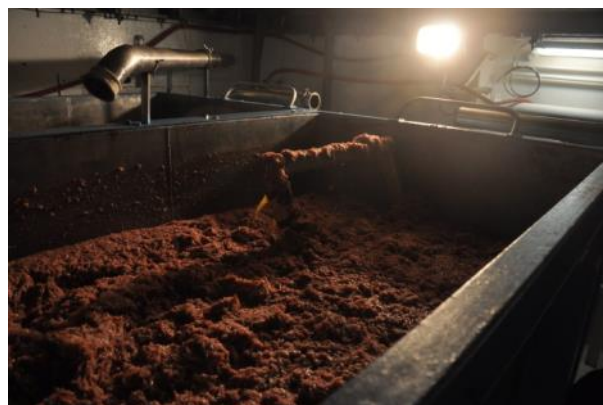


Common by-catch species in CCAMLR longline and trawl fisheries



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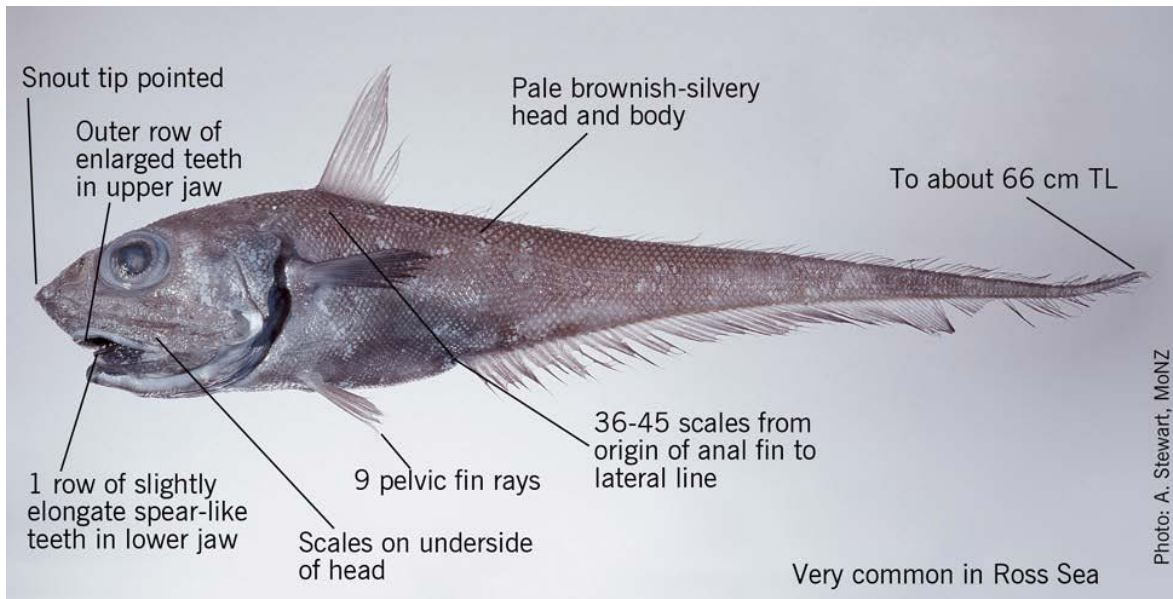
Introduction

This by-catch guide is designed to assist in the identification of common fish by-catch species in CCAMLR longline and trawl fisheries. The identification sheets are based on the resources provided by Australia, New Zealand, the Republic of Korea, and United Kingdom members, and the Secretariat acknowledges their contributions to this guide. Online resources have also been used for images and text description (referenced under each individual species).

It is intended to provide a useful resource for observers and in order to facilitate that outcome, users are encouraged to provide feedback through the CCAMLR Observer Scheme e-group, or through the Scientific Scheme Observer Coordinator email (observer.scheme@ccamlr.org). Any other resources that can be provided to improve this guide are also most welcomed.

Common Finfish By-catch Species

Macrourus whitsoni (Whitson's grenadier) (WGR)



Distinguishing features: Nine pelvic fin rays. 15–28 pyloric caeca. One row of slightly enlarged teeth in lower jaw. Outer row of enlarged teeth (two to five rows total) in upper jaw. Snout tip slightly pointed. Pale brownish-silvery head and body. Scales on most of underside of head and lower jaw but no scales under snout in front of mouth. 36 to 45 scales in a diagonal row from origin of anal fin to (not including) lateral line.

Colour: Pale brownish-silvery head and body. Fins greyish-brown.

Size: To about 66 cm total length.

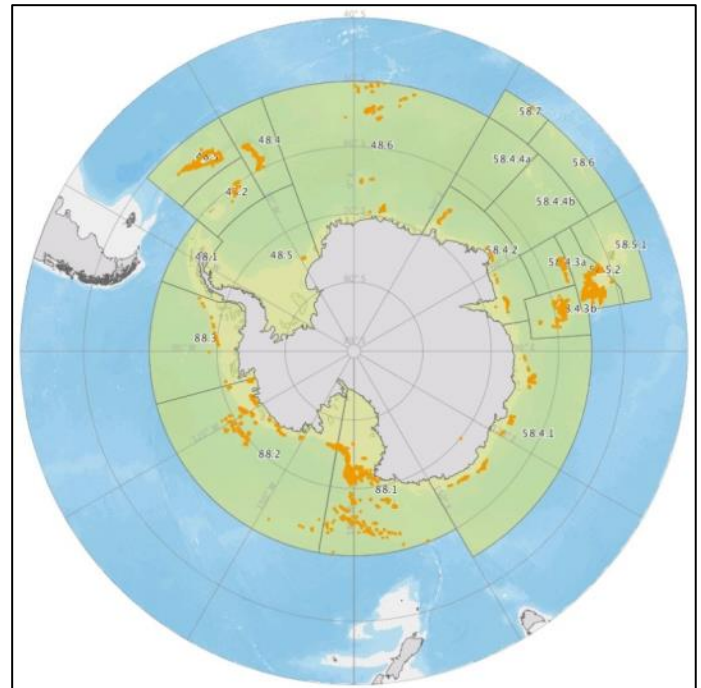
Distribution: Widespread in the CCAMLR area.

Depth: 760 to 3 190 m.

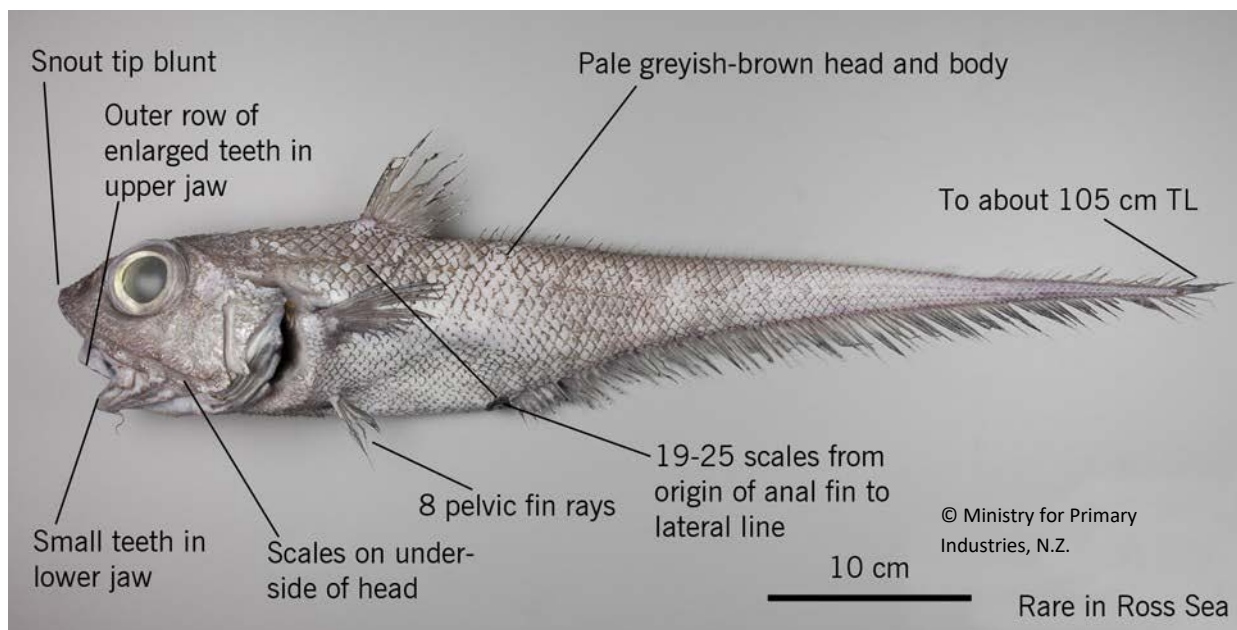
Similar species: Appendix 1 contains a species key, and a table of distinguishing features to assist in separating the very similar *M. carinatus*, *M. caml*, and *M. holotrachys*.

References: Iwamoto (1990a and b); McMillan et al. (2012); Roberts and Stewart (2001); Smith et al. (2011).

CCAMLR Longline Records:



***Macrourus carinatus* (Ridge scaled grenadier) (MCC)**



Distinguishing features: Eight pelvic fin rays. 13–21 pyloric caeca. Two to five rows of small uniform sized teeth in lower jaw. Outer row of enlarged teeth (three to six rows total) in upper jaw. Snout tip blunt. Pale greyish-brown head and body. Scales on most of underside of head and lower jaw but no scales under snout in front of mouth. 19 to 25 scales in a diagonal row from origin of anal fin to (not including) lateral line scale.

Colour: Pale greyish-brown head and body. Greyish-brown fins.

Size: To about 105 cm total length.

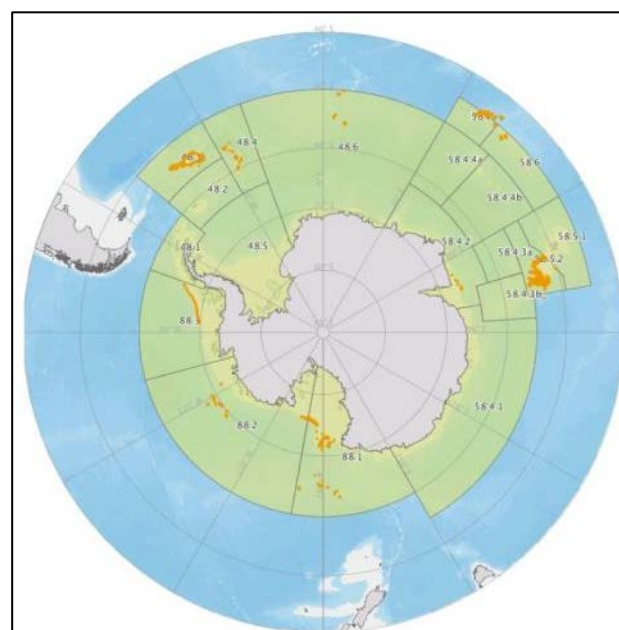
Distribution: Widespread in the CCAMLR area.

Depth: 400 to 1 500 m.

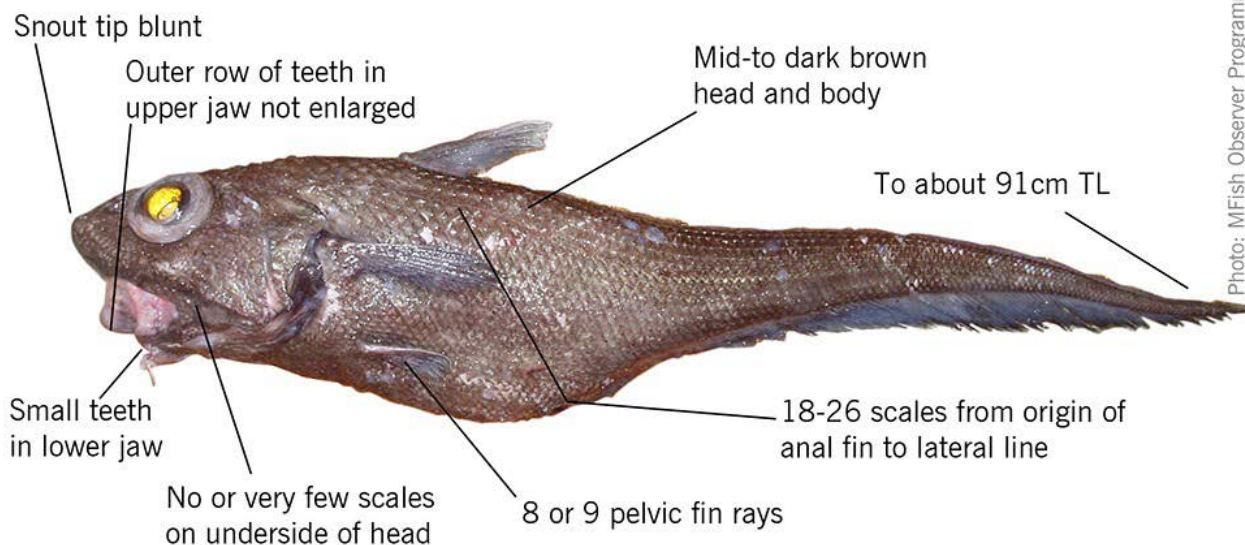
Similar species: Appendix 1 contains a species key, and a table of distinguishing features to assist in separating the very similar *M. whitsoni*, *M. caml*, and *M. holotrachys*.

