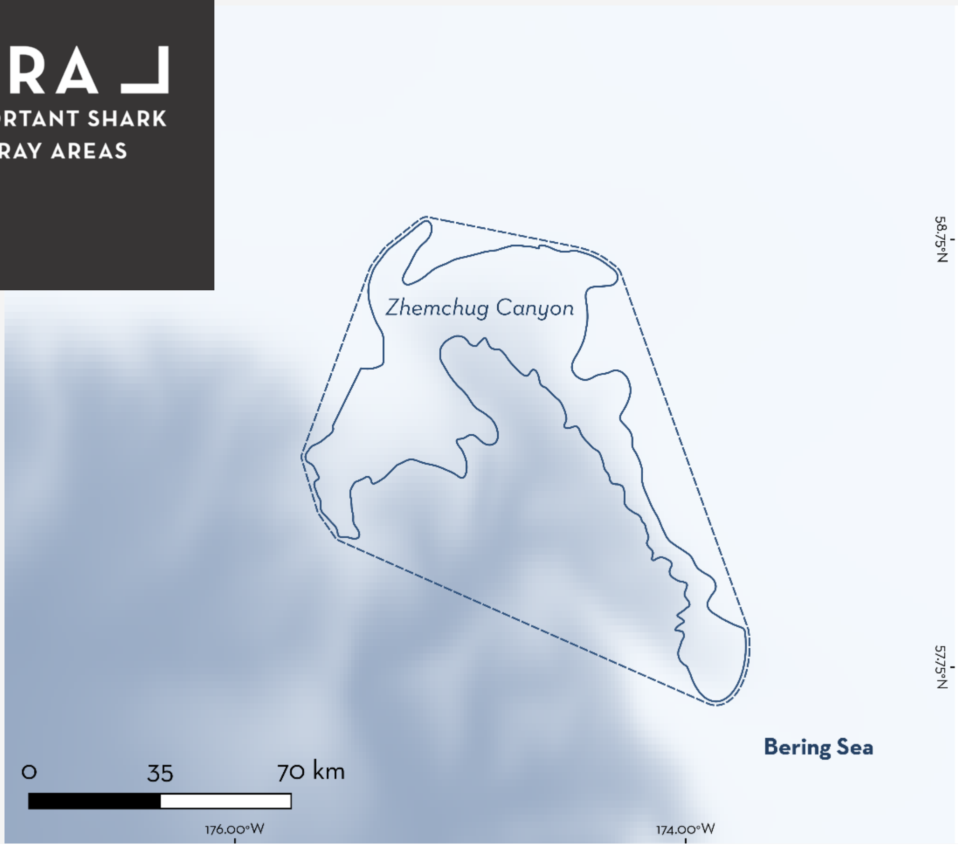
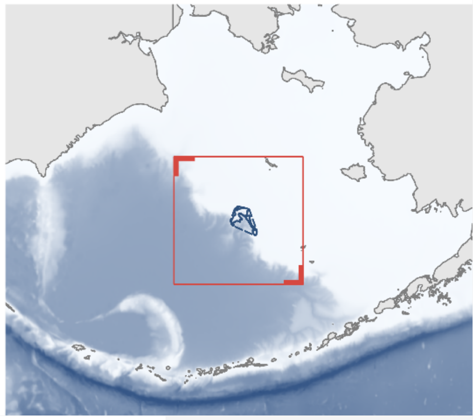
ISRA
IMPORTANT SHARK AND RAY AREAS





Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

ZHEMCHUG CANYON ISRA

North American Pacific Region

UNITED STATES OF AMERICA

150–1,100 metres

3,572.0 km²

SUMMARY

Zhemchug Canyon is located in Alaskan waters of the United States of America. It sits on the continental shelf break of the Eastern Bering Sea and is characterised by a steep slope, coral and sponge communities, sandy and rock substrates, and strong eddy activity that enhances productivity. Within this area there are: **reproductive areas** (e.g., Roughtail Skate *Bathyraja trachura*); and **undefined aggregations** (e.g., Aleutian Skate *Bathyraja aleutica*).

CRITERIA

Sub-criterion C1 – Reproductive Areas; Sub-criterion C5 – Undefined Aggregations

DESCRIPTION OF HABITAT

Zhemchug Canyon is located in Alaskan waters of the United States of America. It sits on the continental shelf break of the Eastern Bering Sea between a wide shelf and the deep Aleutian Basin. The area is characterised by a steep slope and an elongated shape, bifurcated at the slope axes and parallel to the shelf edge, with sandy and rocky substrates and large communities of cold-water corals and sponges (Karl et al. 1996; Miller et al. 2012; Sigler et al. 2015).

The area is influenced by the Bering Slope Current, a boundary current flowing north following the continental slope along the southeastern Bering Sea, linking the subarctic North Pacific (via the Alaskan Stream) to the Bering Sea shelf (Stabeno et al. 1999). It is a relatively warm, saline, and nutrient-rich current that brings nutrients to shelf waters. The complex structure of canyons along the slope produces the formation of eddies with stronger activity during the boreal spring influencing spring blooms and enhancing productivity in the region (Ladd et al. 2012; Sigler et al. 2015).

