

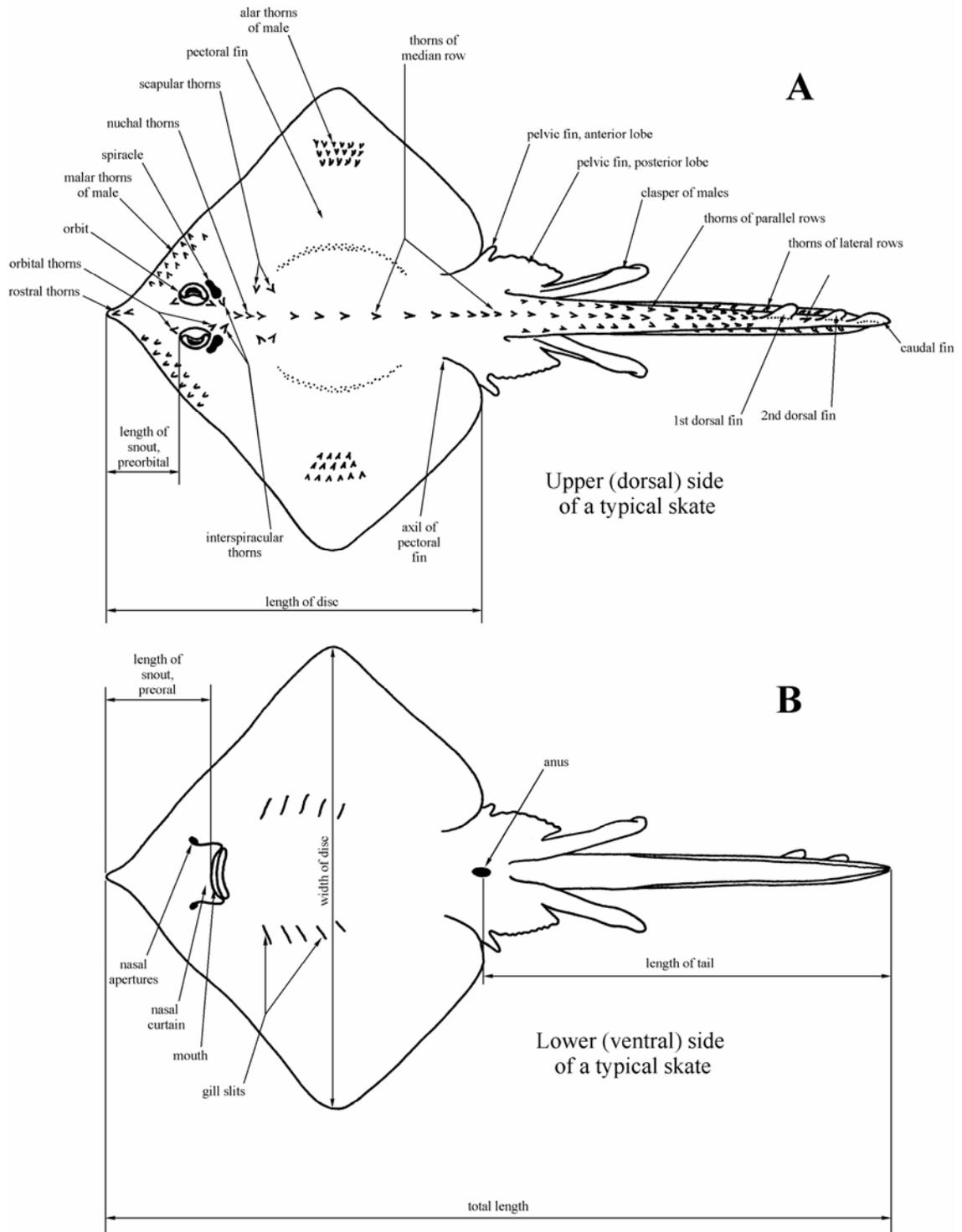
# Identification guide and biology of the Falkland Islands skates.

V. A. Bizikov, A.I. Arkhipkin, V.V. Laptikhovsky and J. Pompert



**Fisheries Department**  
**Falkland Islands Government**  
**Stanley, Falkland Islands**

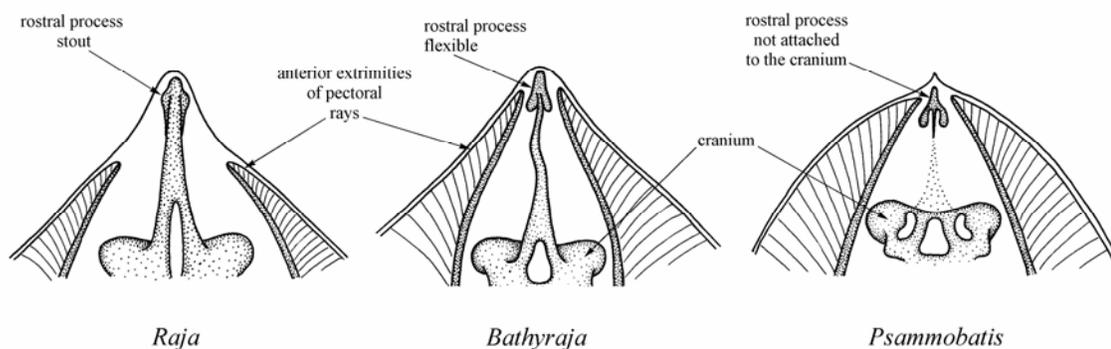
Telephone: (+500) 27260  
Facsimile: (+500) 27265  
E-mail: [director@fisheries.gov.fk](mailto:director@fisheries.gov.fk)



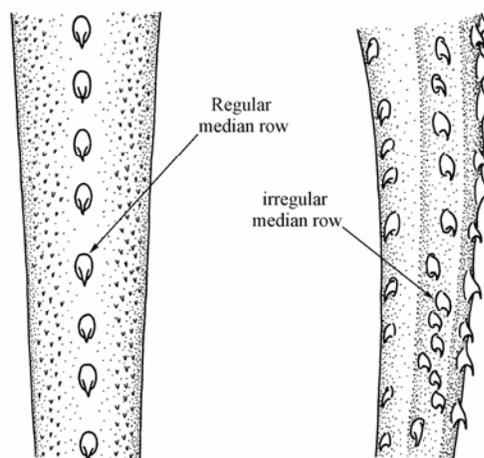
**Figure 1** Technical terms and measurements used in the study of skates (from Stehmann & Burkel, 1990).

**Key to species of Rajidae found in the Falkland Islands waters.**

- 1(2). Snout firm; rostral cartilage stout and calcified. Anterior extremities of pectoral rays do not extend toward the tip of the rostrum (Figure 2).....Genus *Raja*
  
- 2(1). Snout flexible; rostral cartilage delicate and flexible. Anterior extremities of pectoral rays extend forward to near the tip of rostrum (Figure 2).....3.
  
- 3(4). Thorns of the median row on the tail arranged in regular line and reach the first dorsal fin (Figure 3). Disk rhomboidal or sub-triangular in adults, but more circular in juveniles. Rostral cartilage is connected to the cranium (Figure 2; need to remove skin on the dorsal side of the head to see structure of snout).....Genus *Bathyraja*
  
- 4(3). Thorns of median row on tail form irregular, zigzag rows; up to five rows, including median row (Figure 3). Disk heart-shaped in adults or almost circular in juveniles. Rostral appendage is not attached to cranium (Figure 2).....Genus *Psammobatis*



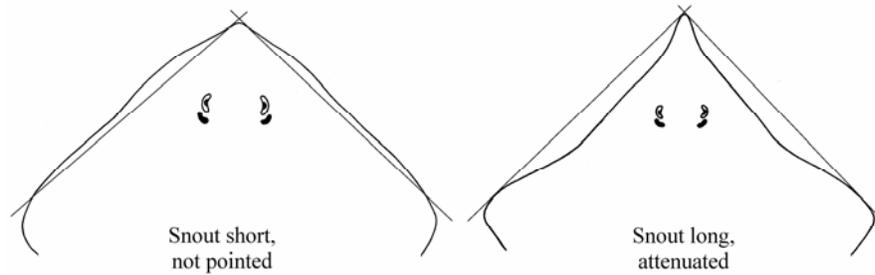
**Figure 2** Structure of the snout in Rajidae.



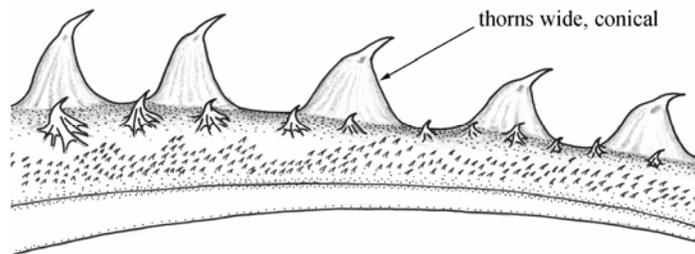
**Figure 3** Arrangement of thorns on the tail.

**Key to species of the genus *Raja*.**

- 1(8). Snout short; not acutely pointed. The line from tip of snout to the outer pectoral corner cuts or touches the anterior margin of disk (Figure 4). Three thorns on each scapular, one intraspiracular and two or three pairs of orbital thorns. All thorns are wide and conical, with a broad base (Figure 5).....Subgenus *Amblyraja*.....2.

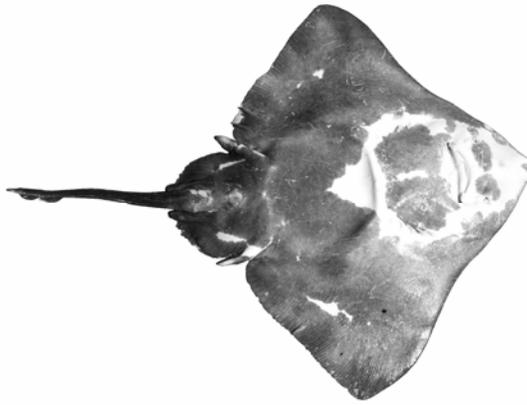


**Figure 4** Shape of the snout in *Raja*.



**Figure 5** Thorns on the tail in *Raja (Amblyraja) doellojuradoi*.

- 2(3). Lower surface of the disk, including tail, is uniformly dark grey. (Very rare species).....*Raja (Amblyraja) frerichsi* (**RAF**)
- 3(2). Ventral surface is either entirely white, or with white and dark blotches.....4.
- 4(5). Ventral surface of the disk is characterized by large white blotches that are symmetrically spaced over dark grey background (Figure 6). 22-28 (rarely as few as 20) prominent thorns in the median row. Adults attain 80 cm disk width (found at depths greater than 600 m in the south of FICZ).....*Raja (Amblyraja) georgiana* (**RGE**)



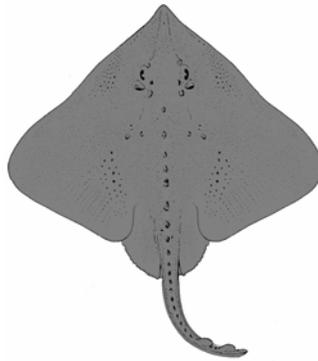
**Figure 6** Ventral view of *Raja (Amblyraja) georgiana*.