References: Iwamoto (1990a and b); McMillan et al. (2012); Roberts and Stewart (2001); Smith et al. (2011).

CCAMLR Longline Records:



***Macrourus holotrachys* (Bigeye grenadier) (MCH)**



Distinguishing features: Eight or nine pelvic fin rays. 8 – 16 pyloric caeca. Two to five rows of small uniform sized teeth in lower jaw. Four to six rows of small uniform sized teeth in upper jaw. Snout tip blunt. Mid to dark brown head and body. No scales on most of underside of head but may be a few small scales near rear of head and on lower jaw. 18 to 26 scales in a diagonal row from origin of anal fin to (not including) lateral line scale.

Colour: Mid to dark brown head and body. Fins dark greyish-black.

Size: To about 91 cm TL.

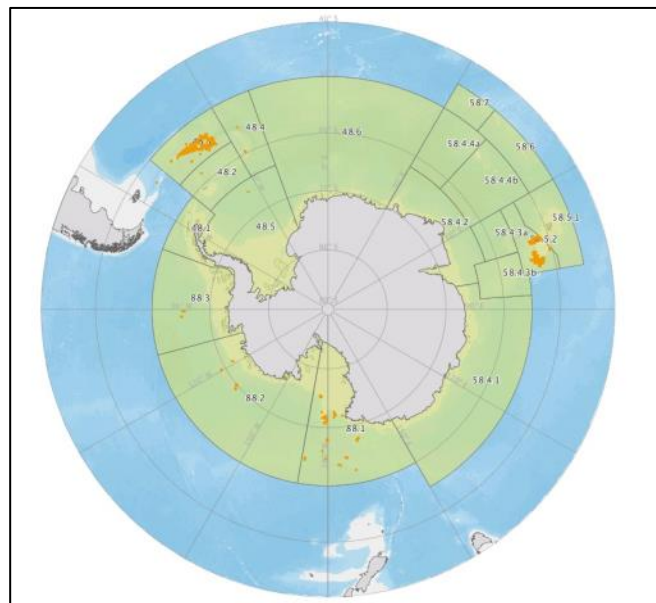
Distribution: Probably widespread in Southern Ocean from 37 to 65 S.

Depth: 1050 to 2000 m.

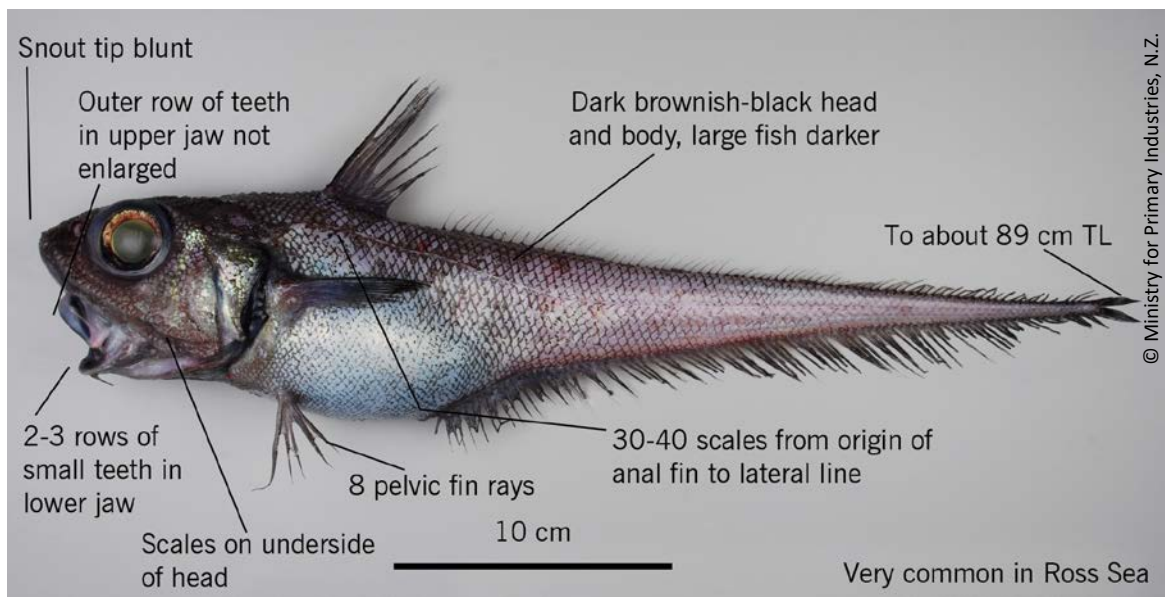
Similar species: Appendix 1 contains a species key, and a table of distinguishing features to assist in separating the very similar *M. whitsoni*, *M. caml*, and *M. carinatus*.

References: Iwamoto (1990a and b); McMillan et al. (2012); Roberts and Stewart (2001); Smith et al. (2011).

CCAMLR Longline Records:



***Macrourus caml* (CAML grenadier) (QMC)**



Distinguishing features: Eight pelvic fin rays. 20–37 pyloric caeca. Two to three rows of small uniform teeth in lower jaw. Four to five rows of small uniform teeth in upper jaw. Snout tip blunt. Dark brownish-black head and body, larger fish darker. Scales on most of underside of head and lower jaw but no scales under snout in front of mouth. 30 to 40 scales in a diagonal row from origin of anal fin to (not including) lateral line scale.

Colour: Dark brownish-black head and body, larger fish darker. Fins dark brownish-black.

Size: To about 89 cm total length.

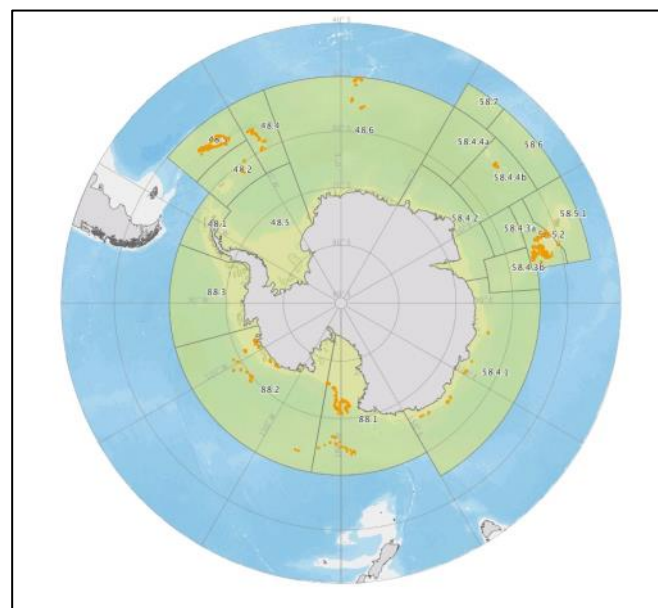
Distribution: Widespread in the CCAMLR area.

Depth: 350 to 1 660 m.

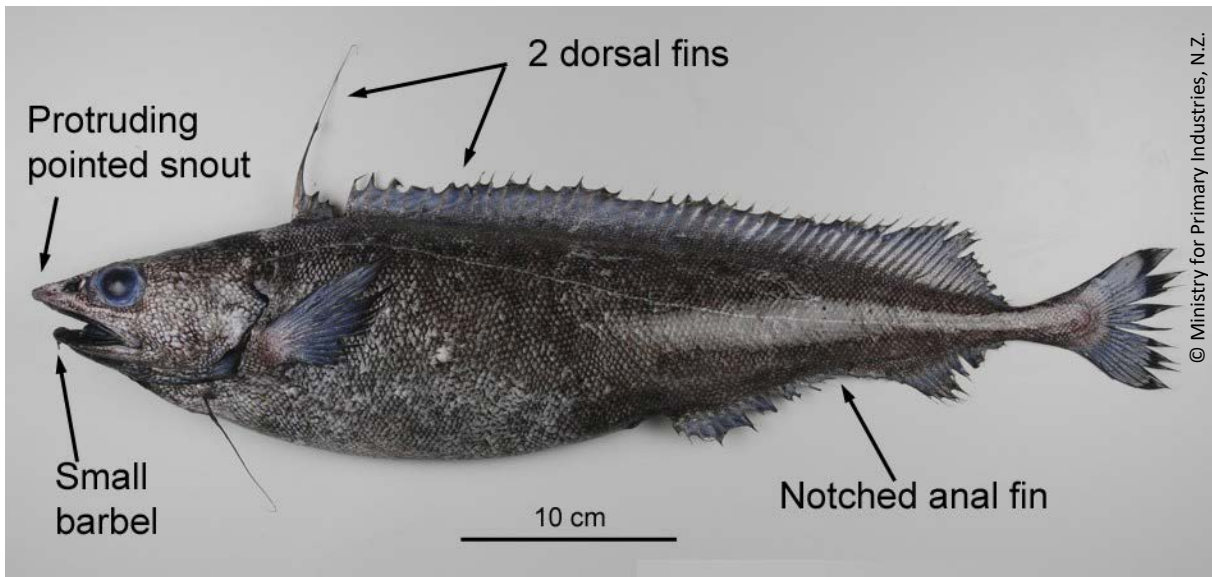
Similar species: Appendix 1 contains a species key, and a table of distinguishing features to assist in separating the very similar *M. whitsoni*, *M. holotrachys*, and *M. carinatus*.

References: Iwamoto (1990a and b); McMillan et al. (2012); Roberts and Stewart (2001); Smith et al. (2011).

CCAMLR Longline Records:



***Antimora rostrata* (Blue antimora, violet cod) (ANT)**



Distinguishing features: Protruding pointed snout. Two dorsal fins with an elongated ray in the first dorsal fin. Single notched anal fin. Small chin barbel present. Scales deciduous and usually lost.

Colour: Larger individuals bluish-black, but paler grey-brown in smaller specimens (see second picture).

Size: To at least 65 cm total length.

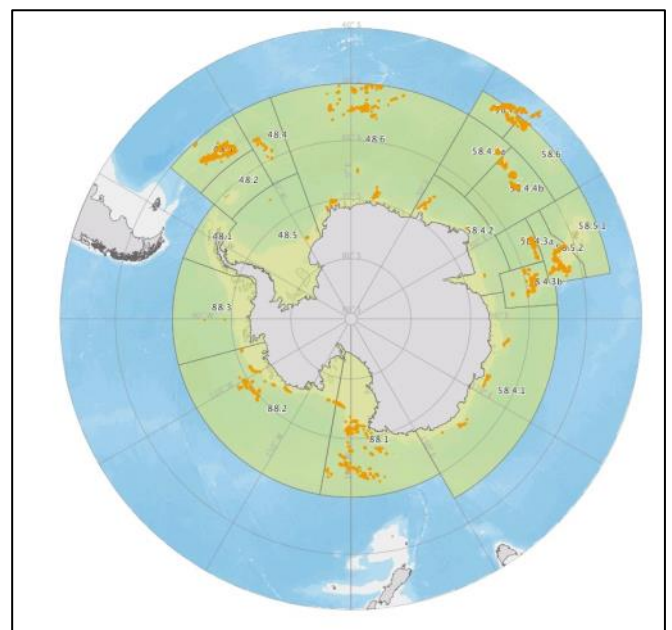
Distribution: Widespread in the CCAMLR area.

Depth: Reported from 400 to 2 900 m but usually found at 800 to 1 800 m.

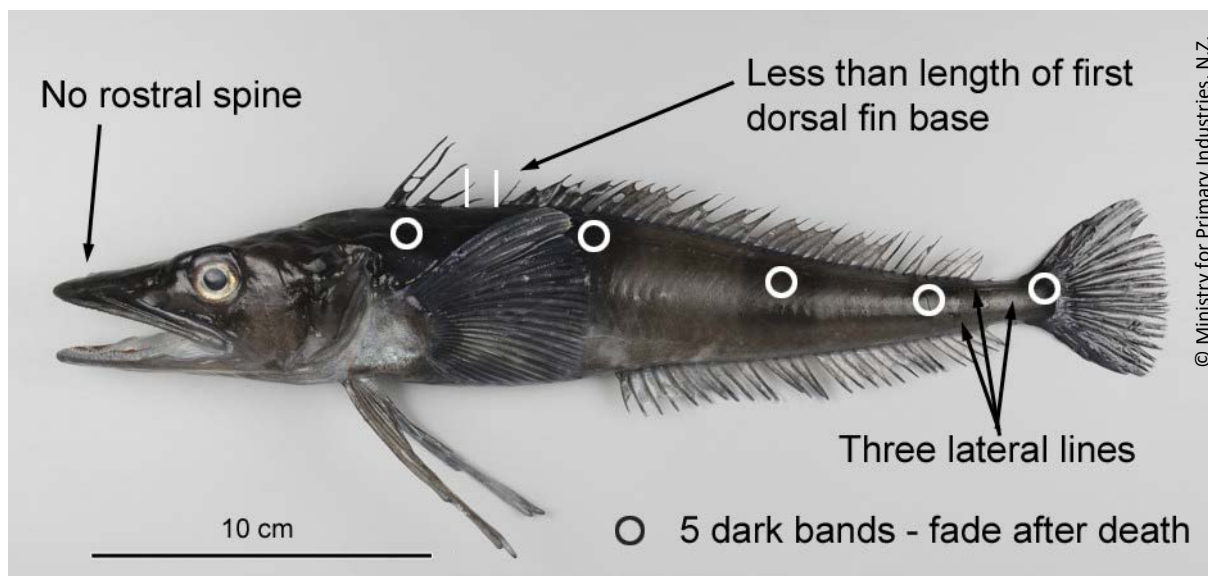
Similar species: Similar to giant morid cod (*Lepidion* sp) except that species lacks a protruding snout (level with mouth) and lacks a notched anal fin.

