis-identifications. Higuchi, 2006 illustrated something identified as this species from off Hokkaido Island, Japan, but its relationship to *N. insularis* remains unclear.

Neptunea alabaster Alexeyev & Fraussen, 2007
(Figure 1H)

Type locality. Bering Sea (59°06.41 N, 166°02.7 E), 330-335 m.

Type. ZMMU Lc-25896

Description. Shell of medium size (to 120 mm), thin but solid, snow-white. Subsutural slope broad, concave on upper spire whorls, straight or slightly convex on body whorl. Upper spire whorls sculptured with two sharp primary spiral cords, penultimate whorl with four strong primary cords, the fourth one occasionally partly concealed under lower suture, interspaces with alternating broad and finer secondary spiral cords. Outer lip thin, flared, irregular (after Fraussen & Terry, 2007). Radula (Figure 1I): Rachidean tooth broad and tall, excavated medially, bearing three subequal cusps. Lateral teeth with 3/4 cusps, outer cusp large thick, strongly curved, inner cusp straight, much smaller than outer one, in cusps about half as long as inner cusp. Examined specimen is unusual in that the laterals on one side have two subequal central cusps, the laterals on the other side have only a single cusp. It is unknown which is the usual number for this species.

New Record. A single specimen, RNC 4969 (Figure 1H), 74.0 mm. Pervenets Canyon (59°35.17 N, 178°24.78 W), 913 m. (NMFS 94-201201-33). Bottom temperature 3.1°C. (*Leg.* Dr. Duane E. Stevenson, June 2012.) Extends the known range of this species about 660 km east, into the Eastern Bering Sea. It also extends the bathymetric range from 440 m to 913 m.

Distribution. Bering Sea, Gulf of Oljuter, Russia (169°45 E) to Pervenets Sea Canyon, Alaska (178°24 W), at 180-913 m.

Neptunea mcleani Clark, new species
(Figures 2A-H)

Type locality. Alaska, Bering Sea, North side of Bering Submarine Canyon (54°16.72 N, 167°44.31 W), 1018 m. (*Leg.* R. Clark, 11 July 2010) (NMFS 94-201001-161).

Type material. Holotype, LACM 3663 (Figure 2A), 106.8 mm; Paratype 1, SBMNH 169022, 95.7 mm. Bering Sea, Bering Submarine Canyon (54°48.1 N, 167°40.45 W), 1065 m. (NMFS 94-201001-143); Paratype 2, RNC 5050, 107.3 mm. Bering Sea, NW of Zhemchug Submarine Canyon (58°37.85 N, 177°47.04 W), 818 m.

Referred material. 1, RNC 5051, 129.1 mm. Bering Sea, North of Unalaska Island, South side of Bering Submarine Canyon (55°13.53 N, 167°53.4 W), 414 m. Differs from typical specimens in bearing six low varices on the outer portion of the body whorl.

Diagnosis. Shell relatively large, broad, fusiform, with 4-5 rounded whorls, suture impressed; spire with four moderately heavy, rounded spiral cords (7-8 on body whorl), with a single smaller, lower secondary cord, and often 2-4 fine spiral lirae between, crossed by numerous fine growth lines; aperture large, about half of shell height, canal moderately long. Shell white with very thin green/tan periostracum.

Description. Shell moderately large (to 10 cm+), broad, relatively thin, fusiform, with 5 (possibly 6) rounded whorls, suture strongly impressed, apex eroded, aperture large, about one half of shell height, outer lip not flaring; axial sculpture of very numerous, fine growth lines; spiral sculpture of narrow, widely spaced, rounded ribs (Figure 2B), four on penultimate whorl, seven to eight on body whorl, with a single smaller, lower rib and 2-4 fine lire on the interspaces, sub-sutural slope with two cords; canal short, only slightly curved, outer lip slightly flared. Color, uniformly white. Radula (Figure 2F): Rachidean tooth chevron shaped, with (normally) two small (often splitting), triangular cusps. Lateral teeth with five sharply pointed cusps, distal cusp large, curved, nearly

twice as long as proximally most cusp. Inner four cusps grading distally from the proximal cusp, distal most of these smaller cusps about half as long as proximal most cusp. What appears to be the egg capsules (Figures 2G, H) of this species were taken at station 94-2010-01-143. Capsules are yellow, triangular, attached by a short stalk at one corner, about 15 mm x 10 mm, sculptured with irregular crisscrossing ribs forming diamond-shaped reticulations.