- 5(4). Ventral surface of the disk is white with 15-19 (rarely as many as 20) prominent thorns in the median row.....6.
- 6(7). Three rows of thorns on the tail; a median row of large thorns flanked by 2 rows of smaller thorns (Figure 7). Often curl up into a ball when captured. Common in waters less than 200 m in depth.....*Raja (Amblyraja) doellojuradoi* (**RDO**)



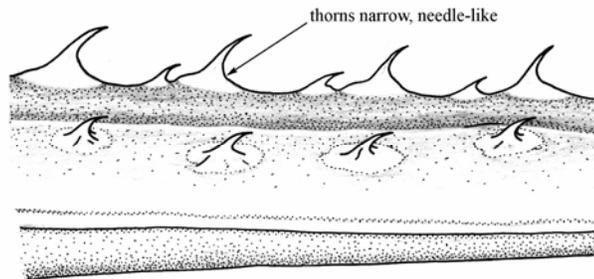
**Figure 7** Dorsal view of *Raja (Amblyraja) doellojuradoi*.

- 7(6). One (median) row of thorns on the tail. Upper side of anterior pelvic lobes is limestone to creamy white in colour, which contrasts to the dark coloration of the remainder of the dorsal side. Rare species that occurs at depths greater than 500 m (Figure 8).....*Raja (Amblyraja) taaf* (**RTF**)



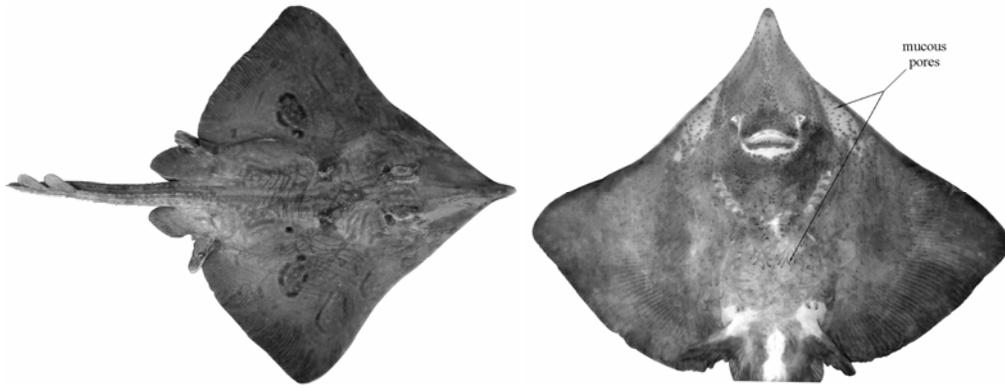
**Figure 8** Schematic representation of the ventral view of *Raja (Amblyraja) taaf*.

- 8(1). Rostrum is long and acutely pointed. Line from the tip of snout to the outer pectoral angle does not touch the anterior margin of disk (Figure 4). Either has one pair of scapular thorns or none. One or two pairs of intra spiracular thorns. Up to 7 pairs of orbital thorns or none. All thorns are narrow and needle-like (Figure 9).....Subgenus *Dipturus*.....9.



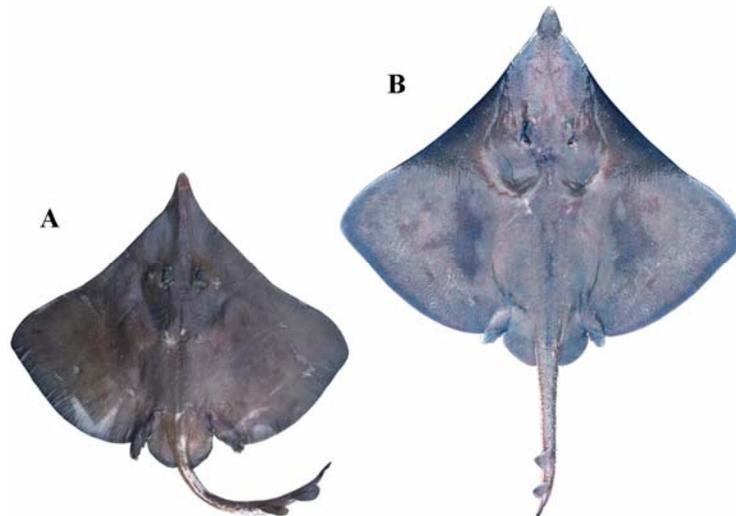
**Figure 9** Thorns on the tail of *Raja (Dipturus) chilensis (=Raja flavirostris)*.

- 9(10). Dorsal side of the disk is brown or greenish-brown, often with dark blotches or stripes that resemble a “camouflage” pattern (Figure 10). Large dark ocelli at base of pectoral fins. Lower side of the disk is pinkish grey and typically much lighter than the upper side. Numerous mucous pores, especially on the ventral surface (look like black dots and streaks) (Figure XX). Tail is thick and muscular even in specimens less than 50 cm disk width. Rare, small thorns may also occur on both sides of the disk.....*Raja (Dipturus) chilensis (=Raja flavirostris) (RFL)*



**Figure 10** Dorsal (A) and ventral view (B) of *Raja (Dipturus) chilensis* (*Raja fllavivrostris*)

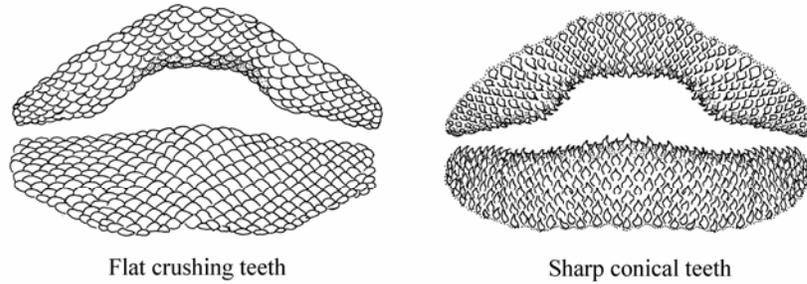
10(9). Body uniformly dark or almost black on both sides, with the dorsal side usually darker than ventral. Mucous pores hardly visible. Tail is thin and whip-like in specimens less than 50 cm disk width. In larger individuals, the tail gradually increases in thickness and until it is muscular and robust. The disk is smooth in specimens smaller than 40 cm; in specimens larger than 90 cm disk width the body is densely set on both sides with prickles (Figure 11).....*Raja (Dipturus) trachydermus* (= *Raja trachyderma*) **(RTR)**



**Figure 11** Dorsal view of a (A) small and (B) adult *Raja (Dipturus) trachydermus* (= *Raja trachydermis*; = *Raja leptocauda*)

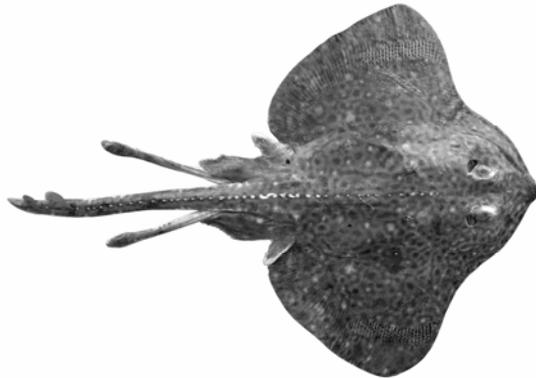
**Key to species of the genus *Bathyraja*.**

- 1(4). Number of median thorns from behind the eyes to first dorsal fin varies from 35-46 (often near to 40).....2.



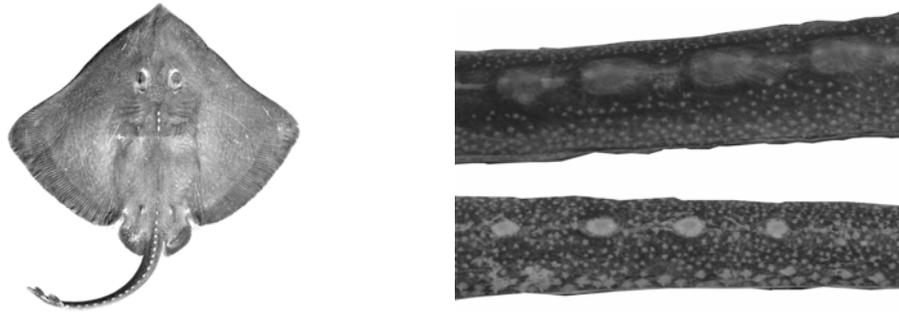
**Figure 12** Types of teeth in Rajidae.

- 2(3). Flat, crushing teeth (Figure 12). Ventral surface white, with occasional rare dark blotches near disk periphery and urogenital area. Often has thorn on each scapula, but these may be lost in adults (Figure 13). Species found in depths between 200 and 1000 m.....*Bathyraja(Rhinoraja) multispinis* (RMU)



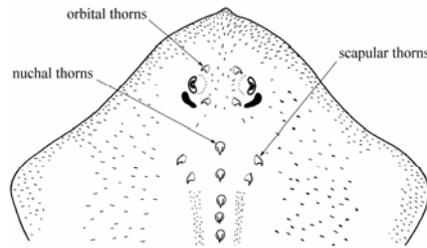
**Figure 13** Dorsal view of *Bathyraja multispinis*.

- 3(2). Teeth conical and sharp (Figure 12). Ventral surface dark brown to pale grey, often with dark patches. No scapular thorns (Figure 14). Found at depths of 700 m and greater .....*Bathyraja meridionalis* (RME)



**Figure 14.** (A) Ventral view of *Bathyraja meridionalis* and (B) tails of *B. papilionifera* (above) and *B. meridionalis* (below).

- 4(1). Number of median thorns never exceeds 34; typically between 23 and 28.....5.
- 5(8). Two large stout orbital thorns on the anterior and posterior side of eyes. One or two pairs of scapular thorns on the shoulders (Figure 15) .....6.



**Figure 15** Arrangement of thorns on dorsal side of the disk.

- 6(7) Often has two thorns on each scapula. Dorsal side of the disk is ash-grey, with black dots and stripes that often merge into circles (Figure 16). Smooth at the base of fins but rough along the median line and periphery to fins. Underside of the disk is white.....*Bathyraja (Rhinoraja) magellanica* (RMG)



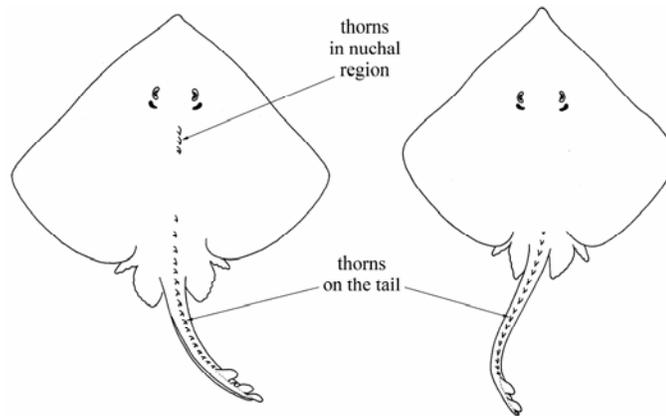
**Figure 16** Dorsal view of *Bathyraja (Rhinoraja) magellanica*.