References: Chiu et al. (1990); Cohen et al. (1990).

CCAMLR Longline Records:



Chionobathyscus dewitti (Dewitt's icefish) (CHW)



Distinguishing features: No obvious rostral spine, 3 lateral lines, 5 dark bands or saddles on the upper surface and sides of the body (not always obvious), first dorsal fin separated from the second dorsal fin by a short distance, usually less than the length of the first dorsal fin base.

Colour: Five dark bands or saddles on the upper surface and sides of the body (not always obvious), first dorsal fin blackish, rear parts of tail and pectoral fin dark/dusky.

Size: To about 60 cm total length.

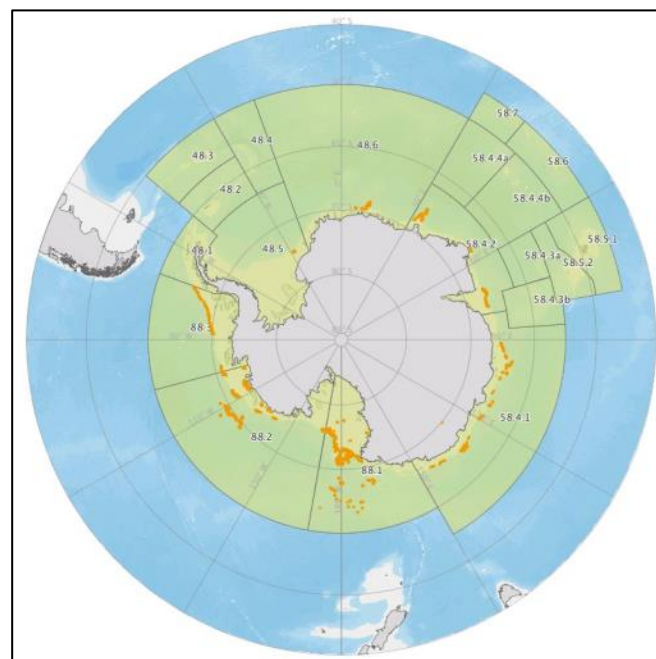
Distribution: Widespread in CCAMLR area.

Depth: 500 to 2 000 m.

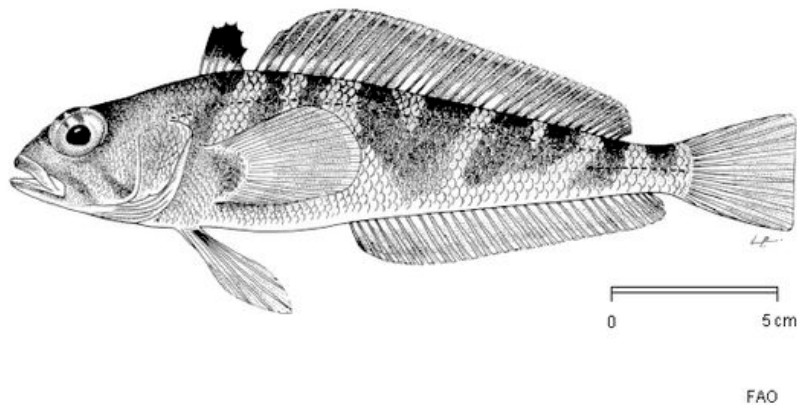
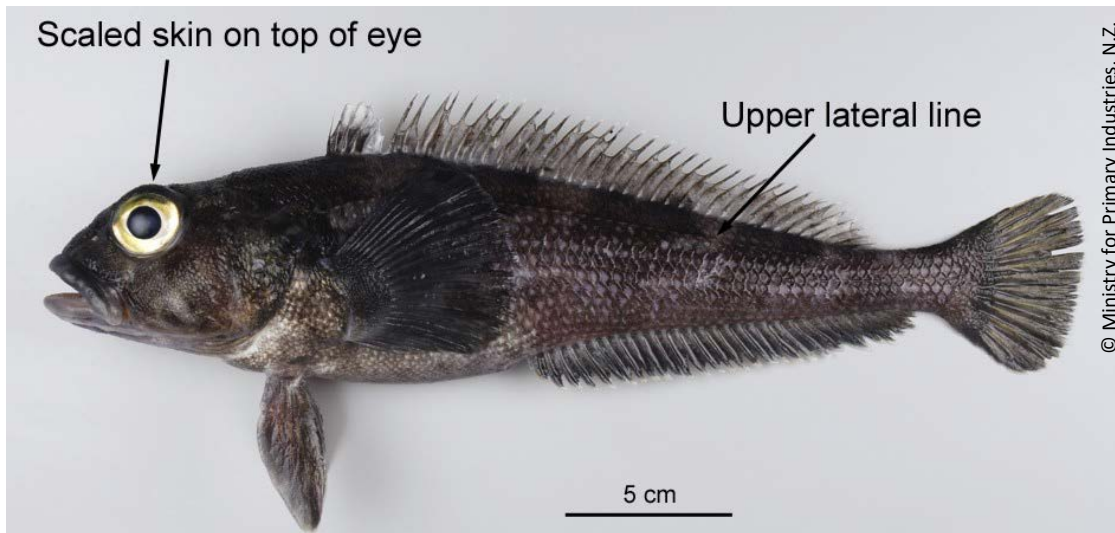
Similar species: Antarctic icefish (*Cryodraco antarcticus*) has the first dorsal fin separated from the second dorsal fin by a large distance, usually more than twice the length of the first dorsal fin base, very low first dorsal fin, slightly longer than the eye length.

References: Iwami and Kock (1990); Stewart and Roberts (2001).

CCAMLR Longline Records:



Lepidonotothen squamifrons (Striped-eye notothen) (NOS)



Distinguishing features: Scales on skin on top of the head extending onto the top of the eyes. Rest of head including snout, pre-orbitals (forward of eyes), lower jaw mostly covered with scales. Long distinct upper lateral line and short indistinct middle lateral line near the tail.

Colour: Upper body greyish with about 9 dark (obliquely forward) bars that merge on the sides of the body. Pectoral fin base and belly pale silvery. Two dark (obliquely back) bars on the head behind the upper jaw and on the cheek. Dorsal and anal fins with dark central stripe but base and tips pale whitish.

Size: To about 50 cm total.

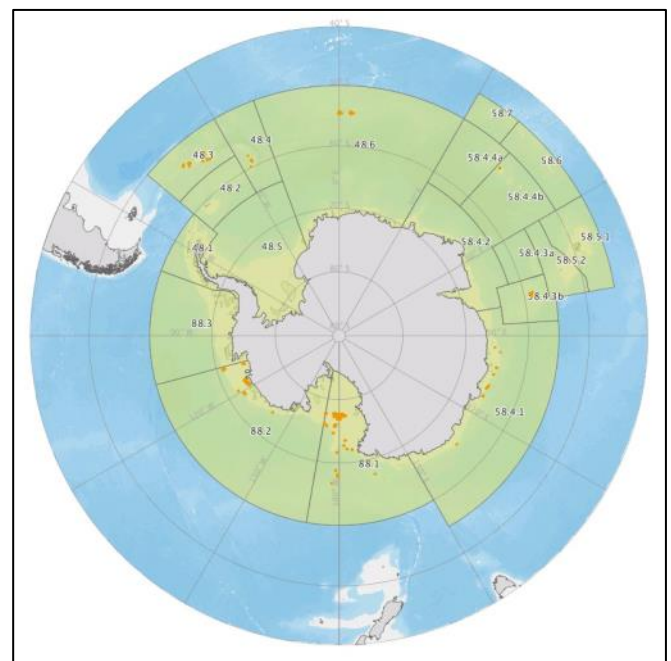
Distribution: Widespread in the CCAMLR area.

Depth: 100 to 900 m.

Similar species: Other small species of cod icefishes (notothen) including *Trematomus* lack scaly skin extending onto the top of the eyes.

References: Dewitt et al. (1990).

CCAMLR Longline Records:



***Muraenolepis microps* (Smalleye moray cod) (MOY)**



Distinguishing features: Body elongate. Two dorsal fins, the first small with only 2 rays. Chin barbel present. Second dorsal, caudal, and anal fins are joined giving a continuous fin around the tail. Body scales (tiny) forming a basket-work pattern on the skin.

Colour: Variably brownish or reddish upper and paler lower body. Fades quickly on death

Size: To about 40 cm total length.

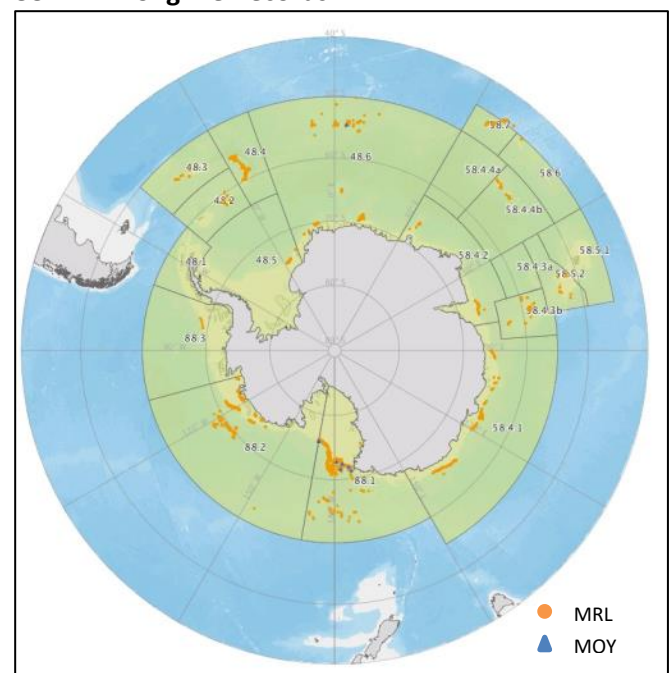
Distribution: *Muraenolepis* spp. are widespread in the CCAMLR area, but ID is difficult hence the low number of confirmed MOY records.

Depth: 10–2 000 m.

Similar species: There are five nominal species in the genus *Muraenolepis*, although published differences conflict therefore reliable separation a matter of conjecture. Use the generic eelpout code (MRL) unless certain of ID.

References: Dewitt et al. (1990).

CCAMLR Longline Records:



***Bathyraja irrasa* (Kerguelen sandpaper skate) (BYR)**



Distinguishing features: Very little known about this species. Large, slow growing with distinct underside pattern.

Colour: Brown to grey from reported images.

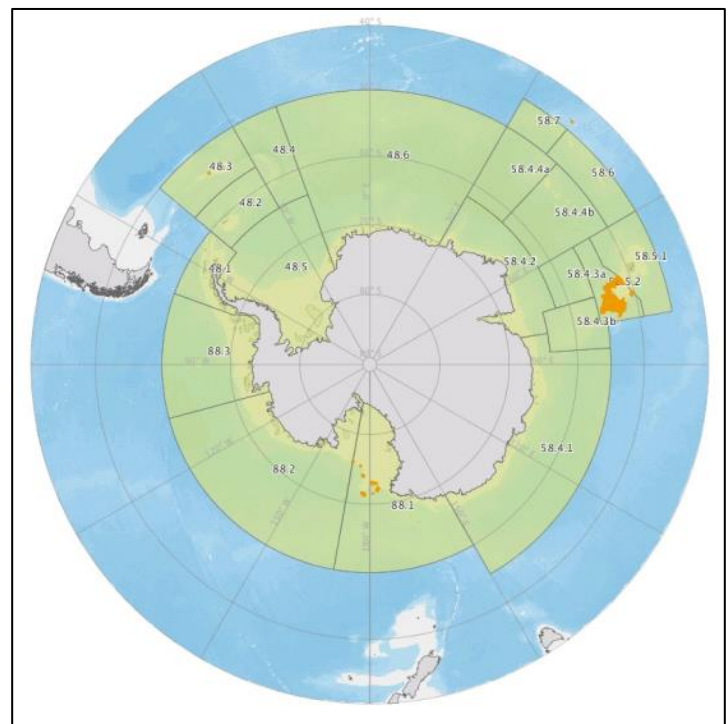
Size: To at least 120 cm total length.

Distribution: Thought to be restricted to Kerguelen plateau, although unconfirmed records exist in other areas. If in doubt take pictures and report them to the CCAMLR Secretariat.