Distribution. Alaska, Eastern Bering Sea continental slope, from W of Zhemchug Submarine Canyon (58°37' N) south to Bering Submarine Canyon (54°16' N), at depths of 412 to 1065 m.

Habitat. Occurs on soft mud bottoms, at temperatures of 2.7°C to 3.7°C.

Remarks. *Neptunea mcleani* resembles *Neptunea pribiloffensis* (Dall, 1919), but differs in having a taller, more slender profile, more pronounced spiral ribs, and lacks the angulation at the shoulder. *Neptunea mcleani* is unique amongst *Neptunea*, in having five cusps on the lateral teeth. Only two other species of *Neptunea* are known to have more than three. *Neptunea costaria* Fraussen & Terryn, 2007 has seven cusps, and an as yet undescribed species from the Aleutian Islands has four (McLean & Clark, in prep.). The one radula of *N. alabaster* examined was abnormal, having four cusps on one side, and three on the other, so it is uncertain which is the normal count for that species.

Etymology. The name honors my friend and mentor the late Dr. James H. McLean, formerly of the Los Angeles County Museum of Natural History. Before his untimely death in 2015, Dr. McLean was in the process of reviewing the *Neptunea* (and other Buccinidae) in the North Pacific.

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LITERATURE CITED

- Dall, W.H. 1895.** Report on the Mollusca and Brachiopoda dredged in deep water, chiefly near the Hawaiian Islands, with illustrations of hitherto unfigured species from Northwest America. Proceedings of the United States National Museum. 17, pp. 675-733.
- Fraussen, K. & Y. Terryn. 2007.** The Family Buccinidae Genus *Neptunea*. A Conchological Iconography. Hackenheim. 166 pp., 154 plts.
- Higuchi, S. 2006.** Northern Sea Shell Groups. 157 pp. Tokyo.
- Kantor Y. & A.V. Sysoev. 2006.** Marine and brackish water Gastropods of Russia and adjacent countries: an illustrated catalogue. KMK Science Press Ltd. Moscow. 371 pp.
- Kosuge, S. 1972.** Illustrations of Type Specimens of Molluscs described by William Healey Dall (North Western Pacific Gastropods). National Science Museum, Tokyo. 34 pp.
- Oldroyd, I. 1927.** The Marine Shells of Stanford University Press, the West Coast of North America. Vol. II, part 1. Stanford University Publications, Palo Alto. 297 pp., 29 plts.