- 7(6). One thorn on each scapula. Dorsal side of the disk is dark grey to brown, with white or light spots of different sizes. Surface rough due to numerous fine thornlets scattered all over the disk (Figure 17). Underside of the disk is white, often with dark trailing edges.....*Bathyraja (Rhinoraja) macloviana* (RMC)

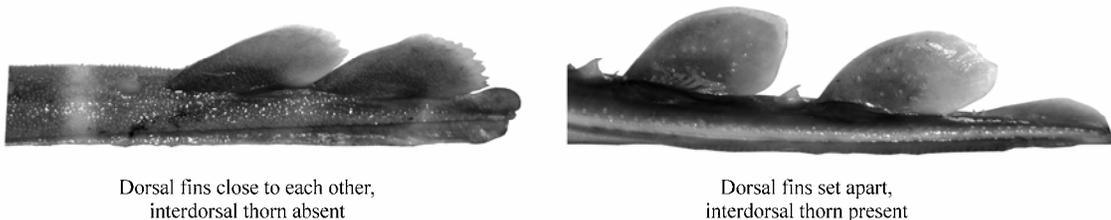


**Figure 17** Dorsal view of *Bathyraja (Rhinoraja) macloviana*.

- 8(5). No orbital or scapular thorns.....9.
- 9(16). Median row of thorns consists of 1-5 thorns on the trunk (in the area behind the eyes) and 14-23 thorns on the tail (Figure 18).....10.

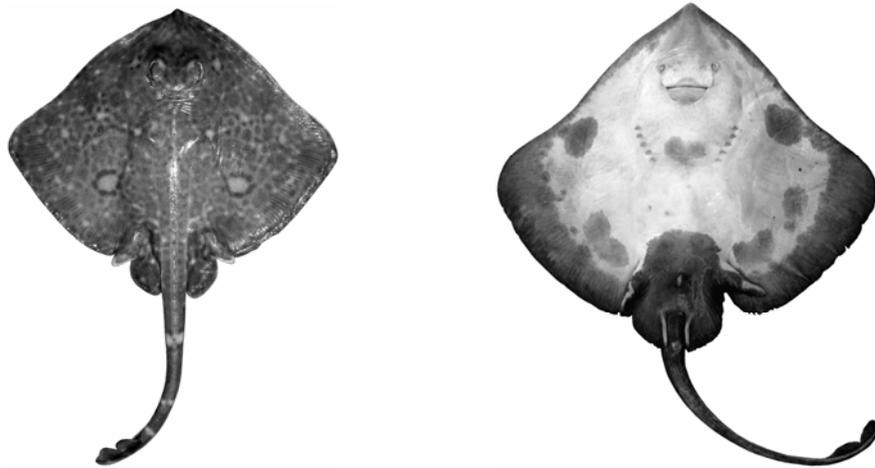


**Figure 18** Arrangement of thorns in median row



**Figure 19** Dorsal fins of *Bathyraja*.with (A) and without (B) an interdorsal thorn.

- 10(11). Dorsal fins set close to each other; no interdorsal thorn (Figure 19). Dorsal surface of the disk and tail in adults (Figure 19). Dorsal surface of the disk and tail in adults set with fine thornlets making them coarse. Ventral side of tail has irregular grey blotches (Figure 20).....*Bathyraja cousseauae* (RBZ)

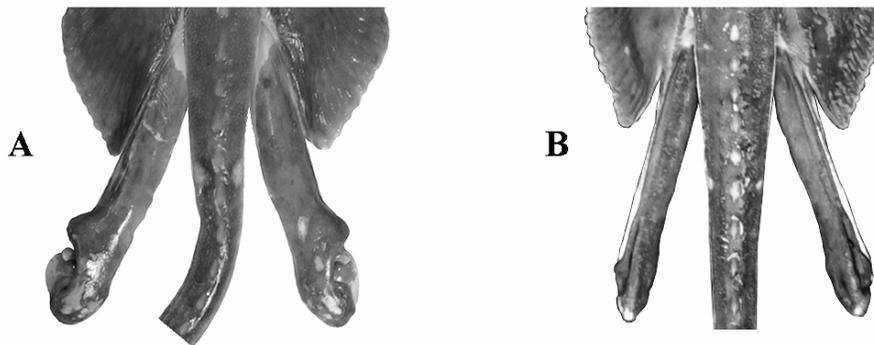


**Figure 20** Dorsal view of (A) an undescribed species of *Bathyraja* and (B) the ventral view of *Bathyraja papilionifera*

- 11(10). Dorsal fins set apart; usually separated by one interdorsal thorn (may be torn off) (Figure 19). Dorsal surface of the disk in adults smooth, except for a few spinules along the median line, head and edges of the wings.....12.

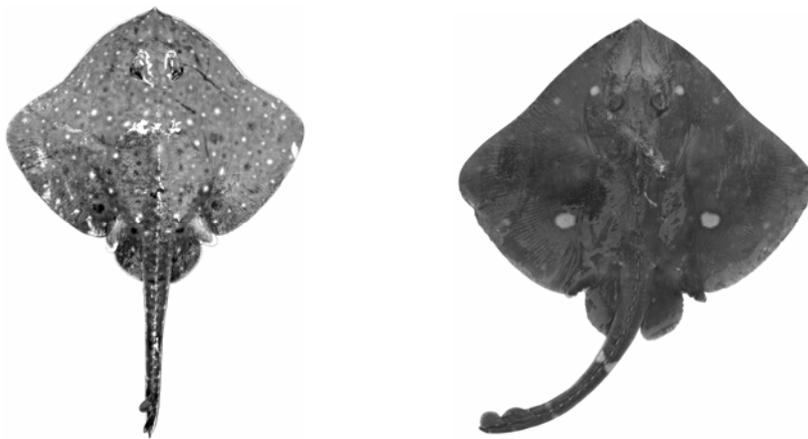
- 12(13). Ventral surface is mostly white, but with dark areas around the trailing edges of the disk, anus, and underside of tail (Figure X). Found at depths of 800 m and greater Found at depths of 800 m and greater.....*Bathyraja papilionifera* (RPA)

- 13(12). Ventral surface is uniformly white or pale.....14.



**Figure 21** Male claspers of (A) *B. brachyurops* and (B) *B. albomaculata*.

- 14(15) Dorsal side of disk is grey, with numerous white and dark spots of different sizes (Figure 22). Male claspers in slender, rod-like, and with slightly enlarged tips (Figure 21).....*Bathyraja albomaculata* (RAL)

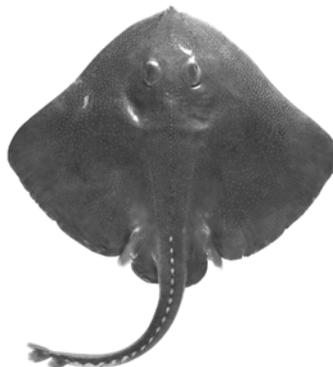


**Figure 22** Ventral view of (A) *Bathyraja albomaculata* and (B) *Bathyraja brachyurops*

15(14) Dorsal side of disk usually uniformly brownish or grey-brownish; may have a pair of large ocelli at base of pectoral fins (Figure XX). No other white spots. Male claspers stout, with enlarged club-shaped glands (Figure 21).....*Bathyraja brachyurops* (**RBR**)

16(9). Median row of thorns consists of 14-22 thorns on the tail only. No thorns on the trunk, or in the area behind the eyes (Figure 18).....17.

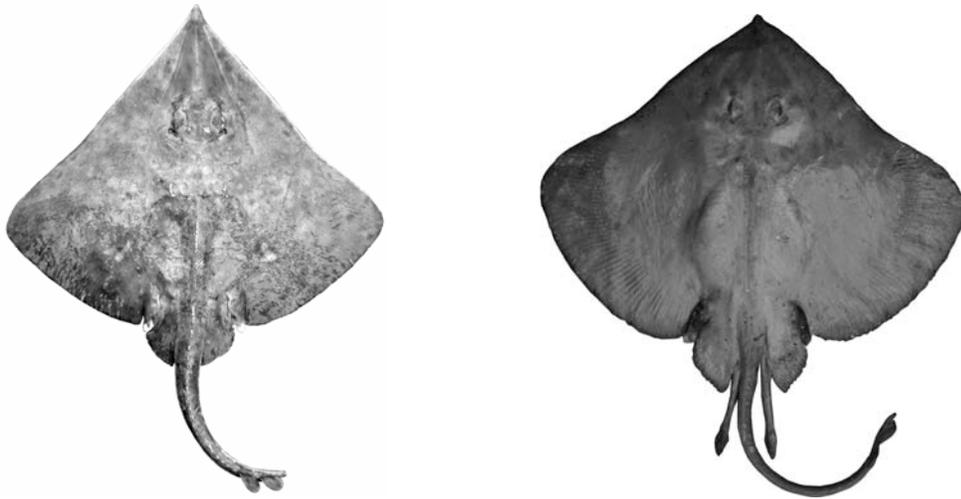
17(18). Dorsal surface of the disk set evenly with small thornlets, giving the skin a rough texture. Upper side of the disk is uniformly grey, with dark dots. Lower side is white. Underside of the tail heavily spotted with dark blotches (Figure 23).....*Bathyraja griseocauda* (**RGR**)



**Figure 23** Dorsal view of *Bathyraja griseocauda*.

18(17). Dorsal surface of the disk is always smooth.....19.

19(20). Long, semitransparent rostrum. Dorsal side of the disk is grey or sandish-brown. Ventral side white near the centre, changing to purplish-blue towards the periphery (Figure 24). Underside of the tail is white.....*Bathyraja scaphiops* (**RSC**)



**Figure 24** Dorsal view of (A) *Bathyraja scaphiops* and (B) *Bathyraja schroederi*.

- 20(19). Dorsal side of the disk very dark brown (Figure 24).  
 Ventral surface is also uniformly dark. Tail is thin (very  
 rare species).....*Bathyraja schroederi* (RSH)

**RAL *Bathyraja albomaculata* (Plate I, II)**

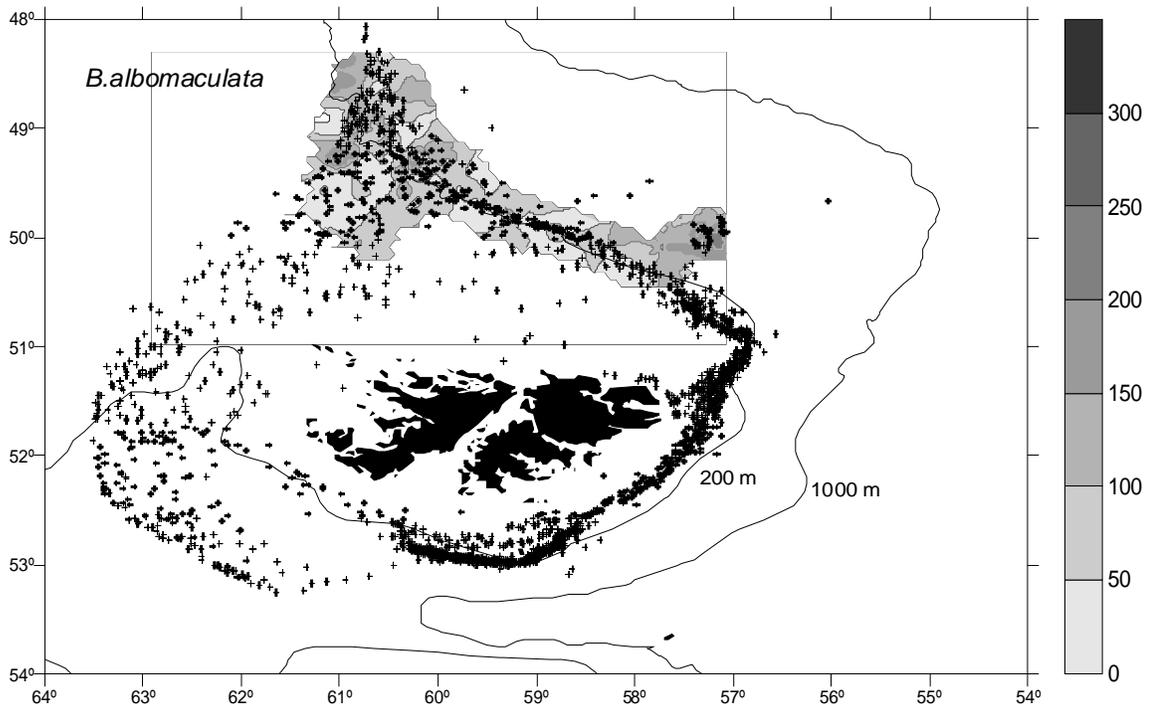
Common name: White-spotted Skate

Rostrum is soft and blunt; disk is covered with many small circular white spots that have dark spots distributed between them. Ventral side of the disk is uniformly white in colour, with the exception of a few dark spots that are occasionally found on the tail. Dorsal surface of juveniles is densely set with fine spinules. In contrast, the dorsal skin of adults is smooth aside from the spinules that can be found along the vertebrae, near the anterior disk margin and between the eyes. Typically, there are 3-4 large median thorns in the nuchal region and 18 to 22 thorns on the tail. There is little or no gap between the thorns on the nuchal region and on the tail. First thorn in median row on the tail is much smaller than the last thorn in the nuchal region. The tips of all thorns in this species are curved toward the posterior. Often some thorns are torn off, which may leave scars on the trunk. No orbital, intraspiracular or scapular thorns, but it does have one interdorsal thorn, which separates the dorsal fins. Teeth are conical and sharp. Females attain a disk width of about 60 cm, which is slightly larger than the maximum size reached by males.