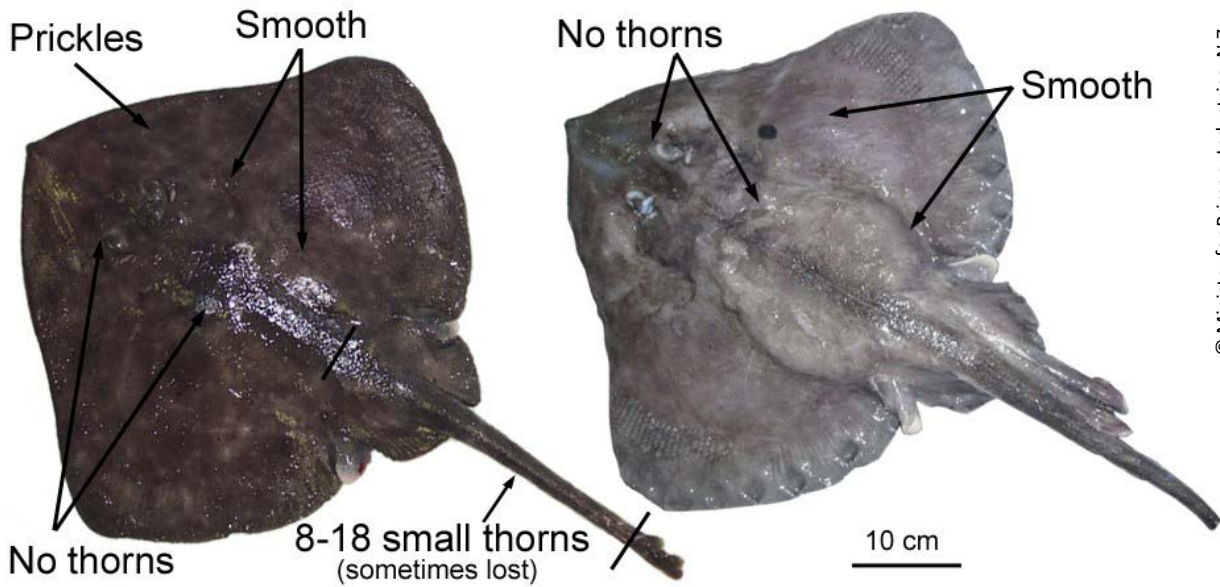
Depth: Reported from 300 to 1 200 m.

References: Jarre-Teichmann (2016); Smale (2009).

CCAMLR Longline Records:



***Bathyraja cf. eatonii* (Antarctic allometric skate) (BEA)**



© Ministry for Primary Industries, N.Z.

Distinguishing features: Prickles on upper surface of disc confined to the anterior margin and midline with most of the rest of the disc smooth. No thorns in front of eyes and usually none or 1 to 2 (small individuals) thorns on midline in shoulder region. 8 to 18 small thorns in a median row along the tail ahead of first dorsal fin.

Colour: Upper surface of disc usually greyish-brown, sometimes with indistinct dark and pale oval spots. Lower surface of disc whitish, sometimes with blackish spots and not a reliable character for identification.

Size: To about 125 cm total length.

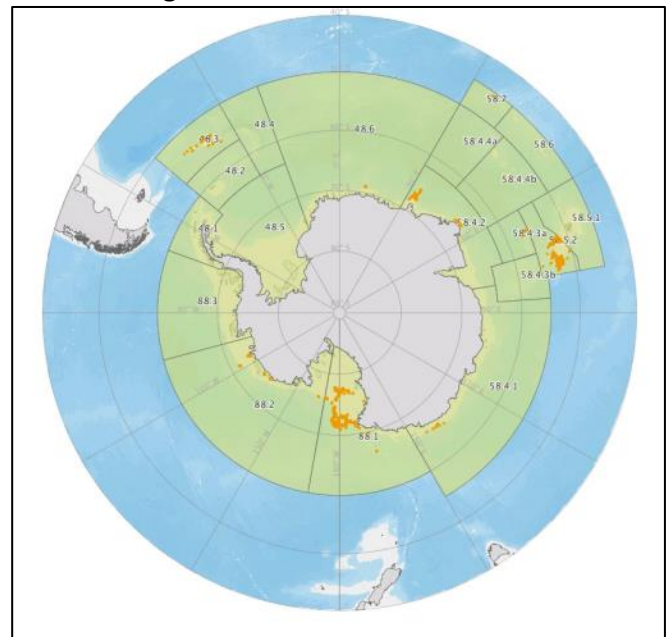
Distribution: Widespread in the CCAMLR area.

Depth: 15 to about 1 600 m.

Similar species: Antarctic starry skate (*Amblyraja georgiana*) has many small white spots and lines on upper disc, thorns in front of eye, 2 to 3 thorns on shoulder, 24 to 28 thorns on midline of tail, upper disc covered with prickles. Macain's skate (*Bathyraja maccaini*) has thorns in front of eye but only 1 thorn on shoulder, 9 to 15 large thorns on midline of tail, prickles on upper disc around outer margins and midline. Dwarf skate (*Bathyraja* sp.) has upper disc entirely covered with prickles, lacks thorns in front of eye and on shoulder, and has 18 to 29 thorns on midline of tail.

References: Roberts and Stewart (2001); Smith et al. (2008); Stehmann and Bürkel (1990).

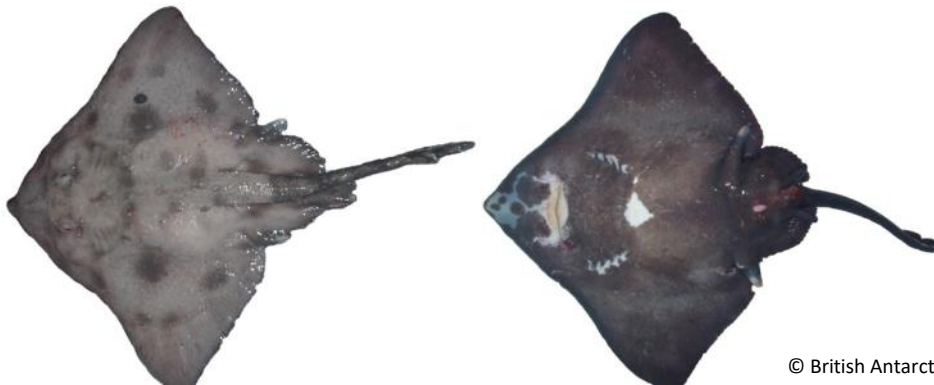
CCAMLR Longline Records:



A. georgiana sp. anon South Georgia Skate (SR2)



© Lee Dongwon



© British Antarctic Survey

Distinguishing features: Dorsal surface has 20–28 prominent thorns in median row from shoulder to first dorsal fin. Upper surface of anterior pelvic lobe as dark as disc (at most pale edged).

Colour: Dorsal surface grey with mottling and distinct darker blotches, symmetrical about the mid-line. Ventral surface darker than dorsal, often with a pattern of white markings in the umbilical region, symmetrical about the midline.

Size: To about 125 cm total length.

Distribution: Thought to be restricted to Subareas 48.3 and 48.4, although unconfirmed records are present in other areas.

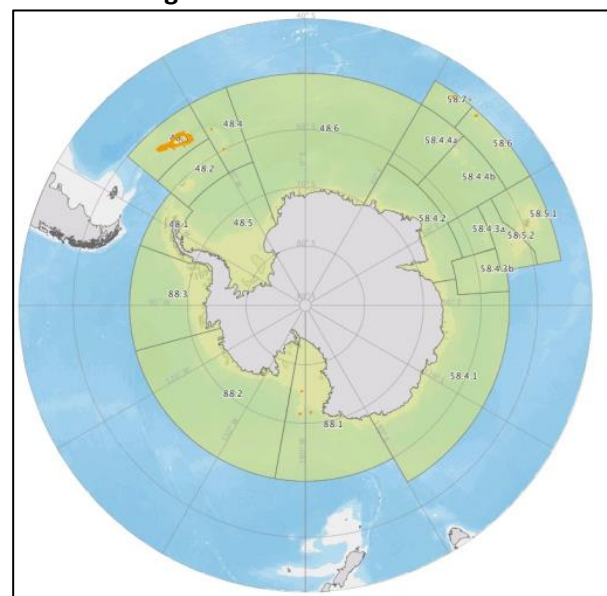
Depth: 300 to 1600 m.

Similar species: Whiteleg skate (*Amblyraja taaf*) has dorsal surface with uniform to slightly patchy brown/grey with irregular black spots. Ventral surface paler than dorsal surface, dorsal colour shows around edges. 15–20 prominent thorns in median row from

shoulder to first dorsal fin. Upper surface of anterior pelvic fin lobes is white.

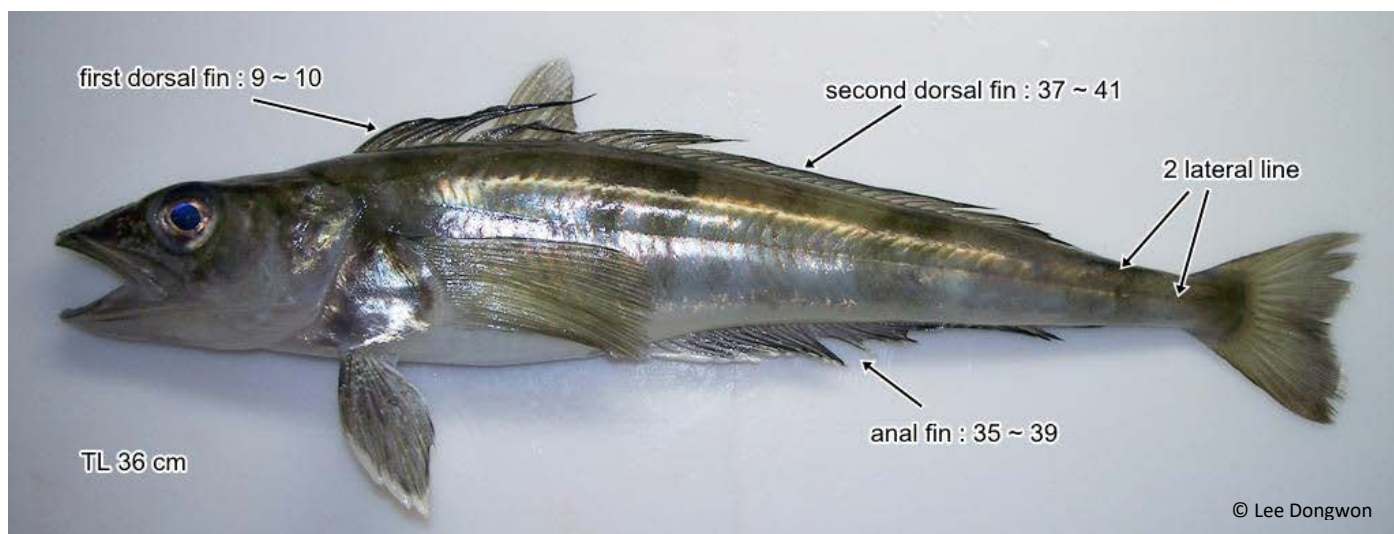
References: Stehmann and Bürkel (1990).

CCAMLR Longline Records:



Common Krill Trawl By-catch Species

Champscephalus gunnari (Mackerel icefish) (ANI)



Distinguishing features: No obvious rostral spine. First dorsal spines: 9-10; second dorsal spines: 37-41; Anal fin 35-39 spines

Colour: Oblique dark stripes, pale green to brown blotches on dorsal surface. Breast to underside a notable silvery-white.

Size: To 66 cm total length.

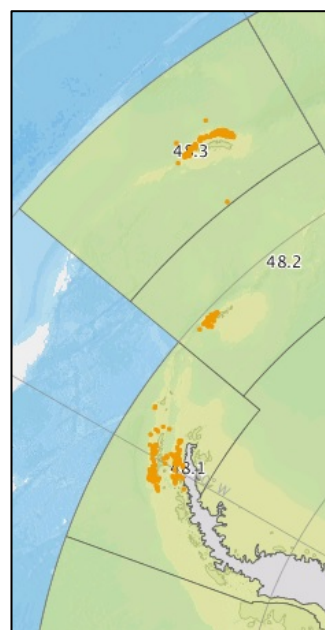
Distribution: Widespread in the CCAMLR area.

Depth: To 700 m.