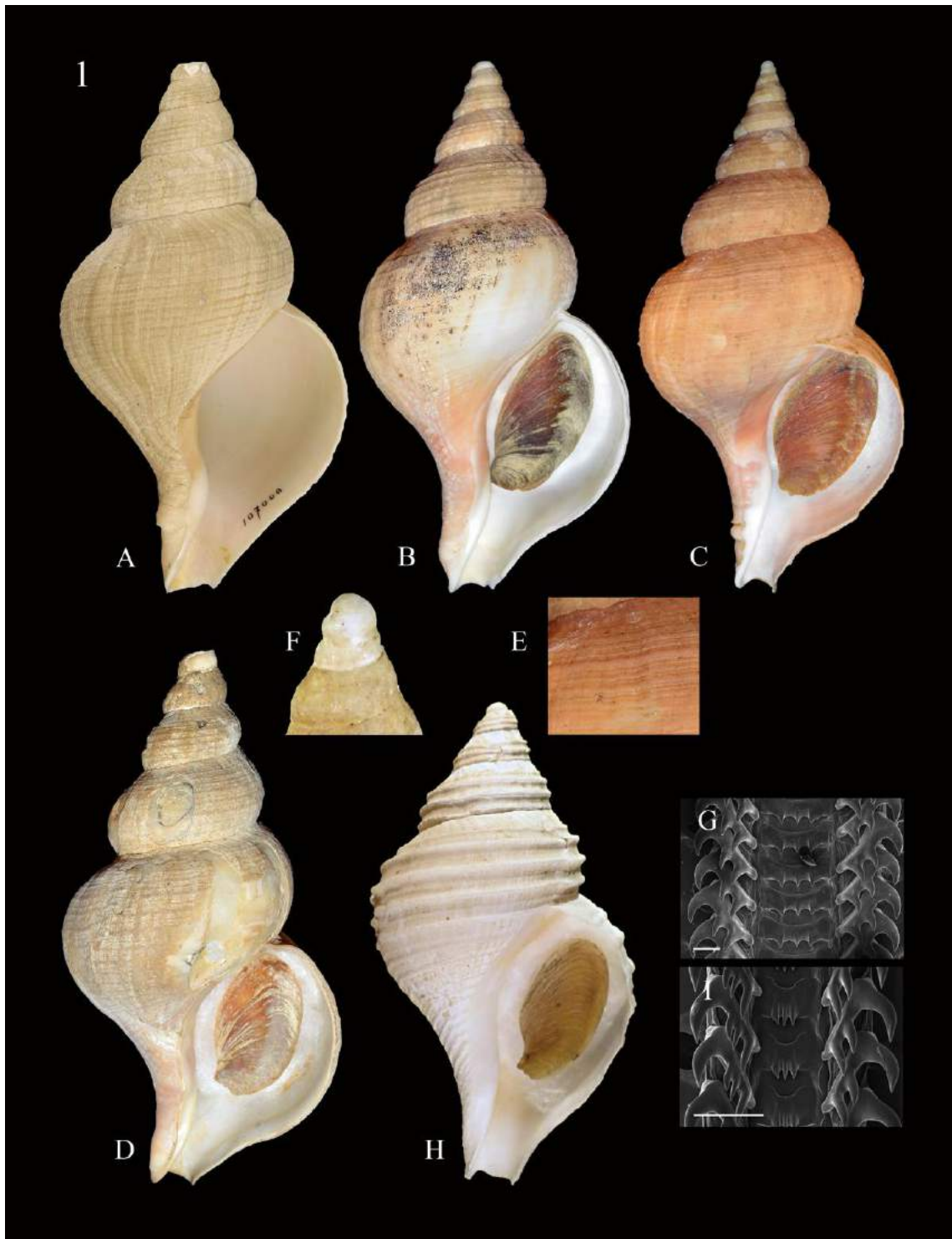


Figure 1. *Neptunea insularis*. **A** = Holotype, USNM 107000; **B** = RNC 4148, Zhemchug Canyon, 410 m, 131.2 mm; **C** = RNC 4672, Zhemchug Canyon, 175 m, 147.4 mm; **D** = SBMNH 169023, Zhemchug Canyon, 642 m, 128.4 mm; **E** = RNC 4672, close-up of sculpture; **F** = RNC 4672, Close-up of apex; **G** = Radula, SBMNH 169023, bar = 200 μm; **H** = *Neptunea alabaster*, RNC 4969, Pervenets Canyon, 913 m, 74.0 mm; RNC 4969, Radula, bar = 200 μm.