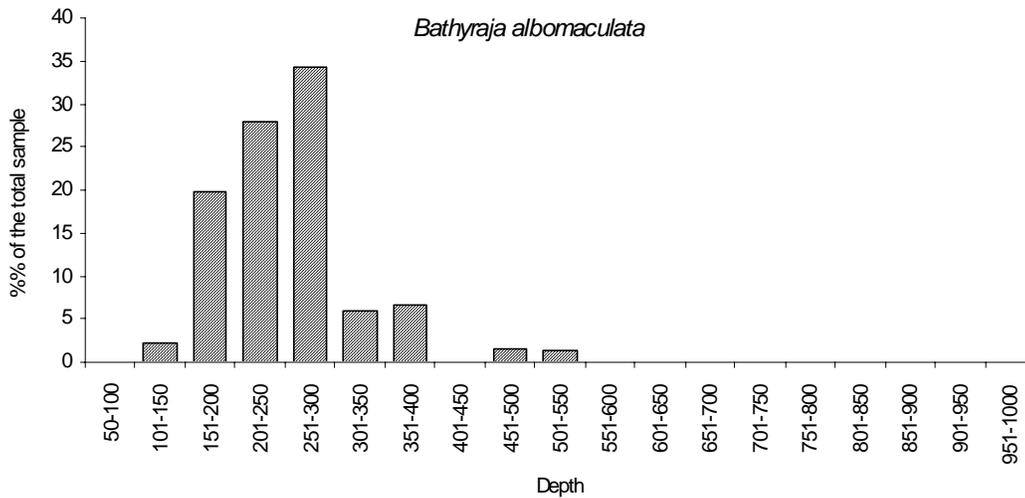
Alar thorns of males are arranged in 16-20 radial rows, with 2-3 thorns per row. Male claspers are slender and rod-like. The width-to-length ratio of claspers is approximately 6.5 to 1. Tips of the claspers are not enlarged or are enlarged only very slightly.

*Bathyraja albomaculata* is distributed over the entire Falkland shelf and slope (Figure 25). It occurs between 72 and 945 m, but its highest abundances are found in waters between 200 and 300 m depth (Figure 26). This is one of the most important commercial species taken by the Falkland Islands ray fishery. Most animals taken in commercial catches vary between 35 and 50 cm DW, which dominate waters shallower than 400 m (Figure 27). Most of the comparatively few individuals taken in waters deeper than 400 m are juveniles (10-20 cm DW), which suggests that this species may spawn in deep water.

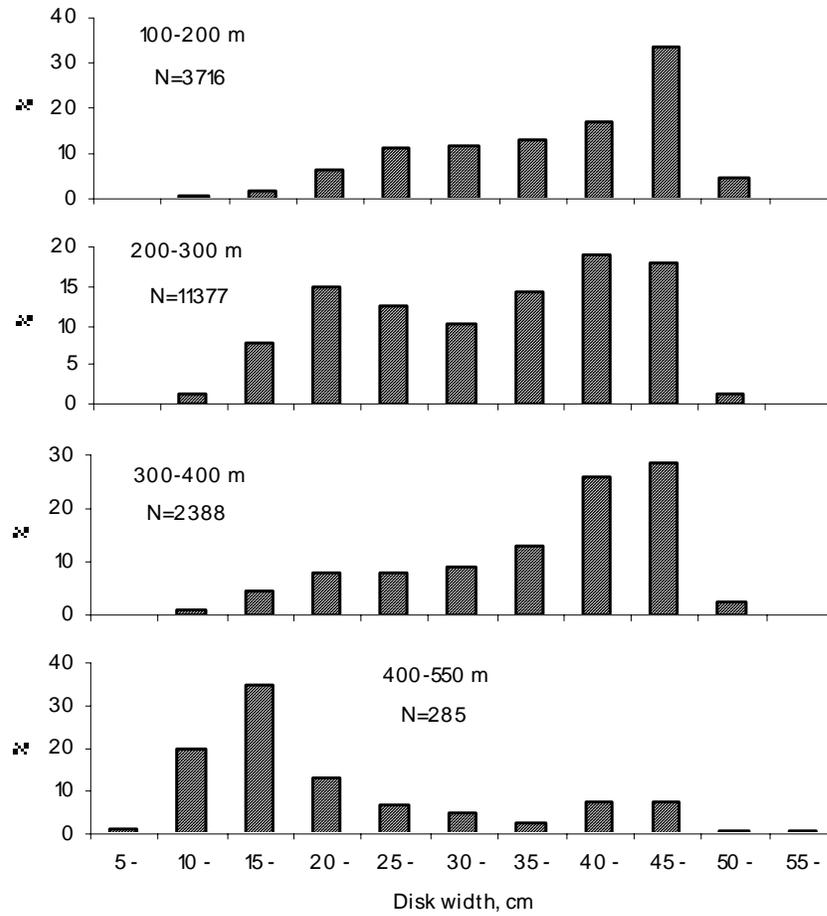
Adult animals prey on polychaets and to a lesser extent isopods.



**Figure 25** Map of the Falkland Islands showing the distribution of *Bathyraja albomaculata* caught by the commercial sector (CPUEs of the specialised fleet, kg/hr are shaded) and on scientific research cruises since September 1992.



**Figure 26** Bathymetric distribution of *Bathyraja albomaculata* caught in Falkland Islands waters since September 1992 by the commercial sector and during scientific research cruises.



**Figure 27** Length-frequency distribution of *Bathyraja albomaculata* caught in Falkland Islands waters since September 1992 by the commercial sector and during scientific research cruises from 4 different depths of water.

**RBR** *Bathyraja brachyurops* (Plate III-V)

No common name

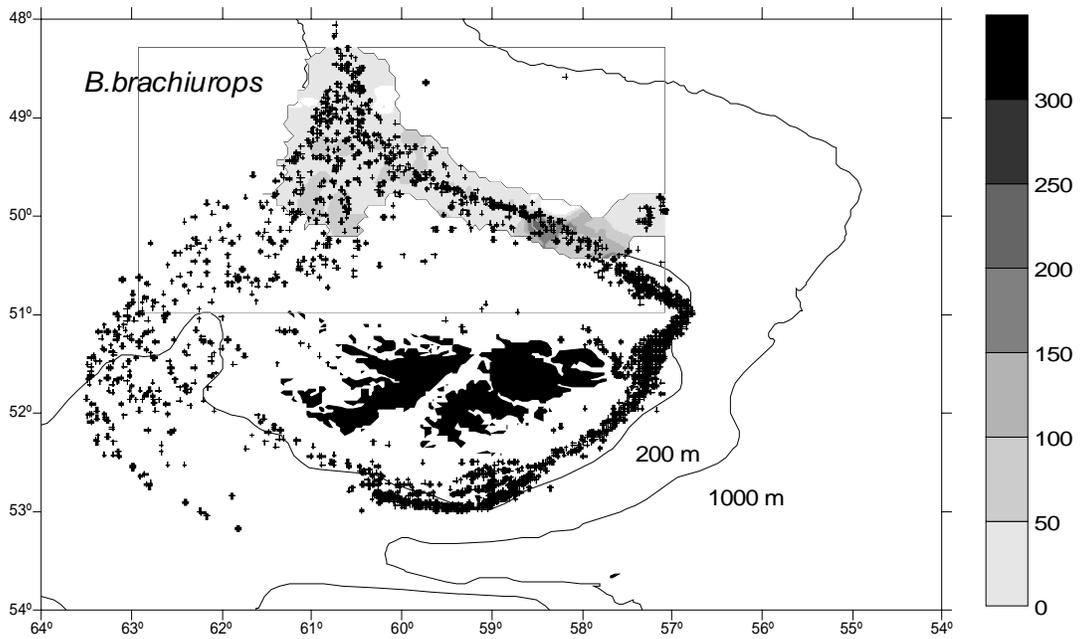
Rostrum is soft, blunt and semitransparent. On most occasions it is purplish-red, but the tip can also be black. Median row of thorns consists of 1-4 thorns in nuchal area and 16-20 thorns on the tail, with a gap over the visceral region. The number of thorns on the tail is generally higher in females (from 18 to 20) than in males (16-18). Occasionally, these thorns are absent, particularly in the nuchal region. Missing thorns do not always leave scars. One interdorsal thorn, but no orbital, intraspiracular or scapular thorns. Dorsal side is a uniform brownish or greyish-brown and is covered with symmetrically placed ocelli of different sizes, which often have light borders. In some specimens, a pair of larger ocelli with a dark border may be present on pectoral bases along the plane of the greatest disk width. One or more pairs of ocelli may occur on the tail of juveniles, resembling a banded appearance. Ventral side of the disk is clean, smooth and pale blue. Rostral cartilage is noticeable from the ventral side as a dark semi-transparent triangle anterior to the mouth. Dorsal side of the disk of individuals less than 20cm DW is set with fine spinules. In adults these spinules almost disappear from the bases of pectoral fins, but still remain along the median row, tail, and the anterior margin of the disk. Teeth are conical and sharp. Males and females reach a similar a maximum disk width of around 85 cm. Alar thorns of males are arranged in 20-22 radial rows; with 3 to 6 thorns per row. Male claspers are short (about one third of disk width), wide, and the glands are distinctly enlarged and club-shaped.