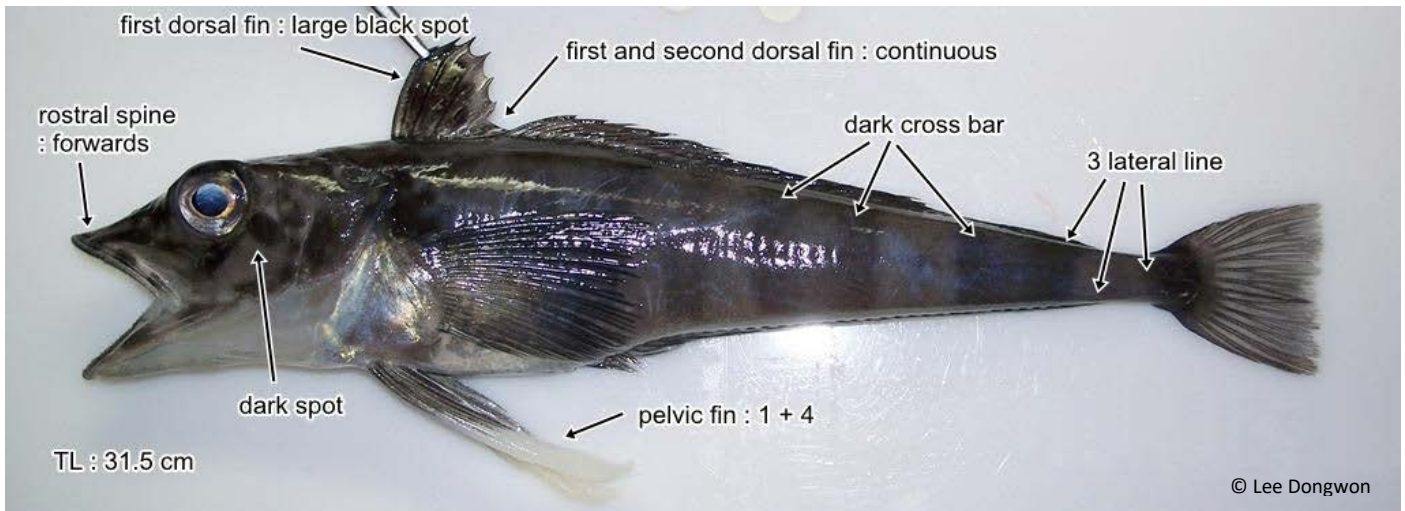
Similar species: Spiny Icefish (*Chaenodraco wilsoni*) has large black spot on dorsal fin, and generally darker in colouration with cross bar pattern.

References: Hureau (1985).

CCAMLR Krill Trawl Records:



***Chaenodraco wilsoni* (Spiny icefish) (WIC)**



Distinguishing features: Large black spot on first dorsal fin, first and second dorsal fin continuous, one spine and four rays on pelvic fin.

Colour: Cross bar pattern on body. Dark spot anterior to eye, breast and anterior silvery white.

Size: Up to 43 cm total length.

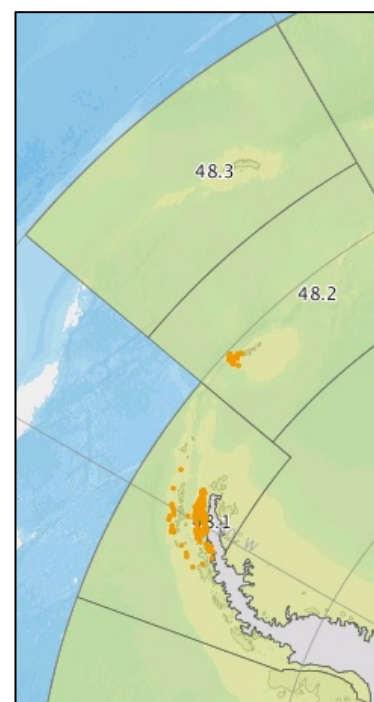
Distribution: Widespread in the CCAMLR area.

Depth: 200–800 m.

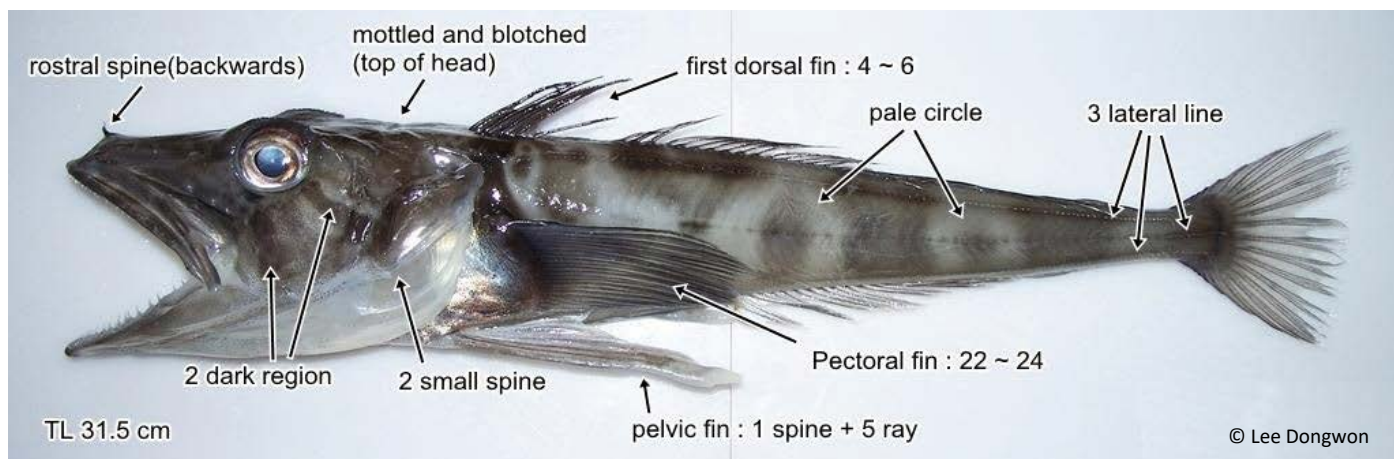
Similar species: Mackerel Icefish (*Champsocephalus gunnari*) no rostral spine, a much less pronounced first dorsal fin with no black spot, and an overall lighter colouration. Ocellated Icefish (*Chaenodraco rastrispinosus*) has backward rostral spine, 5 rays on pelvic fin and non-continuous dorsal fins

References: Iwami and Kock (1990).

CCAMLR Krill Trawl Records:



***Chionodraco rastrospinosus* (Ocellated icefish) (KIF)**



Distinguishing features: Backward rostral spine, two small spines anterior to pectoral fin, pelvic fin one spine and five rays.

Colour: Two dark regions around eye, cross bar pattern with pale circles posterior to pectoral fin. Breast and anterior silvery white.

Size: To 52 cm total length.

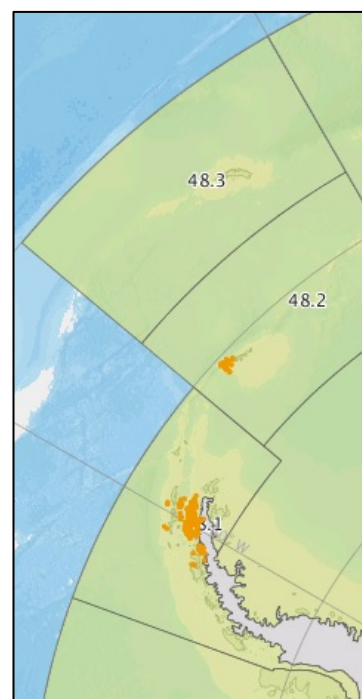
Distribution: Widespread in the CCAMLR area.

Depth: To 1 000 m.

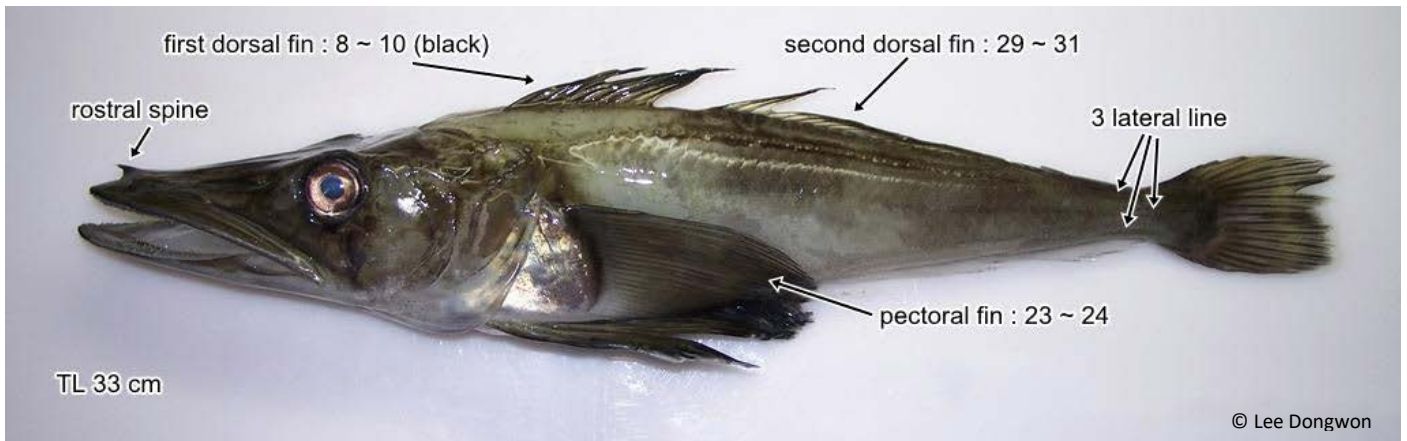
Similar species: Mackerel Icefish (*Champsocephalus gunnari*) no rostral spine, a much less pronounced first dorsal fin with no black spot, and an overall lighter colouration. Spiny Icefish (*Chaenodraco wilsoni*) has forward rostral spine, a dark spot posterior to eye, and four rays on pelvic fin.

References: Hureau (1985).

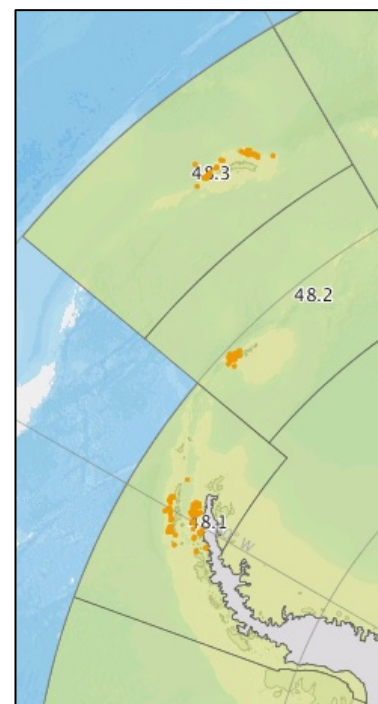
CCAMLR Krill Trawl Records:



***Pseudochaenichthys georgianus* (South Georgia icefish) (SGI)**



CCAMLR Krill Trawl Records:



Distinguishing features: Pronounced forward rostral spine, first dorsal fin 8–10 spines, second dorsal fin 29–31 spines, pectoral fin 23–24 spines.

Colour: Dark first dorsal fin, three distinct lateral lines, body colouration variable.

Size: Up to 60 cm total length.

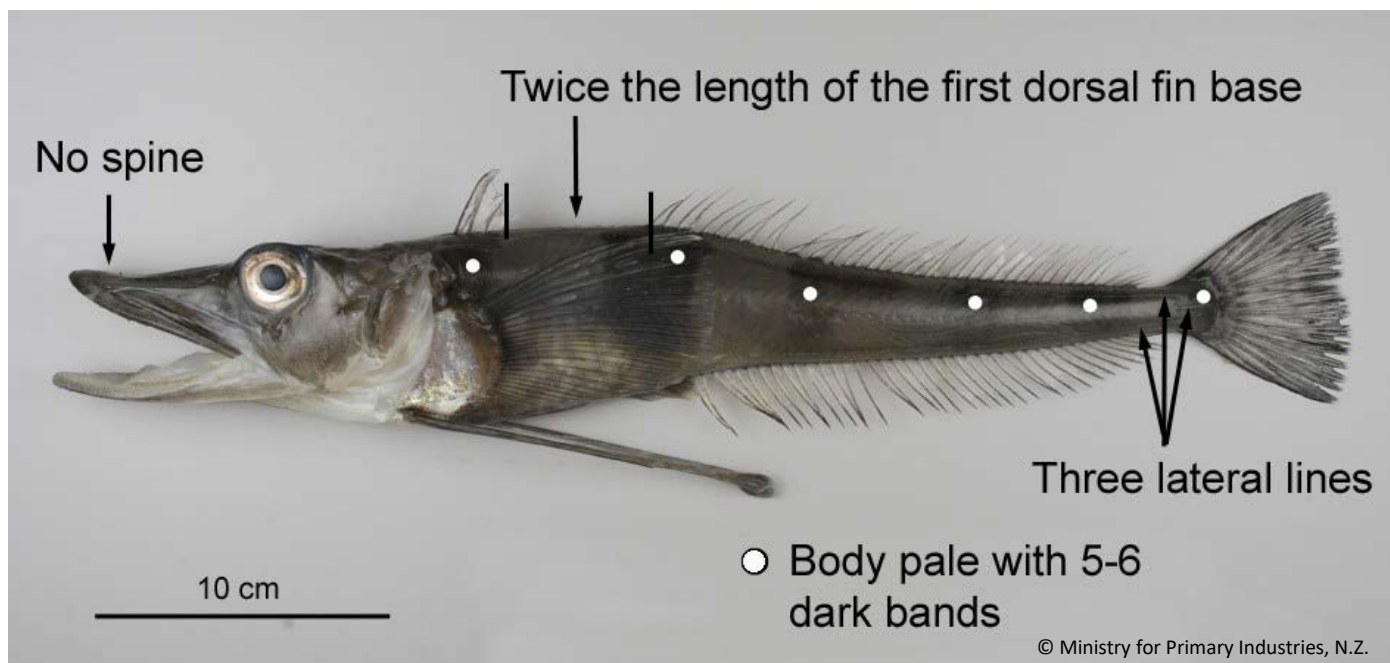
Distribution: Widespread in the CCAMLR area.