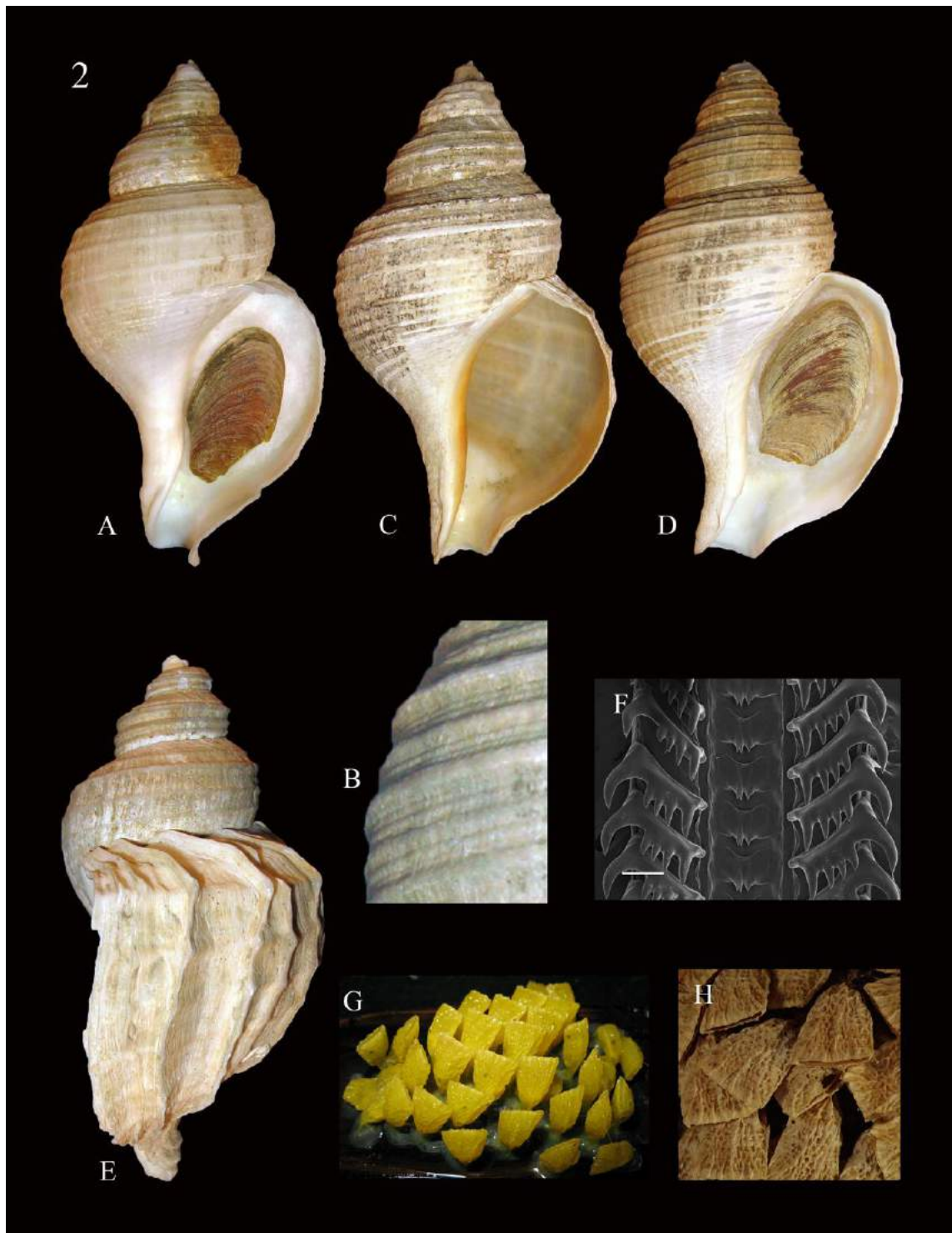


Figure 2. *Neptunea mcleani*. **A** = Holotype, LACM 3663, Bering Canyon, 1018 m. 106.8 mm; **B** = Close-up of sculpture (Paratype 2); **C** = Paratype 1, SBMNH 169022, Bering Canyon, 1065 m. 95.7 mm; **D** = Paratype 2, RNC 5050, S of Zhemchug, 818 m. 107.3 mm; **E** = RNC 5151, Bering Canyon, 414 m. 129.1 mm; **F** = Paratype 2, RNC 5050, Radula, bar = 200 μ m; **G** = SBMNH 169022/RNC 5052, egg capsules attached to skate egg case, Bering Canyon, 414 m. 15 x 10 mm; **H** = Close-up of egg capsules.