*Bathyraja brachyurops* may be confused with *Bathyraja cousseauae* (RBZ). It can be differentiated from this species by the following features:

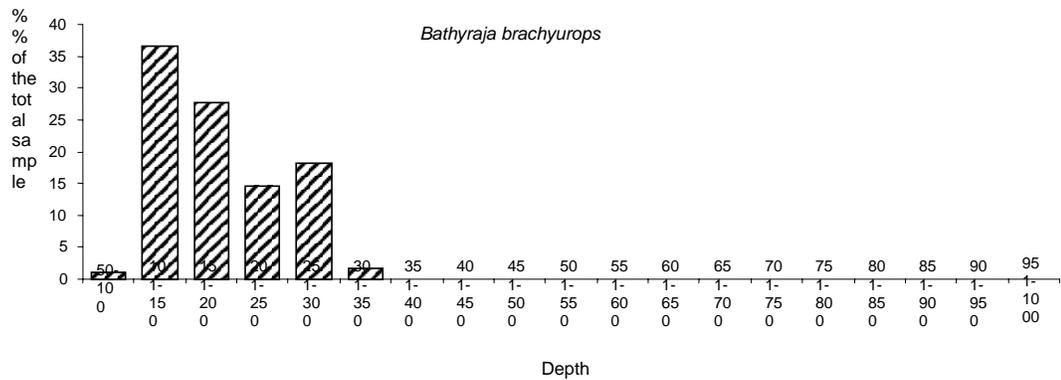
- dorsal fins are separated by interdorsal thorn (even if the thorn is lost, the fins are not confluent);
- median row of thorns is disrupted, and consists of 1-4 nuchal thorns and 16-20 thorns on the tail. No thorns in the visceral region;
- ventral side of the tail is white, and has no dark blotches;
- dorsal surface of disk in adults is smooth except for some spinules along the vertebrae and anterior margin of disk;
- male clasper are short and stout, with enlarged club-shaped glands.

This is a very important commercial species. Spawning aggregations of *Bathyraja brachyurops* can be found on the North-East Falkland shelf between 100 and 200 m (Figure 28), but individuals can occur in depths ranging from 59 to 500 m (Figure 29). Animals of 45-65 cm DW dominate commercial catches (Figure 30). Ray size slightly increases with depth.

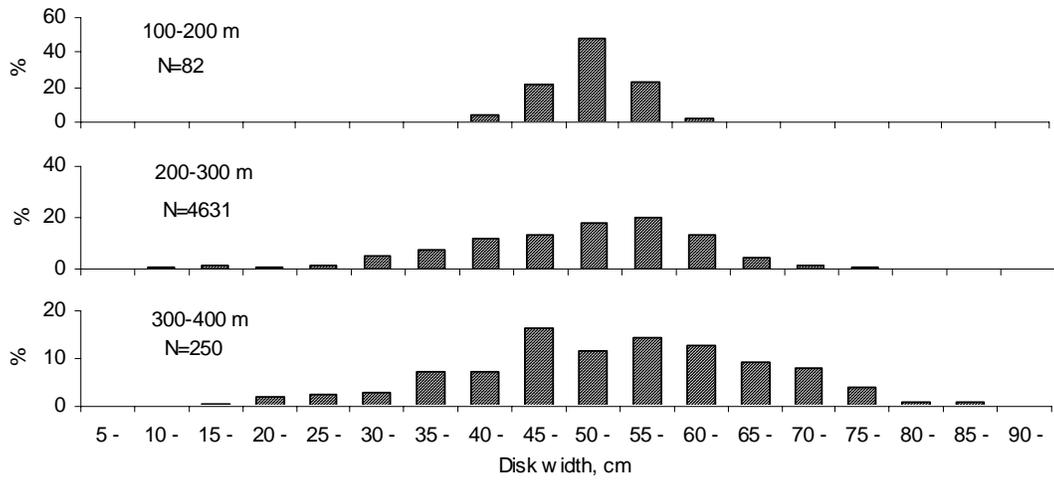
Adults fed mostly on rock cod and *Loligo* squid.



**Figure 28** Map of the Falkland Islands showing the distribution of *Bathyrāja brachyurops* caught by the commercial sector (CPUEs of the specialised fleet, kg/hr are shaded) and on scientific research cruises since August 1992



**Figure 29** Bathymetric distribution of *Bathyrāja brachyurops* caught in Falkland Islands waters since August 1992 by the commercial sector and on scientific research cruises.



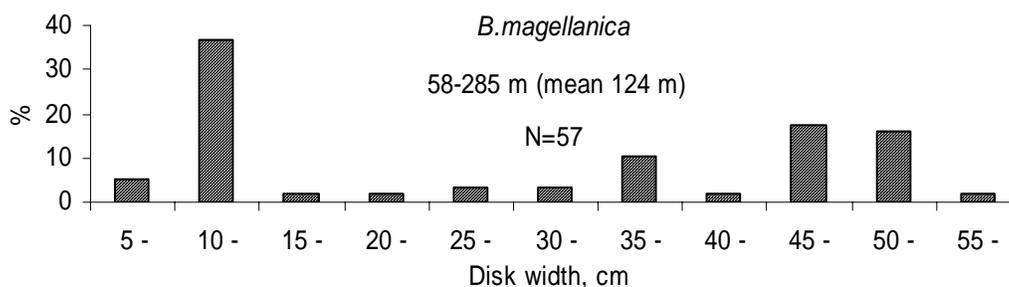
**Figure 30** Length-frequency distributions of *Bathyraja brachyurops* caught in Falkland Islands waters since August 1992 by the commercial sector and during scientific research cruises from 3 different depths of water.

**RMG *Bathyraja magellanica* (Plate VI-VII)**

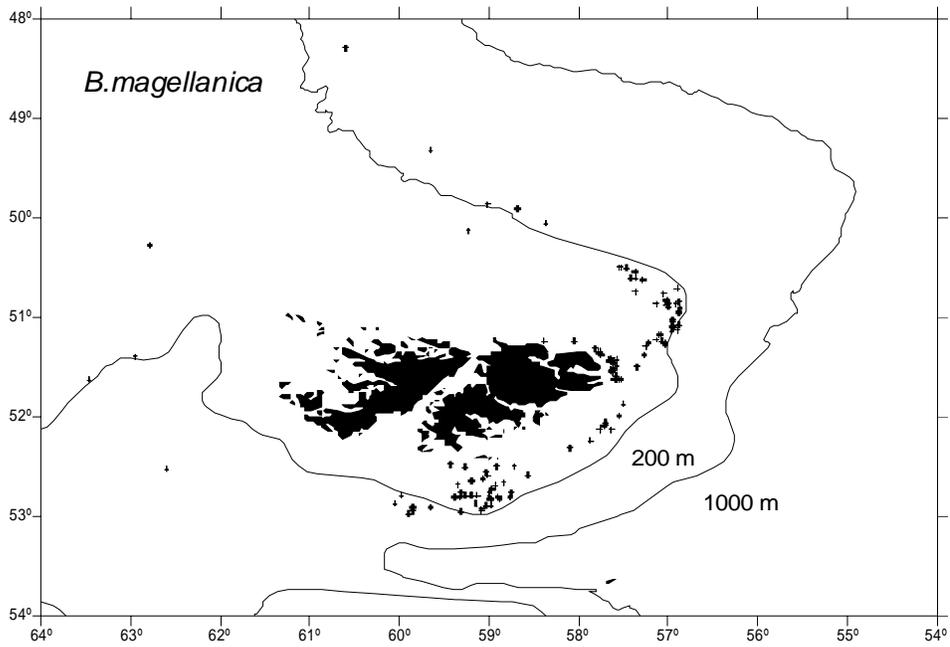
Common name: Grey Skate

Rostrum is blunt and forms a semitransparent triangle visible from both sides of the disk. Dorsal side of the disk is ash-grey and has dark dots and stripes that usually merge into circles. The presence of 2-3 pairs of light spots on the tail gives it a banded appearance. This side of the disk is also covered with coarse spinules. In adults, these spinules are found along the median row and the disk periphery, but are almost non-existent near the base of pectoral fins. Both the ventral side of the disk and the underside of the tail of this species is pale white, with the latter also having a few large, dark and irregular patches. There are 25-32 thorns in the median row, which stretches from the nape to the first dorsal fin. Two robust orbital thorns are situated next to each eye, with 1-2 smaller thorns located in between them. Two scapular thorns are found on each shoulder, but this species does not have any spiracular thorns and only one interdorsal thorn. Both scapular thorns are large and robust in females, whereas the posterior thorn in males is larger than the anterior one. Occasionally, the latter may be torn off, leaving a white scar. Females attain a disk width of 55 cm, while males only reach 51 cm DW (Figure 31). Alar thorns of males are arranged in 18-20 radial rows; with 2 to 4 thorns per row. Teeth are conical, low and sharp. Male claspers are long and narrow, with moderately enlarged glands.

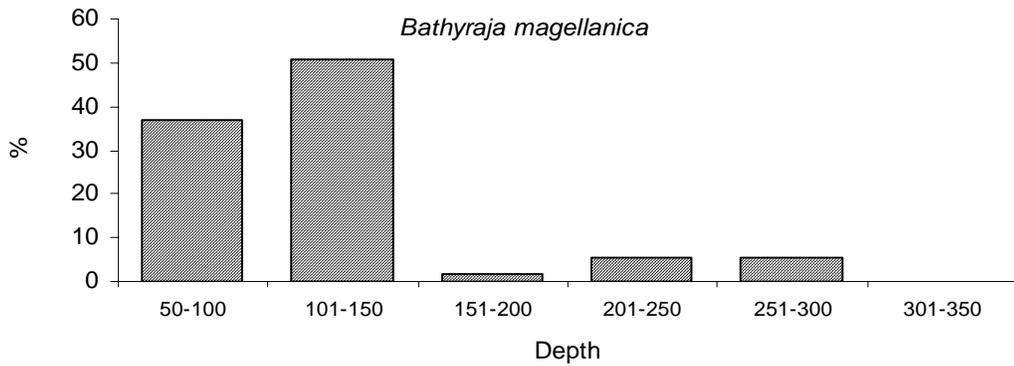
*Bathyraja magellanica* is mostly found between 58 and 150 m, but some (mostly juveniles) are found in depths ranging from 150 to 285 m (Figures 32, 33). Because this species is rare in Falkland Islands waters, it has a low commercial importance.



**Figure 31** Length-frequency distribution of *Bathyraja magellanica* caught in Falkland Islands waters since October 1992 by the commercial sector and during scientific research cruises.



**Figure 32** Map of the Falkland Islands showing the distribution of *Bathyraja magellanica* caught by the commercial sector and on scientific research cruises since October 1992



**Figure 33** Bathymetric distribution of *Bathyraja magellanica* caught in Falkland Islands waters since October 1992 by the commercial sector and on scientific research cruises

**RBZ** *Bathyraja cousseauae* (Plate VIII-X).

No common name

Rostrum is soft and blunt. Dorsal side of the disk is sandy brown and has numerous dark and light spots. Juveniles and adolescents have one or more symmetrical pairs of ocelli that are encircled by dark rings at the pectoral base. Also have one or more pairs of ocelli on the tail, giving it a banded appearance. The dark spots usually merge together to resemble an irregular 'camouflage' pattern in adults. Ventral side of disk is uniformly white and smooth. Ventral side of the tail is spotted with irregular grey blotches. Dorsal surface of the disk and tail is coarse because it is densely set with fine spinules and thornlets. In juveniles, 23 to 27 thorns form an interrupted median row from the nuchal region to the first dorsal fin. Median thorns on the trunk are often missing in adults, and the median row breaks into 3-6 thorns in nuchal region and 17-18 thorns on tail. No orbital, intraspiracular and scapular, etc) thorns on the dorsal side. Dorsal fins are set close to each other, and may have small gap between them. No interdorsal thorn.