Depth: To 500 m.

Similar species: Ocellated icefish (*Pseudochaenichthys georgianus*) has backwards rostral spine, and fewer spines on first dorsal fin. Black icefish (*Chaenocephalus aceratus*) has no rostral spine, and much paler ventral colouration.

References: Iwami and Kock (1990).

Cryodraco antarcticus (Long-fingered icefish) (FIC)



Distinguishing features: No obvious rostral spine, 3 lateral lines, body pale with 5 to 6 dark bands or saddles on the upper surface and sides, first dorsal fin low and separated from the second dorsal fin by a large distance, usually more than twice the length of the first dorsal fin base.

Colour: Body pale with 5 to 6 dark bands or saddles on the upper surface and sides.

Size: Up to about 57 cm TL.

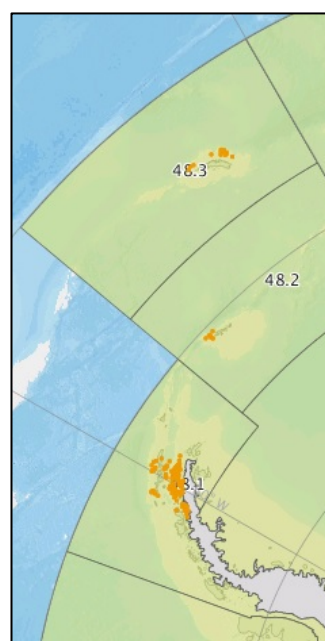
Distribution: Widespread in the CCAMLR area.

Depth: 250 to 800 m.

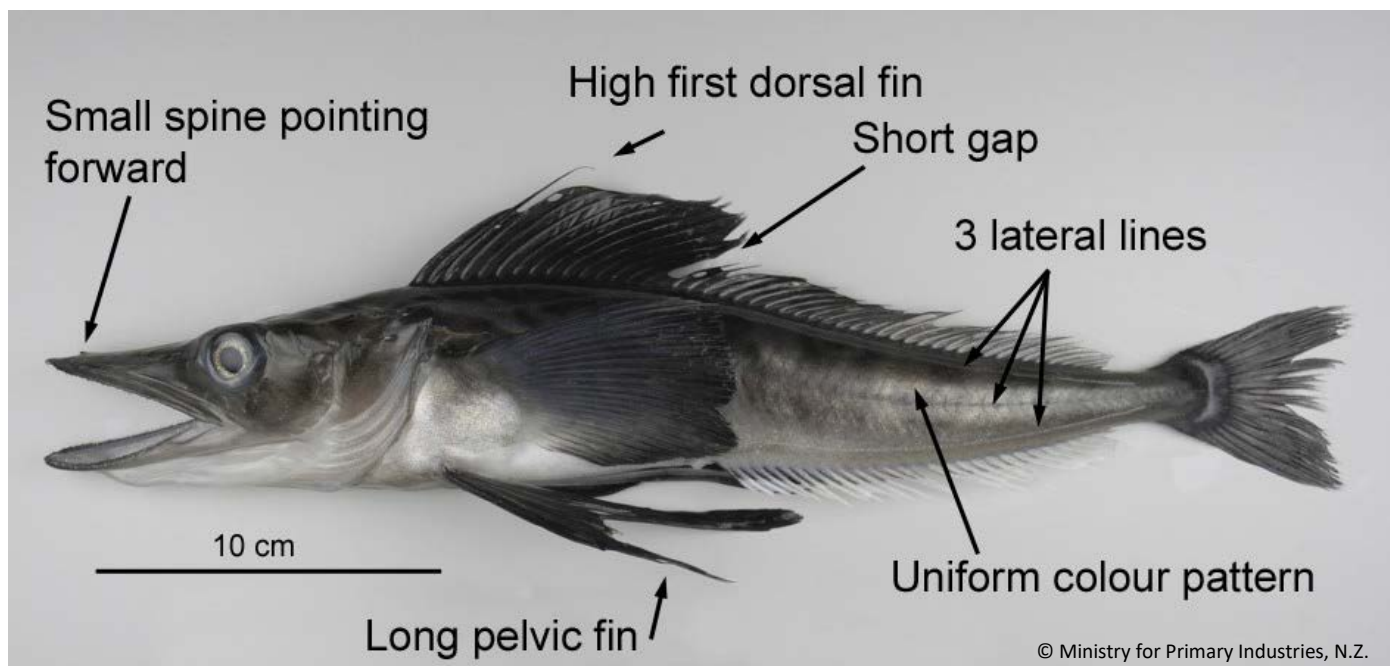
Similar species: Dewitt's icefish (*Chionobathyscus dewitti*) has first dorsal fin separated from the second dorsal fin by a short distance, usually less than the length of the first dorsal fin base, and first dorsal fin height is usually much greater than eye length.

References: Iwami and Kock (1990), Roberts & Stewart (2001), Stewart & Roberts (2001).

CCAMLR Krill Trawl Records:



Neopagetopsis ionah (Icefish) (JIC)



Distinguishing features: Small rostral spine pointing forward, 3 lateral lines, first dorsal fin high and scarcely separated from the second dorsal fin, pelvic fins long. Upper body surface of large adults uniform dark blackish-green or brown.

Colour: Upper body and sides of large adults dark blackish-green or brown, smaller individual sometimes have irregular darker markings.

Size: To about 56 cm TL.

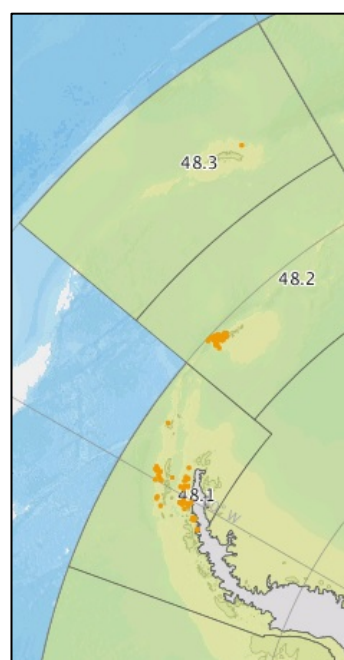
Distribution: Widespread in the CCAMLR area.

Depth: 20 to 900 m.

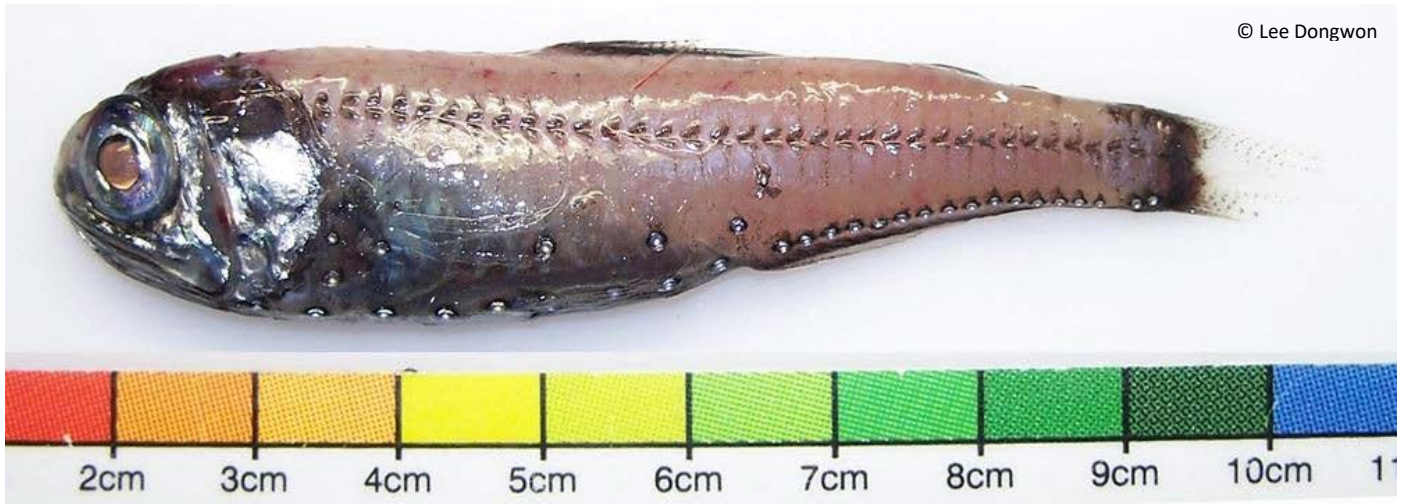
Similar species: Other species of icefishes lack the combination of long, high first dorsal fin, and uniform dark blackish-green or brown body.

References: Iwami and Kock (1990)

CCAMLR Krill Trawl Records:



***Electrona carlsbergi* (Lanternfish) (ELC)**



Distinguishing features: No dorsal or anal spines. Dorsal soft rays 13–15; anal soft rays 18–20.

Colour: Pale body with noticeable discrete silvery spots on posterior half of fish. Silvery colouring on breast and eye.

Size: To 9 cm TL.

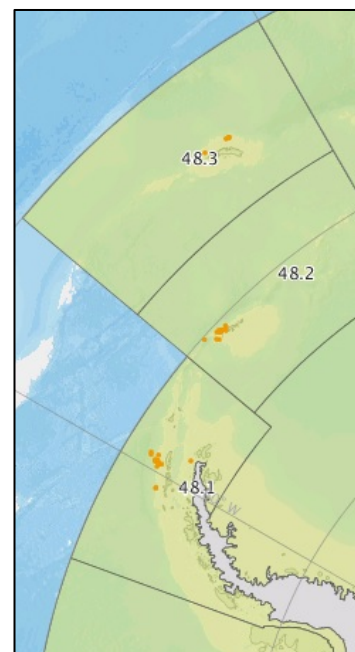
Distribution: Widespread in the CCAMLR area.

Depth: 100 to 350 m.

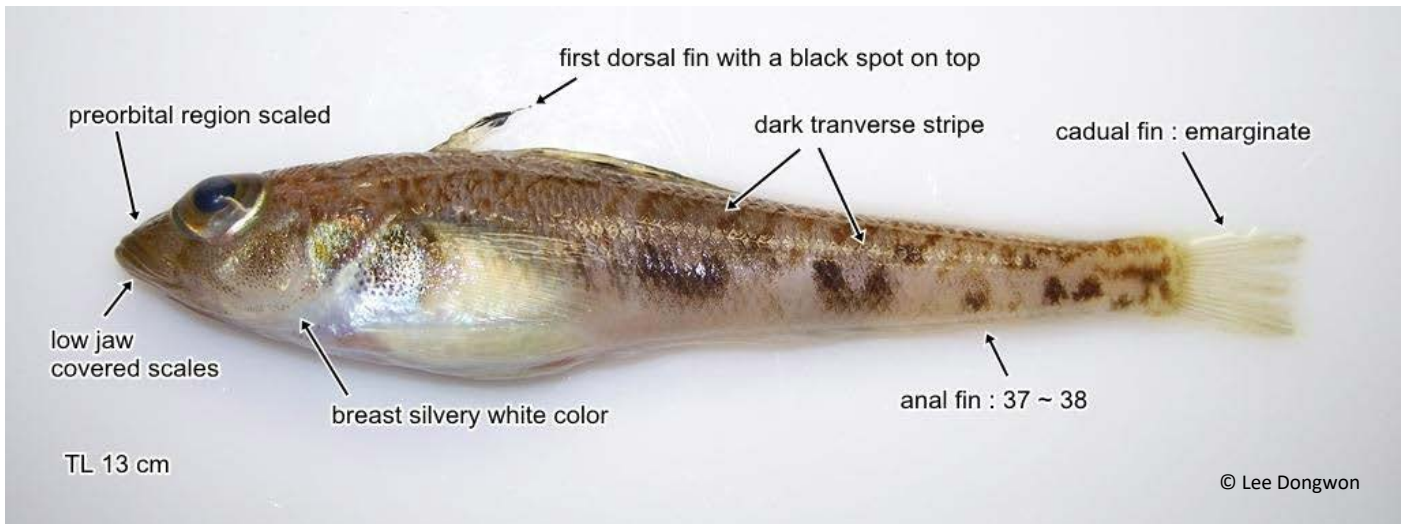
Similar species: *Gymnoscopelus nicholsi* (Lanternfish) attains longer total length (16 cm), 17–19 dorsal soft rays and has less silvery colouration.

References: Hulley (1990).

CCAMLR Krill Trawl Records:



***Lepidonotothen larseni* (Painted Rockcod) (NOL)**



Distinguishing features: Dorsal spines: 5–6; Dorsal soft rays (total): 37–39; Anal soft rays: 37–38. Irregular oblique dark cross-bars on body.