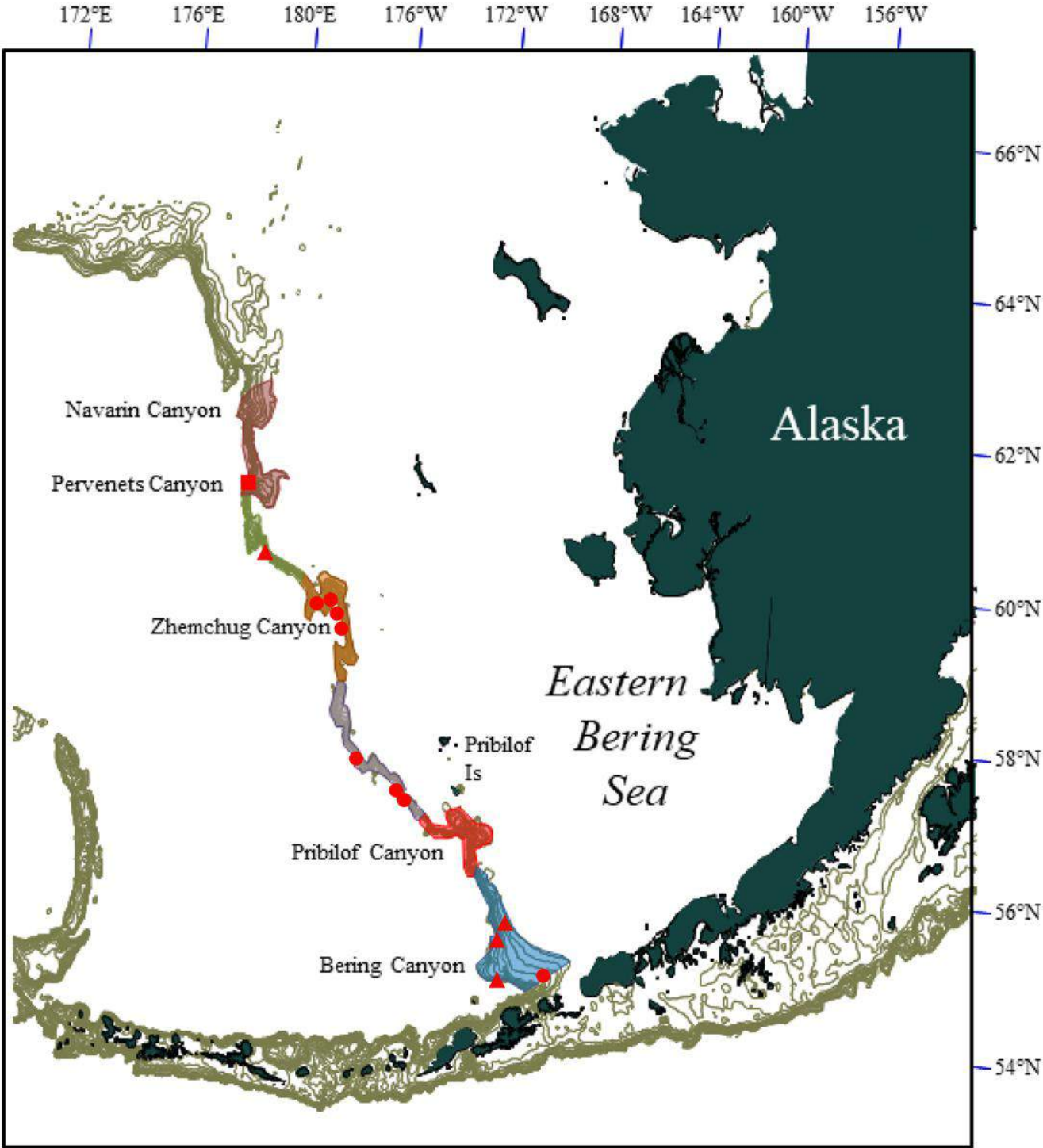


Figure 3. Distribution map Eastern Bering Sea.