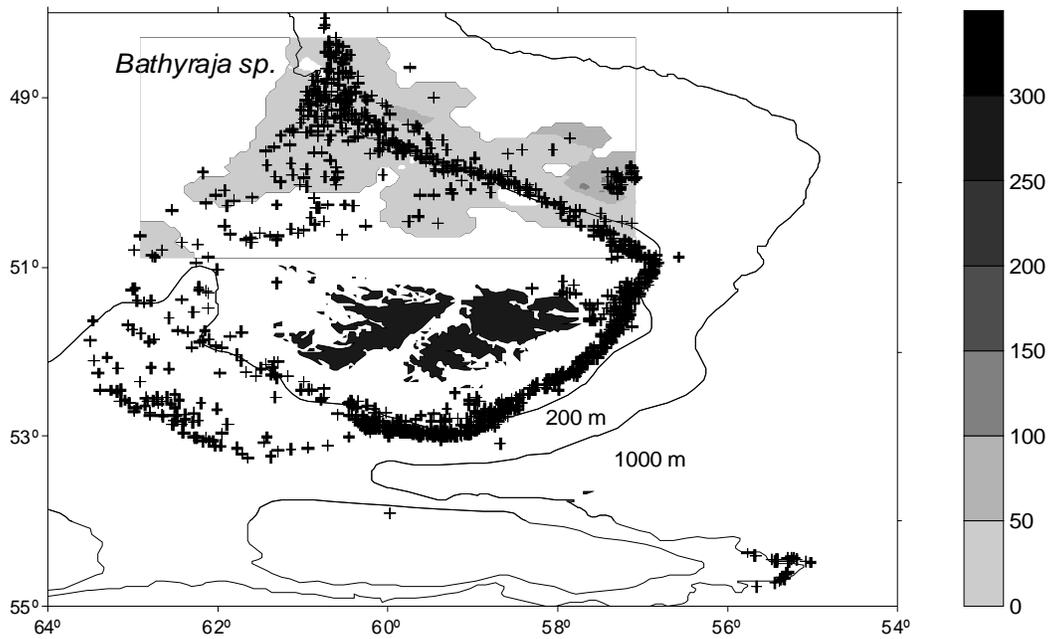
Both females and males and attain a disk width of about 90 cm. Alar thorns of adult males are set in 20-24 radial rows, with 5-6 thorns per row. Teeth are conical and sharp. Male claspers are slender, elongated, and the glands are not enlarged.

While this species is very similar to *Bathyraja brachyurops* (RBR), it differs from it by the following features:

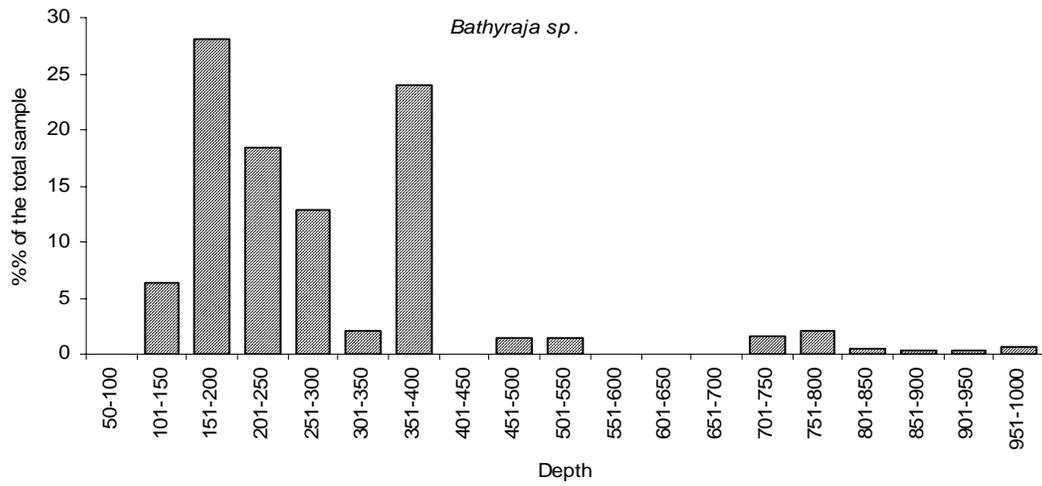
- dorsal fins confluent; interdorsal thorn absent;
- median thorns form a single uninterrupted row from tail to nuchal area;
- ventral side of the tail marked with dark blotches;
- dorsal side is densely set with spinules and coarse;
- male claspers are long and narrow, without obviously enlarged glands.

*Bathyraja cousseauae* occurs around the Falkland Islands and in adjacent deep-waters (Figure 34). It has been caught in waters ranging from 121 to 1011 m deep (Figure 35) and its size increases with depth (Figure 36). This species is of moderate commercial importance.

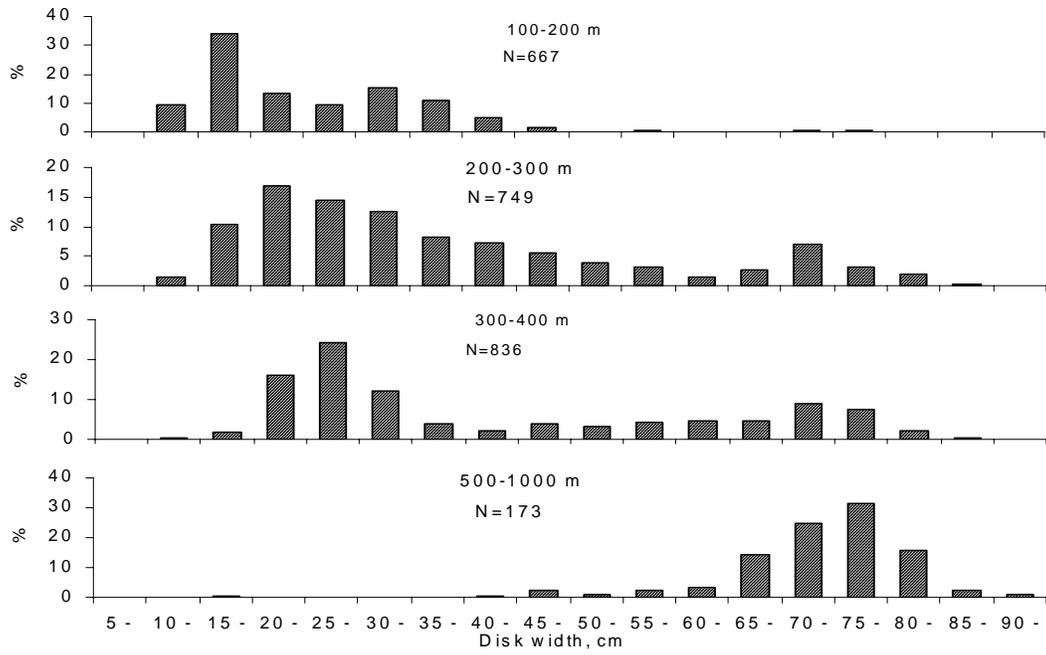
Medium-sized and adult animals feed on a wide range of fish and invertebrates.



**Figure 34** Map of the Falkland Islands showing the distribution of *Bathyraja cousseauae* caught by the commercial sector (CPUEs of the specialised fleet, kg/hr are shaded) and on scientific research cruises since September 1992



**Figure 35** Bathymetric distribution of *Bathyraja cousseauae* caught in Falkland Islands waters since September 1992 by the commercial sector and on scientific research cruises.



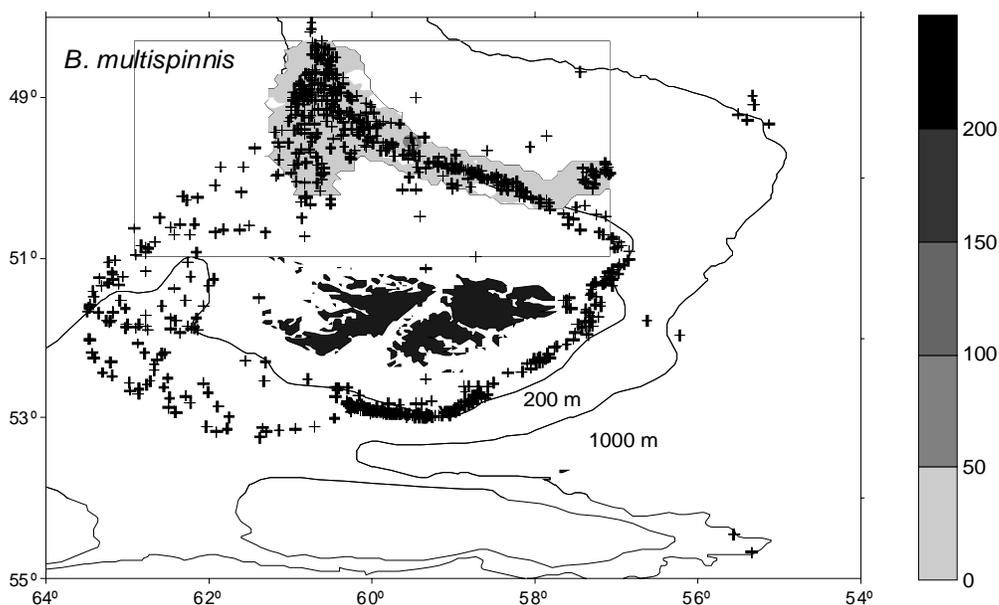
**Figure 36** Length-frequency distributions of *Bathyraja cousseauae* caught in Falkland Islands waters since September 1992 by the commercial sector and during scientific research cruises from 4 different depths of water.

**RMU *Bathyraja multispinis* (Plate XI-XII)**

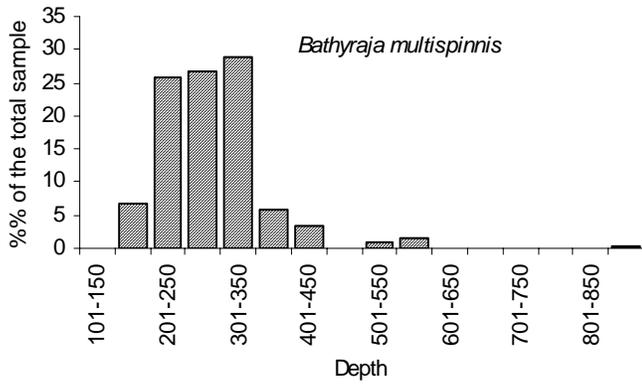
No common name

Rostrum is soft and blunt. Dorsal side of the disk is dark-grey and is often covered by light spots of different sizes. One pair of light ocelli is located in the posterior part of the pectoral base. Aside from the dark blotches around the urino-genital area and near the periphery of the disk, the ventral side of the disk is white and smooth. Ventral side of the tail is entirely pale; lateral tail folds are whiter in appearance. Dorsal surface of the disk is smooth, but the anterior margin of the disk is set densely with small spinules. 40 to 45 thorns in the single median row that extends from the nuchal region to first dorsal fin. Spinules on the dorsal side of the tail form parallel rows on either side of the median thorns. Posteriorly, these spinules form two rows which flank the dorsal fins. One interdorsal thorn separates these fins. One thorn is also found on each scapula, unless they are torn off. Teeth are flat. Females can reach 98 cm DW, which is larger than the 90 cm DW that males attain.