Colour: First dorsal fin with black blotch, second dorsal soft with oblique dark stripes. Anal plain or similarly marked. Breast to middle depth of pectoral fins a notable silvery-white.

Size: To about 24 cm total length.

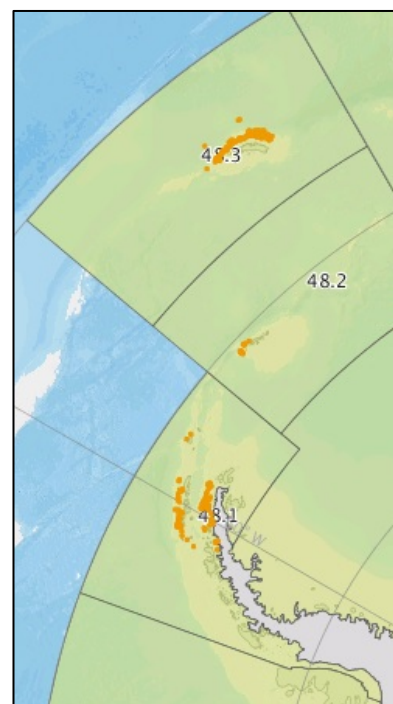
Distribution: Throughout the CCAMLR area except for the Kerguelen Plateau.

Depth: 30–750 m.

Similar species: Antarctic Rockcod (*Trematomus eulepidotus*) has a similar colouration but lacks scales on the lower jaw, and has two distinct lateral lines.

References: Dewitt et al. (1990).

CCAMLR Krill Trawl Records:



***Gobionotothen gibberifrons* (Humped rockcod) (NOG)**



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Distinguishing features: Humped forehead, two lateral lines, first dorsal fin 6-8 spines, second dorsal fin 31-34 spines.

Colour: Body and fins have blotchy brown to yellow markings with pale ventral surface

Size: To 55 cm total length.

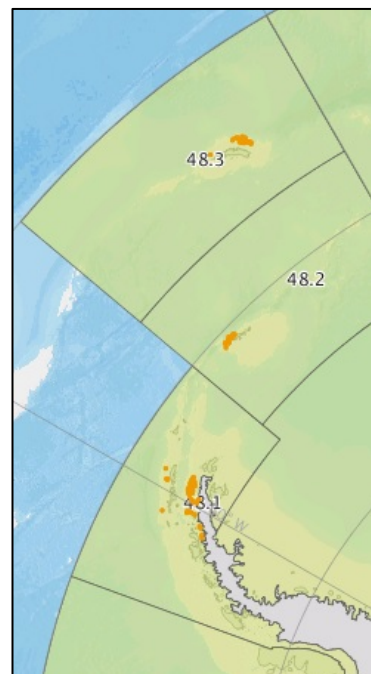
Distribution: Widespread in the CCAMLR area.

Depth: To 500 m.

Similar species: Black rockcod (*Notothenia coriiceps*) has noticeably darker colouration and fewer spines on first dorsal fin.

References: Dewitt et al. (1990).

CCAMLR Krill Trawl Records:



Melanostigma gelatinosum (Limp eelpout) (MWG)



Distinguishing features: Body and tail elongate (eel-shaped), with single dorsal and anal fins continuous with the tail fin. Dorsal fin soft rays 108; anal fin soft rays 99.

Colour: Pale brown or greyish in colour.

Size: To about 29 cm TL.

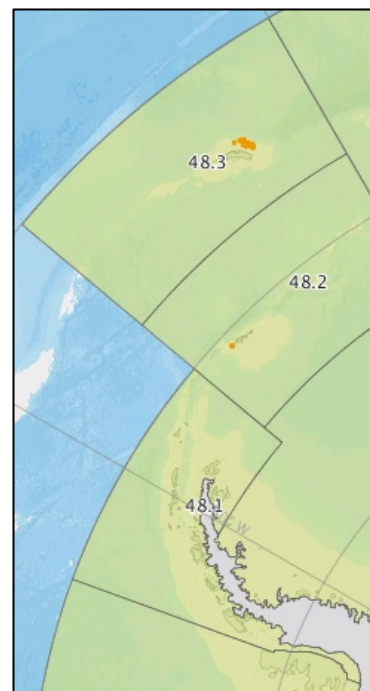
Distribution: Widespread in the CCAMLR area.

Depth: To 2 500 m.

Similar species: There are several species which require microscopic study to correctly identify. If in doubt identify the individual using the generic eelpout code (ELZ)

References: Anderson (1990).

CCAMLR Krill Trawl Records:



Euphausia crystallorophias (Crystal/ Ice Krill) (KRC)



© Volker Siegel

Antarctic krill (Euphausia superba) top, Crystal krill (Euphausia crystallorophias) bottom.

Distinguishing features: Smaller than Antarctic krill, with larger eyes, and a long sharply pointed rostrum.

Colour: Similar to many Euphausids, although often described as slightly paler, or more translucent than Antarctic krill. Colouration dependent on food consumption. Can have a green tinge from eating algae, or brown from diatoms or other detritus.

Size: Mature specimens 25–35 mm.

Distribution: Coastal Antarctica, generally above 74° South.

Depth: Commonly between 350 and 600 m. Has been found to 4 000 m

Similar species: Antarctic Krill (*E. superba*), Spiny Krill (*Euphausia triacantha*)

References: Siegel V. et al. (Eds., 2018).

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Appendix 1 – Common *Macrourid* (Grenadier) By-catch Species Key

Four species of grenadier, *Macrourus holotrachys* (MCH), *Macrourus carinatus* (MCC), *Macrourus whitsoni* (WGR) and *Macrourus caml* (QMC) are caught as by-catch in the longline fishery for Patagonian toothfish in the CCAMLR area. Their external appearance is very similar, making species identification tricky for scientific observers working at sea. However, reliable identification to species level is necessary in order to quantify the impact of the fishery on each species. The guide presents key characteristics in an easy-to-use fashion allowing observers to differentiate between species.

KEY

(1) Underside of the head is free from scales (or perhaps only in small patches of <8 scales adjacent to angles of mouth and posterior of head).

- YES *Macrourus holotrachys* (MCH)

(Confirm as *M. holotrachys* by presence of 9 pelvic fin rays and <28 scales between anal fin origin and lateral line)

- NO Go to (2)

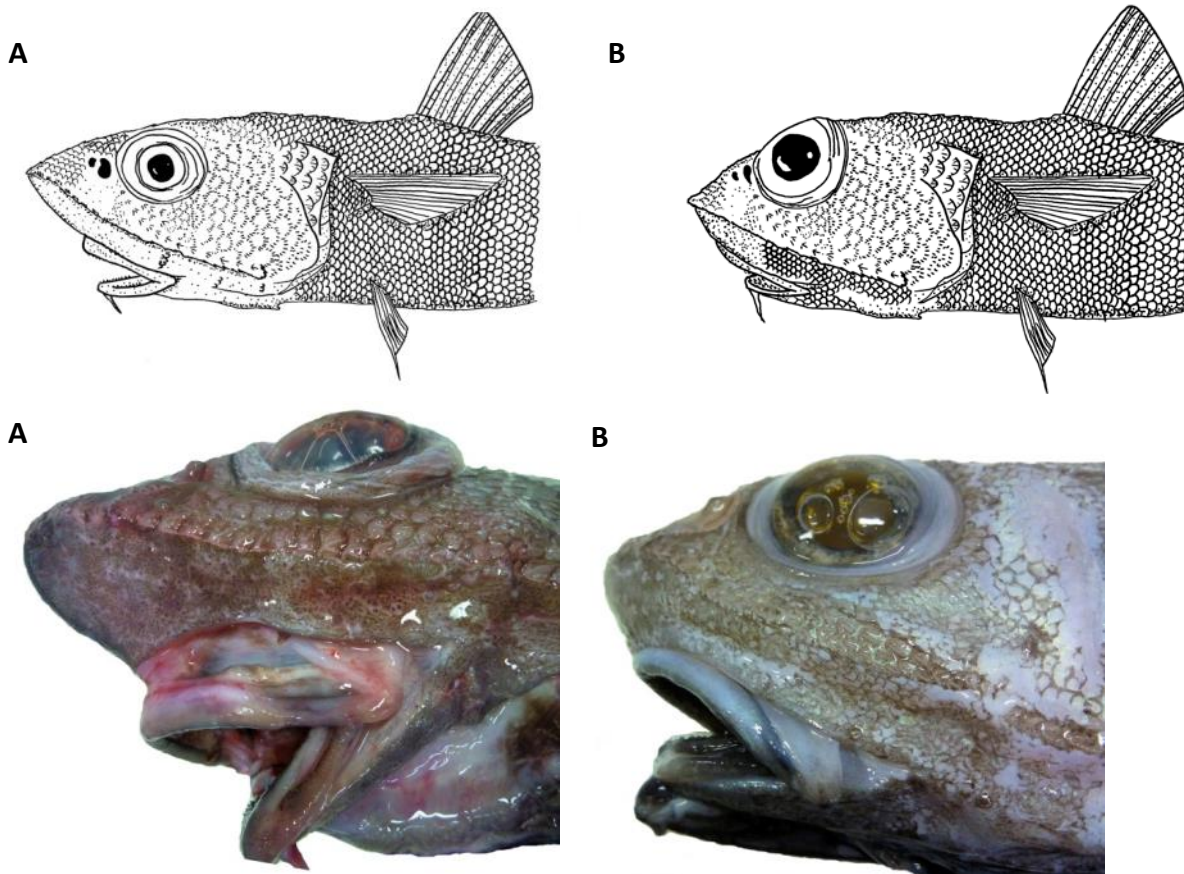


Figure 1. Lateral views showing the presence of scales on the underside of the head of (A) *Macrourus holotrachys* (mostly naked), and (B) *Macrourus whitsoni* (mostly scaled).

(2) Are there less than 28 scales between anal fin origin and lateral line (not counting the lateral line)?

- YES *Macrourus carinatus* (MCC)

(Confirm as *M. carinatus* by the presence of 8 pelvic fin rays and outer row of teeth in upper jaw enlarged relative to inner rows)

- NO Go to (3)

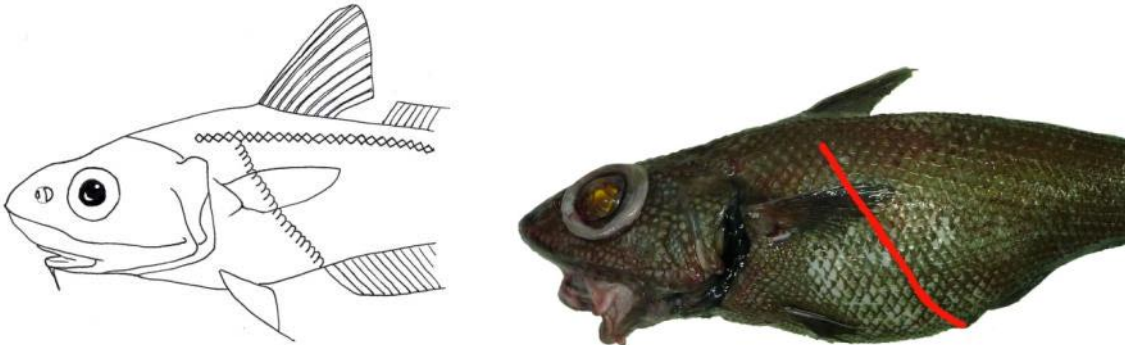


Figure 2. Diagram showing diagonal line of scales between anal fin origin and the lateral line (not counting the lateral line).

(3) Are there 9 (rarely 10) pelvic fin rays?

- YES *Macrourus whitsoni* (WGR)

(Confirm as *M. whitsoni* by the presence in the upper jaw of an enlarged outer row of teeth relative to the inner rows together with a single row of enlarged uniformly spaced teeth in the lower jaw)

- NO *Macrourus caml* (QMC)

(Confirm as *M. caml* by presence of 2–3 rows of small closely spaced teeth in the lower jaw, together with 4–5 rows of small uniform teeth in the upper jaw, the outer row not enlarged relative to inner rows)

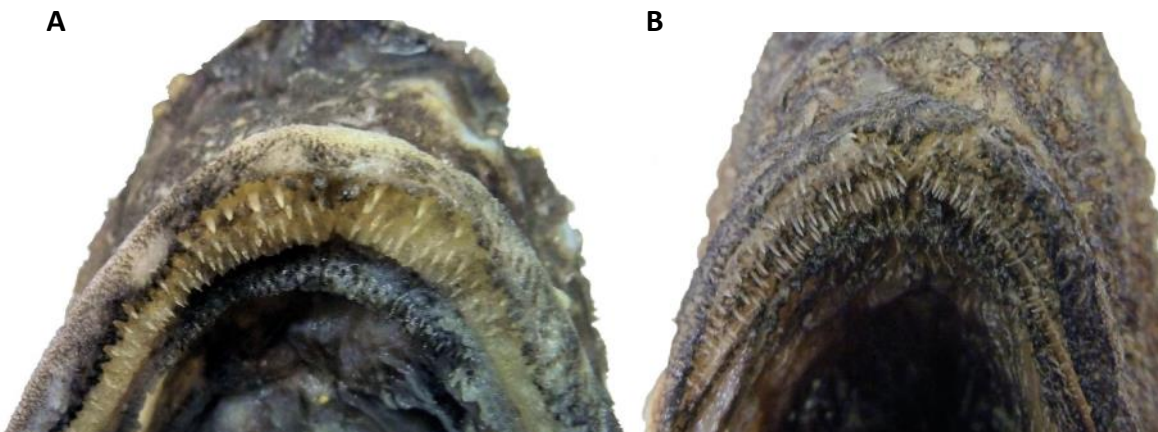


Figure 3. Photographs of the upper jaw, showing the enlarged outer row of *Macrourus whitsoni* (A) and the rows of small uniform teeth of *Macrourus caml* (B).