This Important Shark and Ray Area is benthic and subsurface and is delineated from 150–1,100 m based on the depth range of Qualifying Species in the area.

ISRA CRITERIA

SUB-CRITERION C1 – REPRODUCTIVE AREAS

Zhemchug Canyon is an important reproductive area for four ray species.

This area has been reported as a potential nursery area for Aleutian Skate, Bering Skate, Alaska Skate, and Roughtail Skate based on the high density of egg cases and young-of-the year (YOY) individuals (Aleutian Skate) recorded from fisheries-independent surveys and commercial fisheries catches in the region (Matta 2015; Hoff 2016a, 2016b; Stevenson et al. 2018; Rooper et al. 2019; NOAA-AFSC 2026). Zhemchug Canyon has been highlighted as an area with high habitat suitability for nursery areas of skates across the whole region (Rooper et al. 2019).

Between 1982–2025, the Alaska Fisheries Science Center (AFSC) - National Oceanic and Atmospheric Administration (NOAA) conducted trawl surveys during the late boreal spring and summer in the Bering Sea, the Aleutian Islands, and the Gulf of Alaska. (NOAA-AFSC 2026) Temporal coverage of the surveys varies per region with most conducted annually (e.g., continental shelf surveys in the Bering Sea), or biennially (e.g., Gulf of Alaska) since 1999 (Hoff 2016b; Siple et al. 2024; Markowitz et al. 2025; Dowlin et al. 2026). The continental slope survey in the Bering Sea stopped in 2016 (Markowitz et al. 2025). Surveys were conducted at fixed stations or following a stratified random survey design and covering depths from 0–1,000 m divided in multiple depth strata across 300–500 stations per region. In general, otter trawls of ~25 m headrope and ~34 m footrope were used and tows lasted between 15–30 minutes at a speed of ~3 knots. Catch-per-unit-effort (CPUE) was estimated as the number of individuals or number of egg cases per square kilometre (no./km^2) and the area swept (km^2) as the linear distance towed, multiplied by the mean net width (Hoff 2016b; Siple et al. 2024; Markowitz et al. 2025; Dowlin et al. 2026).

Between 2000–2013, the second highest abundance for YOY Aleutian Skates reported during fishing surveys was recorded in this area (CPUE = 458–795 individuals/km^2) only after Pribilof Canyon (CPUE = 796–2,315 individuals/km^2; Hoff 2016a). Size-at-birth for Aleutian Skate is 22–25 cm total length (TL; Teshima & Tomonaga 1986; Hoff 2009) and YOY size for the region is ~35 cm TL (Matta & Gunderson 2007; Hass 2011). This high abundance of YOY suggests that recently hatched individuals stay in the area before moving to deeper waters (Hoff 2010, 2016a). In addition, between 2004–2025, the presence of Aleutian Skate egg cases was recorded in 160 tows during trawl surveys across the whole region, six (3.75%) of which were recorded inside this area in 2012, 2014, 2016, and 2022 at depths between 150–714 m (NOAA-AFSC 2026). CPUE values ranged between 18.5–388.5 egg cases/km^2 (mean= 92.7) confirming the regular presence of egg cases in the area (NOAA-AFSC 2026). Female Aleutian Skate are regularly recorded in trawl surveys with sizes ranging between 22–150 cm TL (average = 99 cm TL; Hoff 2016b). Size-at-maturity for female Aleutian Skate is >109 cm TL (Hass 2011), indicating mature females are regularly caught in the area although pregnancy has not been assessed.

Between 2004–2025, the presence of Bering Skate egg cases was recorded in 569 tows during trawl surveys across the whole region, 44 (7.7%) of which were recorded inside this area in June–July of all years surveyed at depths between 150–1,040 m (NOAA-AFSC 2026). The third highest abundance of Bering Skate egg cases reported for the surveyed region was recorded inside this area (mean CPUE = 403.1 egg cases/km^2; 18.6–2,169.3) compared to the whole region surveyed (mean CPUE = 137.1 egg cases/km^2; 17.3–3,668.1), just after Pervenets Canyon and Pribilof Canyon (NOAA-AFSC 2026). Female Bering Skate are regularly recorded in trawl surveys with sizes ranging between 18–85 cm TL (average = 52 cm TL; Hoff 2016b). Size-at-maturity for female Aleutian Skate is ~70 cm TL (Last et al. 2016), indicating that mature females are regularly caught in the area although pregnancy has not been assessed.