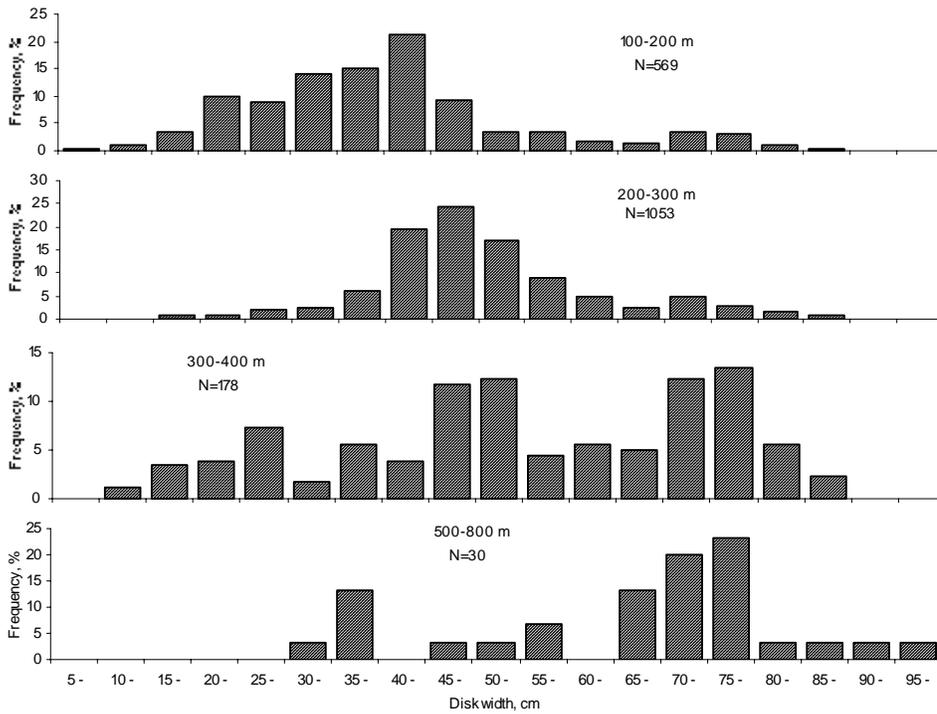
*Bathyraja multispinis* occurs throughout the Falkland Islands shelf (Figure 37). It has been caught in waters ranging between 72 and 845 m in depth, but is most abundant between 200 and 350 m (Figure 38). Most of the animals found in waters deeper than 500 m are adults with a disk width greater than 60cm (Figure 39). This species is of moderate commercial importance. It is a specialised crab-eater, and is often found feeding on *Peltarion spinosulum*. The ventral cavity of this species is often heavily infected with the digenean parasite *Otodistemum plunketi*, with numbers greater than 100 recorded.



**Figure 37** Map of the Falkland Islands showing the distribution of *Bathyraja multispinis* caught by the commercial sector (CPUEs of the specialised fleet, kg/hr are shaded) and on scientific research cruises since August 1992.



**Figure 38** Bathymetric distribution of *Bathyraja multispinnis* caught in Falkland Islands waters since August 1992 by the commercial sector and on scientific research cruises.



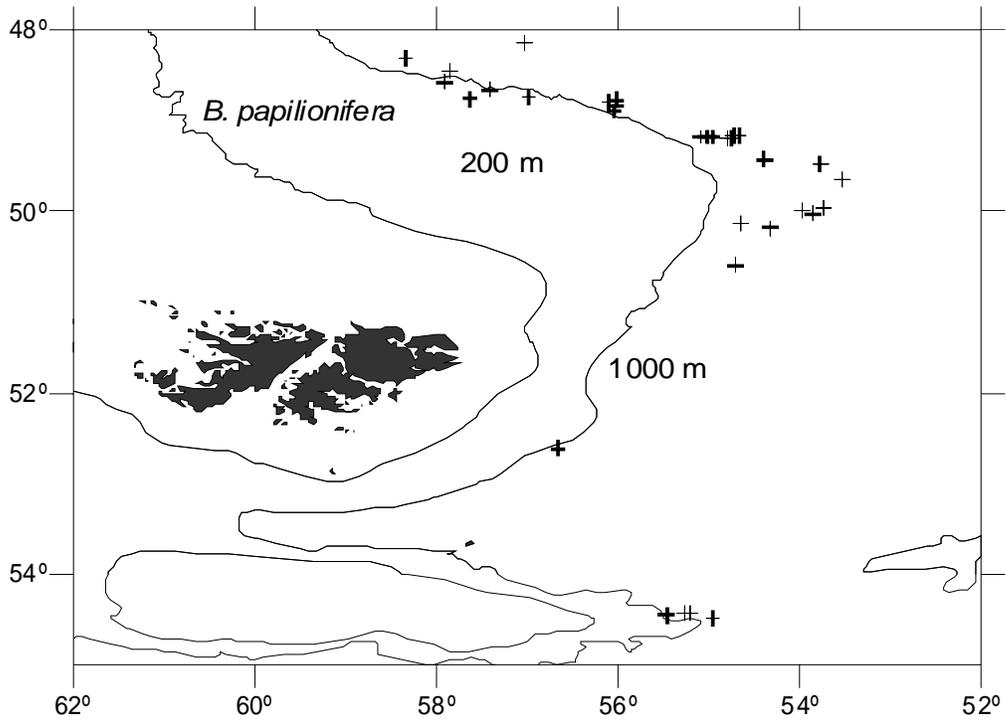
**Figure 39** Length-frequency distributions of *Bathyraja multispinnis* caught in Falkland Islands waters since August 1992 by the commercial sector and during scientific research cruises from 4 different depths of water.

**RPA *Bathyraja papilionifera* (Plate XIII-XIV)**

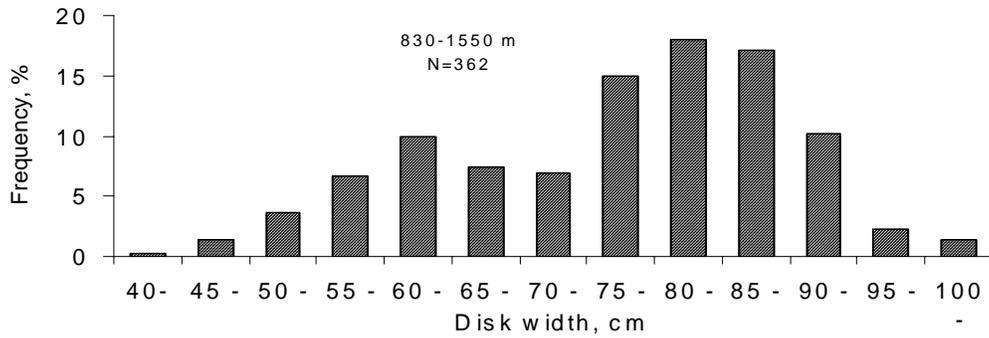
No common name

Rostrum is soft, blunt, and not semi-transparent. Disk width is 65-75% of the total length in individuals greater than 40 cm. The dorsal side of the disk in juveniles is dark with small pale dots and large, darker blotches. These dots are not found in adolescents. The colouration of adults gradually changes to pale brown and even bright creamy, with neither dots nor blotches found. Both the rostrum and the area between the eyes are whitish in colour. Ventral side in small specimens is white near the centre and grey along disk periphery, pelvic fins and around the anus. Occasionally, a pair of large blotches could be found on the belly, which is similar to the pattern commonly found in juvenile RME. Ventral side of adults is uniformly white with a hint of grey around the trailing edge of the disk. In contrast, the underside of the tail is dark and the tips of the anterior pelvic lobes are lime-stone in colour. Dorsal side of the tail is set densely with coarse flat spinules that form two stripes that run along the vertebrae to the shoulders. Posterior part of the dorsal disk (behind the maximum width) is smooth while the anterior part is set with coarse spinules, which run along the anterior margins of pectoral fins. Small thornlets may be present between the eyes. The median row of thorns in adults consists of 1-5 robust thorns in the nuchal region and between 18 and 27 (usually 20-24) on the tail. Often, these thorns are missing, leaving whitish scars. Juveniles typically have 28-30 thorns in the median row. No orbital, spiracular and scapular thorns in juveniles or adults. Dorsal fins are separated by a gap, and often there is no interdorsal thorn. When one is present, it is quite robust. Spinules on the tail are small and of uniform size. The outer rows are not distinguishable from the others rows. Teeth are conical and sharp in both sexes.

*Bathyraja papilionifera* is found on the eastern slope of the Falkland Islands and on the Burdwood bank at depths varying between 827 and 1550 m (Figure 40). It is a common deep-water species mainly caught as a by-catch of the toothfish longline fishery. The largest animals caught in the Falkland waters were a mature male of 102 cm DW and a mature female of 103 cm DW, but most individuals caught in this fishery have a disk width of between 75 and 90 cm (Figure 41).



**Figure 40** Map of the Falkland Islands showing the distribution of *Bathyraja papilionifera* caught by the commercial sector and on scientific research cruises since August 1994



**Figure 41** Length-frequency distribution of *Bathyraja papilionifera* caught in Falkland Islands waters since August 1994 by the commercial sector and during scientific research cruises.

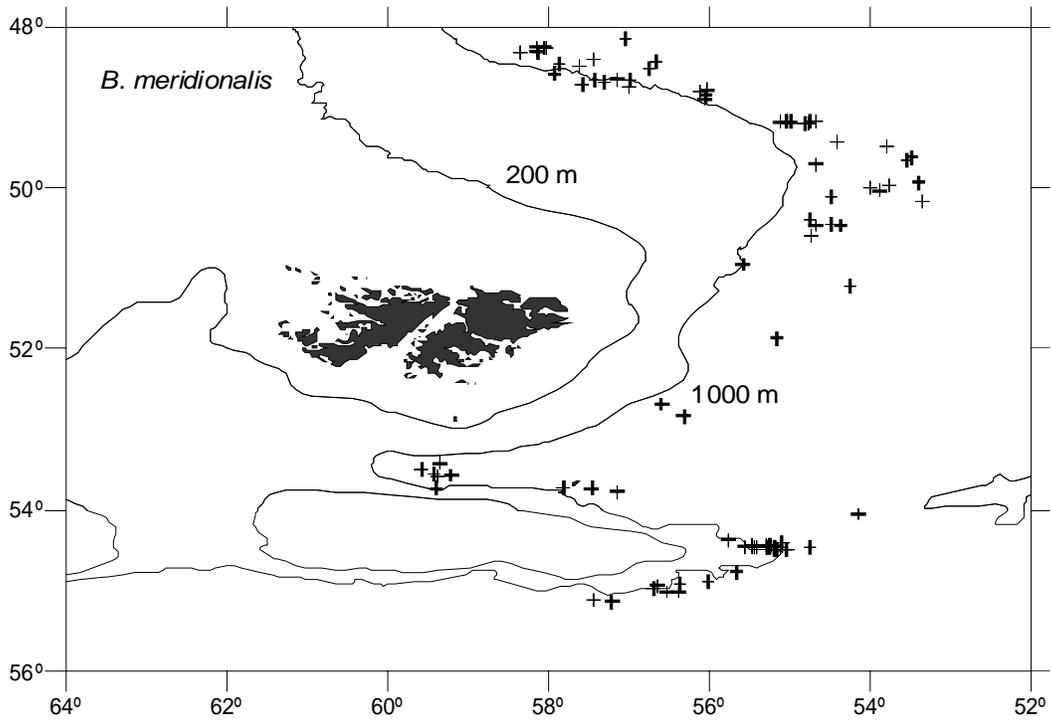
## **RME *Bathyraja meridionalis* (Plate XV-XVI)**