Be aware that *M. carinatus* and *M. holotrachys* are particularly difficult to tell apart due to considerable overlap between many measures. It can also be difficult to identify juveniles and specimens that have been damaged during fishing operations (e.g. with damaged lower jaws). If unsure over a particular character, use a greater range of criteria from the table below, combinations of several measures will enable the species to be identified. However, if still uncertain, be sure to record as *Macrourus* sp. (GRV).

Species	Pelvic fin rays ²	Pyloric caeca ¹	Lower jaw teeth rows ¹	Upper jaw teeth rows ¹	Underside head ¹	Scales from anal fin origin and lateral line ⁴
<i>Macrourus carinatus</i> (MCC)	8	13–21	2–5 rows small uniform teeth	2–6 rows outer row enlarged teeth	Scaled	19–27
<i>Macrourus holotrachys</i> (MCH)	9 (8)	8–16	2–5 rows small uniform teeth	4–6 rows small uniform teeth	Naked	15–28
<i>Macrourus whitsoni</i> (WGR)	9 (rarely 10) ³	15–28	1 row, enlarged uniformly spaced teeth ³	2–5 rows outer row enlarged teeth ³	Scaled	34–45
<i>Macrourus caml</i> (QMC)	8 (rarely 7 or 9) ³	20–37	2–3 rows closely spaced small teeth ³	4–5 rows small uniform teeth, outer row not enlarged ³	Scaled behind snout	30–40

¹Cohen et al. 1990 in Smith et al. 2010

²from 'NIWA_amended_10032011' guide to Ross Sea fish

³Pinkerton et al. 2012

⁴McMillan et al. 2012

Compiled by James McKenna (BAS) 2014

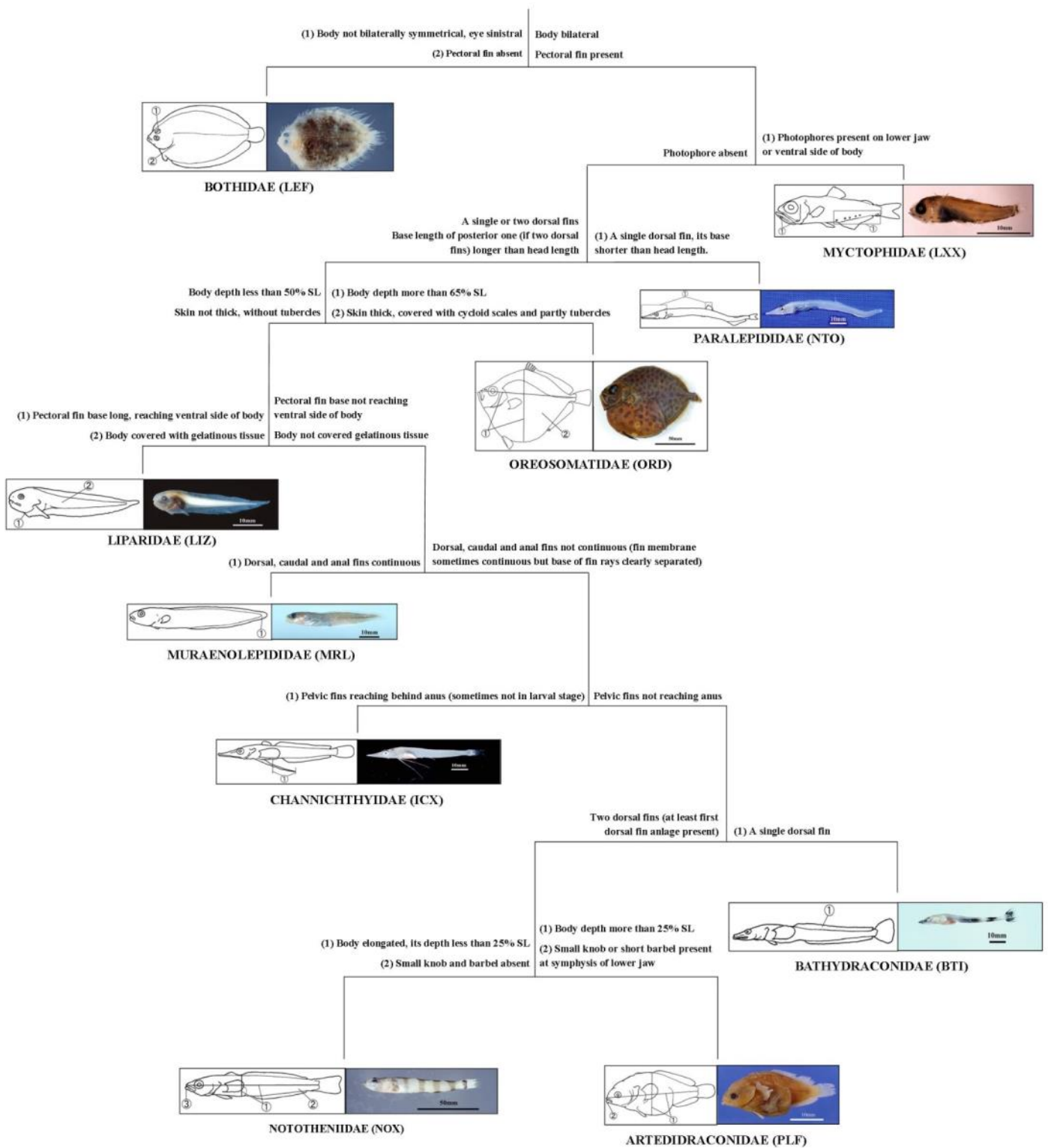
Appendix 2 – Family and Species ID Keys for Krill Trawl By-catch

This additional appendix is designed to assist in the identification of fish by-catch in the krill fisheries to appropriate taxonomic levels. It is also available separately on the CCAMLR website

(www.ccamlr.org/document/science/common-fish-catch-species-ccamlr-krill-fisheries).

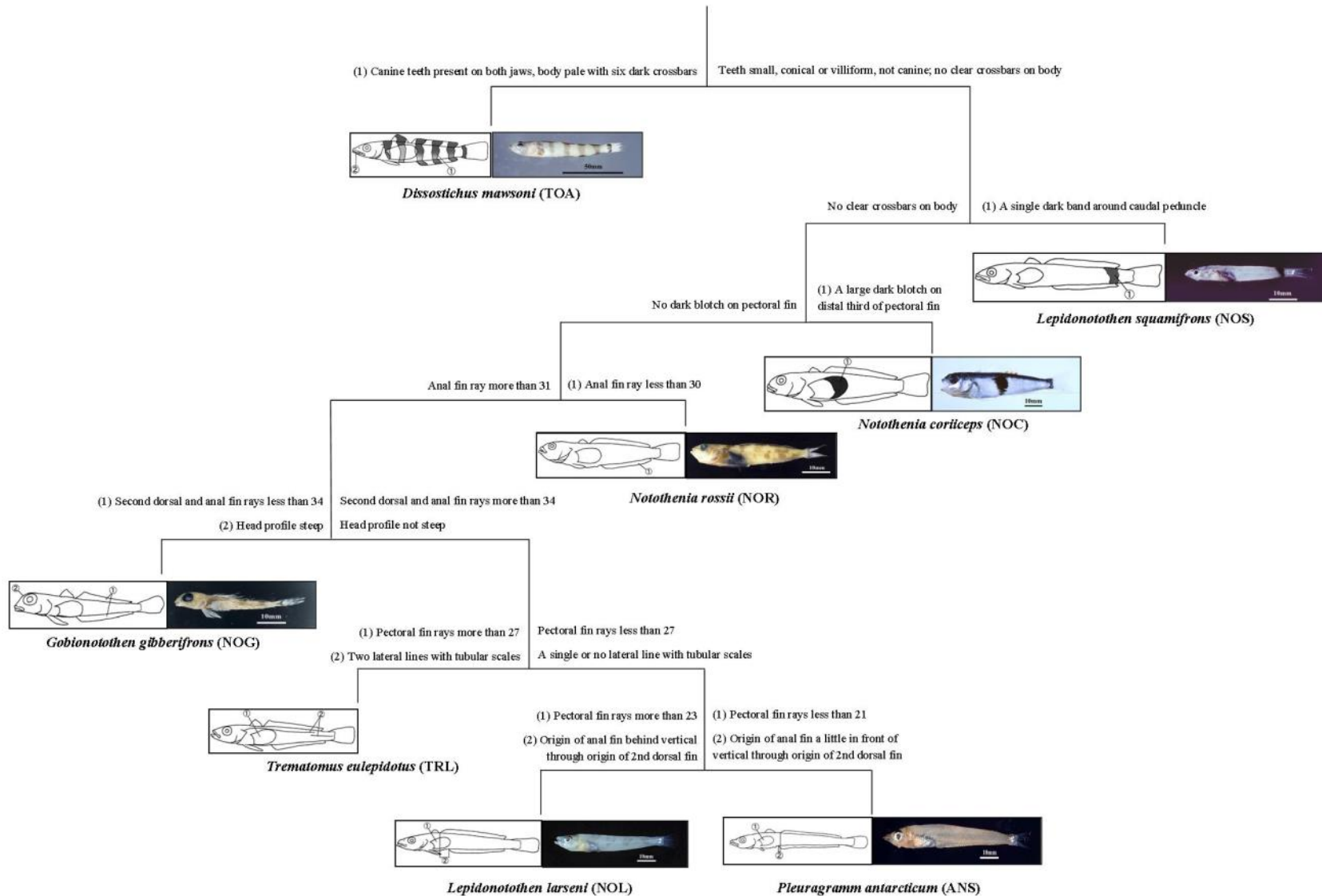
Included is an illustrated key to distinguish the families of fish that have occurred as by-catch in the krill fishery, as well as three family-specific keys. The information was provided in WG-EMM-07/32 (A guide to identification of fishes caught along with the Antarctic krill, T. Iwami and M. Naganobu (Japan)), and we are particularly grateful to Prof. Tetsuo Iwami for permission to use that material.

KEY TO FAMILIES



NOTOTHENIIDAE (NOX)

Red blood, two dorsal fins, scales on body



CHANNICHTHYIDAE (ICX)

White blood and gills, two dorsal fins, no scales, opercular spines

Pelvic fins well elongated

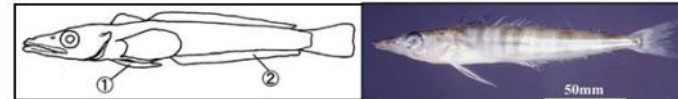
(1) Total pelvic fin rays 5 (1 spine + 4 soft rays)



Chaenodraco wilsoni (WIC)

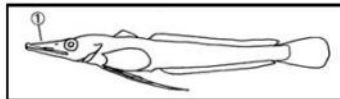
Pelvic fins not elongated

(1) Pelvic fin normal in shape, its membrane pale; (2) anal fin rays more than 35



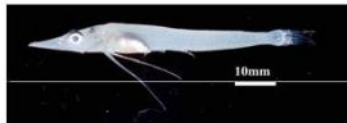
Champsocephalus gunnari (ANI)

Total pelvic fin rays 6 (1 spine + 5 soft rays)



(1) No rostral spine

Chaenocephalus aceratus (SSI)



Chionodraco myersi (MIC)



(1) Nostral spine present (sometimes undeveloped and recognized as a small knob)

Chionodraco hamatus (TIC)

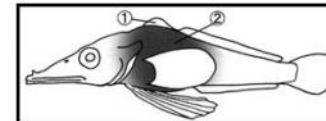
Chionodraco rastrospinosus (KIF)



(1) First dorsal fin rays less than 3

(2) Body pale with 5 dark crossbars

Dacodraco hunter (DAH)



(1) First dorsal fin rays more than 8

(2) Body sometimes dark, no clear dark crossbars

Neopagetopsis ionah (JIC)



Pseudochaenichthys georgianus (SGI)



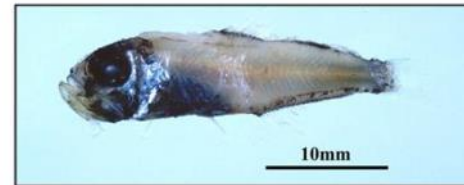
Pagetopsis macropterus (PMA)

MYCTOPHIDAE

Photophores on the head and body, jaw reaches to or beyond the posterior margin of the eye, scales, adipose fin and abdominal pelvic fins



Krefftichthys anderssoni (KRA)



Protomyctophum tenisoni (PRE)