Between 2004–2025, the presence of Alaska Skate egg cases was recorded in 710 tows during trawl surveys across the whole region, 63 (8.9%) of which were recorded inside this area in June–July of all surveyed years since 2006 at depths of 150–576 m (NOAA-AFSC 2026). The highest CPUE (mean = 1,250.5 egg cases/km^2; 18.4–37,668.2) of Alaska Skate egg cases was recorded in this area compared to the whole region surveyed (mean CPUE outside the area = 115.1 egg cases/km^2; 16.1–15,348.7). Between 2014–2017, the third highest CPUE (>51 egg cases/km^2) of egg cases in the Eastern Bering Sea was also recorded in this area during monitoring of commercial fisheries by onboard fisheries observers (Stevenson et al. 2018). YOY individuals (22–35 cm TL; Matta & Gunderson 2007; Hass 2011) were recorded exclusively outside this area during fishing surveys conducted between 2000–2013 suggesting that recently hatched individuals leave the area to shallow waters (Hoff 2010, 2016b). Pregnant females were also recorded in the area during surveys conducted in 2003–2005 (Matta 2015). Female Alaska Skate are regularly recorded in trawl surveys with sizes ranging between 18–114 cm TL (average = 90 cm TL; Hoff 2016b). Size-at-maturity for female Alaska Skate is >95 cm TL (Matta & Gunderson 2007), indicating mature females are regularly caught in the area.

Between 2004–2025, the presence of Roughtail Skate egg cases was recorded in 110 tows during trawl surveys, 14 (12.7%) of which were recorded inside this area in June–July 2008, 2012, and 2016 at depths of 450–1,100 m (NOAA-AFSC 2026). The third highest CPUE reported for the surveyed region was recorded inside this area (mean CPUE = 169.5 egg cases/km^2; 18.5–766.0), just after Pervenets Canyon and Pribilof Canyon (NOAA-AFSC 2026).

SUB-CRITERION C5 – UNDEFINED AGGREGATIONS

Zhemchug Canyon is an important area for undefined aggregations of one ray species.

Skates are known to aggregate, with temporal changes in aggregations related to sex and life-stage segregations (Swain & Benoît 2006; Frisk 2010; Hoff 2010). Skate aggregations are usually related to high density areas where large catch quantities occur (Bizzarro et al. 2014). Between 1982–2025, AFSC conducted trawl surveys during late spring and summer in the Bering Sea, the Aleutian Islands, and the Gulf of Alaska (NOAA-AFSC 2026). Temporal coverage of the surveys varies per region with most conducted annually (e.g., continental shelf surveys in the Bering Sea), or biennially (e.g., Gulf of Alaska) since 1999 (Hoff 2016b; Siple et al. 2024; Markowitz et al. 2025; Dowlin et al. 2026). The continental slope survey in the Bering Sea stopped in 2016 (Markowitz et al. 2025). Surveys are conducted at fixed stations or following a stratified random survey design and covering depths from 0–1,000 m divided in multiple depth strata across 300–500 stations per region. In general, otter trawls of ~25 m headrope and ~34 m footrope were used and tows lasted between 15–30 minutes at a speed of ~3 knots. CPUE was estimated as the number of individuals/number of egg cases per square kilometre (no/km^2) and the area swept (km^2) as the linear distance towed, multiplied by the mean net width (Hoff 2016b; Siple et al. 2024; Markowitz et al. 2025; Dowlin et al. 2026).

Between 1999–2025, aggregations of Aleutian Skate were regularly recorded in this area. During this period, Aleutian Skates were recorded in 2,694 tows during trawl surveys across the whole region, 138 (5.1%) of which were recorded inside this area in June–August of all surveyed years at depths of 130–1,100 m (NOAA-AFSC 2026). The second highest mean CPUE of Aleutian Skate in the region was reported from this area (mean = 273.2 individuals/km^2; 17.6–2,580.3) compared to other areas in the surveyed region (mean CPUE outside the area = 123.8 individuals/km^2; 16.9–3,981.1) after Pribilof Canyon. Multiple individuals (>5) were recorded in 56 tows (40.6% of the tows inside this area) with 106 being the maximum number of individuals recorded in a single tow. Additional information is required to understand the nature and function of these aggregations.

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QUALIFYING SPECIES

Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
RAYS												
Bathyraja aleutica	Aleutian Skate	LC	15–1,602			X				X		
Bathyraja interrupta	Bering Skate	LC	100–1,372			X						
Bathyraja parmifera	Alaska Skate	LC	15–1,116			X						
Bathyraja trachura	Roughtail Skate	LC	90–2,900			X						

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
RAYS		
Bathyraja lindbergi	Commander Skate	LC
Bathyraja maculata	Whiteblotched Skate	LC
Bathyraja minispinosa	Whitebrow Skate	LC
Bathyraja taranetzi	Mud Skate	LC

IUCN Red List of Threatened Species Categories are available by searching species names at www.iucnredlist.org Abbreviations refer to: CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient.

SUPPORTING INFORMATION

There are additional indications that the area is important for undefined aggregations of one ray species. Between 2002–2024, aggregations of Whitebrow Skate were regularly recorded in this area. During this period, Whitebrow Skate was recorded in 541 tows during trawl surveys, 52 (9.6%) of which were recorded inside this area in June–July of all surveyed years at depths of 192–1,100 m (NOAA-AFSC 2026). The second highest mean CPUE of Whitebrow Skate in the region was reported from this area (mean = 94.6 individuals/km^2; 23.1–413.8) compared to other areas in the surveyed region (mean CPUE outside the area = 73.1 individuals/km^2; 16.8–1,094.6) after Pervenets Canyon. Multiple individuals (>5) were recorded in 11 tows (21.1% of the tows inside this area). Additional information is required to confirm the importance of the area for this ray species.

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