No common name

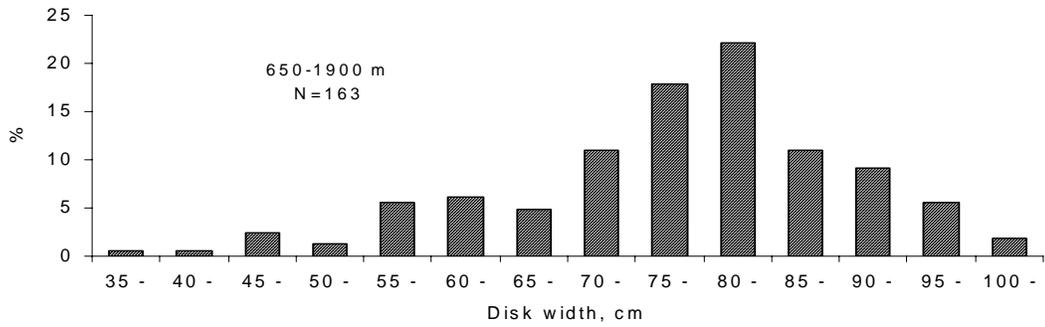
Rostrum is soft, blunt and not semitransparent. Maximum width is 55-65% of total length for animals greater than 40cm disk width. Dorsal side of juveniles is uniformly dark grey-brown, while in adults it is pale brown. No dots or blotches are found on the dorsal side and both the rostrum and interorbital region are whitish in colour. Ventral side of small specimens is white near the centre but dark along the disk periphery, pelvic fins and around the anus. General background is creamier in colour than white. A pair of large blotches can be found on the belly. Often this pattern is accompanied by numerous black dots and blotches scattered on both white and dark parts of the disk. Mature animals either keep their juvenile colouration, or the size of dark parts increases. In the latter scenario, the lower disk surface becomes uniformly dark but a white area remains around or below the mouth, gill slits, and near the centre of the belly. Underside of the tail is dark coloured. Anterior pelvic lobes are often lime-stone in colour. Dorsal disc surface is covered with a scattering of coarse prickles, with the larger and more densely ones set in the anterior part of the disk and between the eyes. Posterior part of the disk is always almost smooth. Dorsal side of the tail is set densely with spinules that form two stripes that run along the vertebrae to the shoulders. Outer spinules of the tail are quite developed, forming two marginal rows of small spines. Between 37 and 50 small, pale thorns in the median row. Adults, and the occasional juvenile, may lose these thorns, with some 28-37 thorns found on the tail. No orbital, spiracular or scapular thorns. Dorsal fins are either set close together or slightly apart. In the latter scenario, they may be a small and weak interdorsal thorn. Teeth are conical and sharp in both sexes.

Females attain 104 cm DW while males reach a maximum disk width of 101 cm.

*Bathyraja meridionalis* occurs in waters deeper than 600 m on the east Falkland shelf and Burdwood bank (Figure 42). Most of the animals caught in the commercial catch vary from 75 to 90 cm DW (Figure 43) and are taken by fisherman using longlines to target toothfish. This species feeds on crayfish, crabs, shrimps and benthic fish.



**Figure 42** Map of the Falkland Islands showing the distribution of *Bathyraja meridionalis* caught by the commercial sector and on scientific research cruises since April 1994.



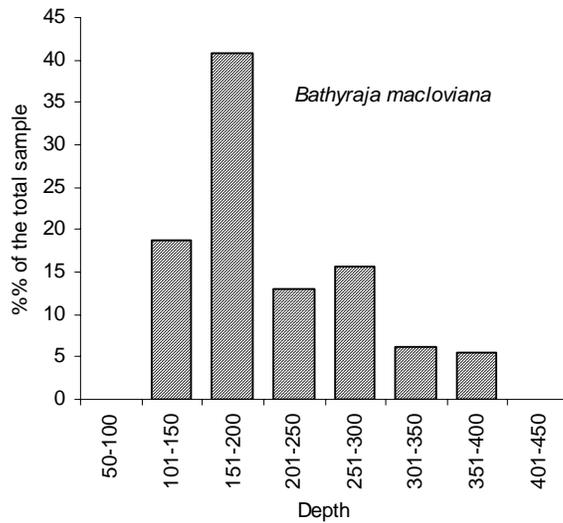
**Figure 43** Length-frequency distribution of *Bathyraja meridionalis* caught in Falkland Islands waters since April 1994 by the commercial sector and during scientific research cruises

**RMC *Bathyraja macloviana* (Plate XVII-XVIII)**

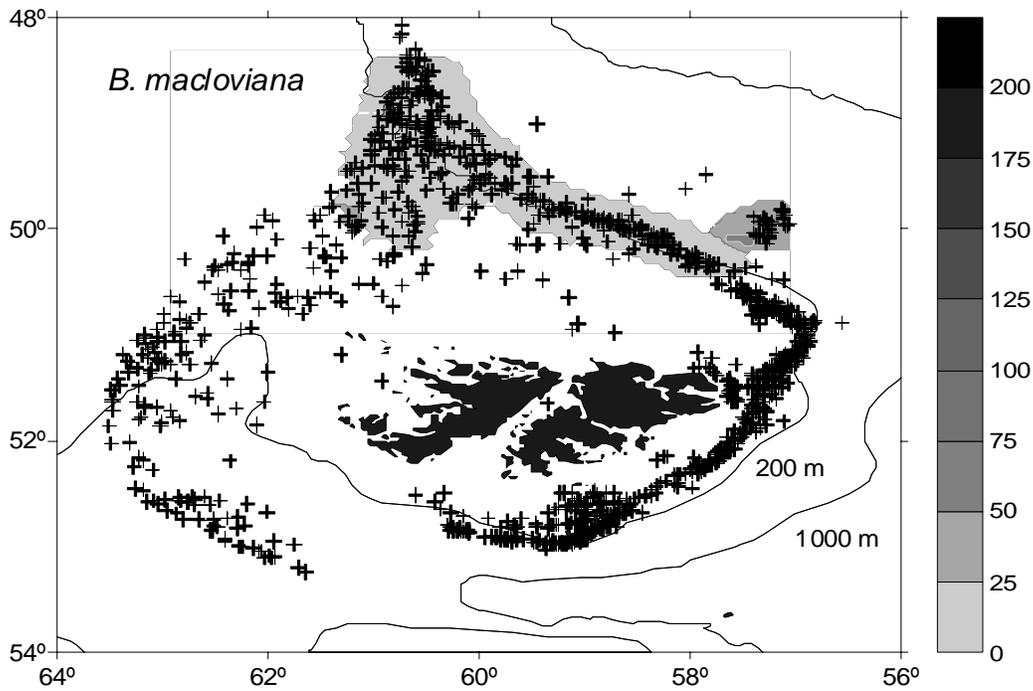
No common name

Rostrum is soft, blunt, and non-transparent. Dorsal side varies from grey to sandy brown, and is often covered with faint spots of differing sizes. On occasions, two pairs of large light ocelli form a trapezium in the central part of the disk. Each ocellus is encircled by a dark band, with the posterior pair of ocelli larger than those found in the anterior. Two ocelli may be present in the middle of the tail, on both sides of the median row of thorns. Ventral side of the disk is uniformly white. The rostral cartilage of juveniles is barely visible from the ventral side; whilst in adults it cannot be seen under the white skin. Dorsal side of the disk is set with coarse spinules. These spinules are distributed uniformly over the disk surface in juveniles, but in adults they are set more densely along the anterior disk margins, median row and tail. This species has two robust orbital thorns next to each eye and no spiracular thorns. Three median thorns and a thorn on each scapula form a triangle in the nuchal region. Scapular thorns are at the level of the third nuchal thorn. The number of thorns in the median row ranges from 24 to 28 in females and from 21 to 28 in males; the number of thorns on the tail ranges from 15 to 18. In juveniles, the median thorns in the nuchal region and on the tail are united in the single row while in adults, there may be a small gap between them. One interdorsal thorn. On the tail, two bands of densely set spinules run on both sides of median row. The spinules in each band are set irregularly and never form a regimented row. Alar thorns of males arranged in 17-20 radial rows, with 2 to 4 thorns per row. Males and females have a similar maximum size attaining 55 and 58 cm, respectively. Male claspers are slender, rod-like and with slightly enlarged tips. Maximum length of claspers is about 25% of the total length. The width of claspers is about an eighth of total length.

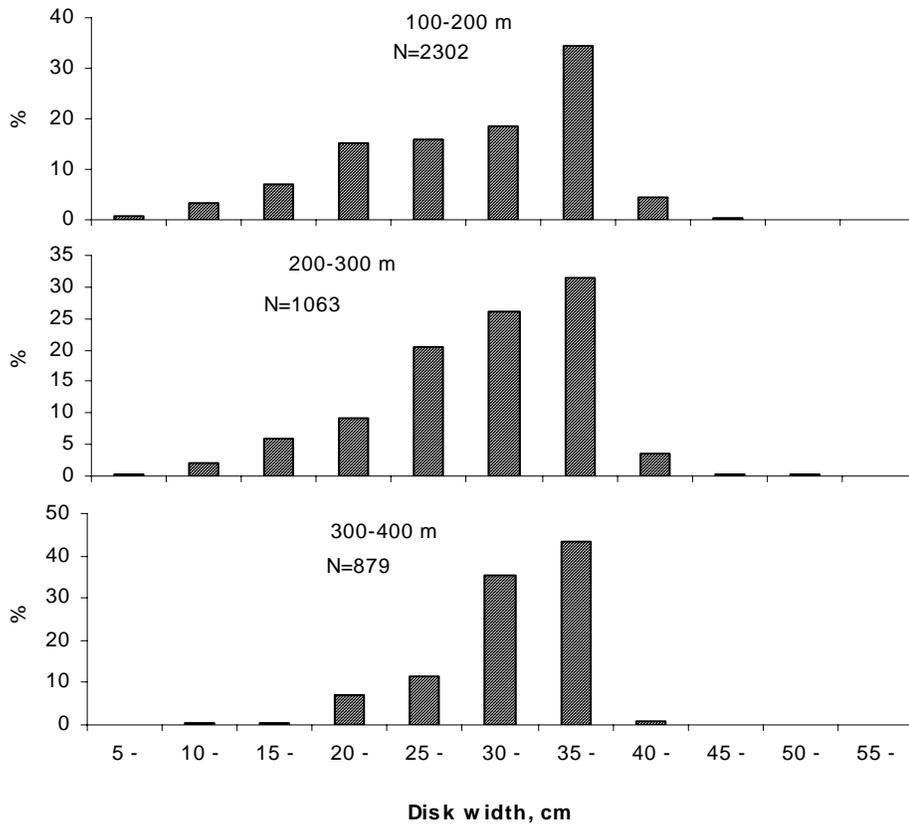
*Bathyraja macloviana* occurs in waters ranging from 113 to 389 m in depth, but it is most abundant between 150 and 200 m (Fig. 44). Despite being widespread over the Falkland shelf (Fig. 45), this species never occurs in large numbers. For this reason, it only has a moderate commercial importance. Most of the rays caught in the commercial fishery have a disk width of 30-35 cm. Size distribution does not seem to vary significantly over depth (Fig. 46). Juvenile specimens feed mainly on amphipods until they reach 25cm disk width, when they shift their diet to focus on polychaets.



**Figure 44** Bathymetric distribution of *Bathyraja macloviana* caught in Falkland Islands waters since August 1992 by the commercial sector and on scientific research cruises.



**Figure 45** Map of the Falkland Islands showing the distribution of *Bathyraja macloviana* caught by the commercial sector (CPUEs of the specialised fleet, kg/hr are shaded) and on scientific research cruises since August 1992.



**Figure 46** Length-frequency distributions of *Bathyraja macloviana* caught in Falkland Islands waters since August 1992 by the commercial sector and during scientific research cruises from 3 different depths of water.

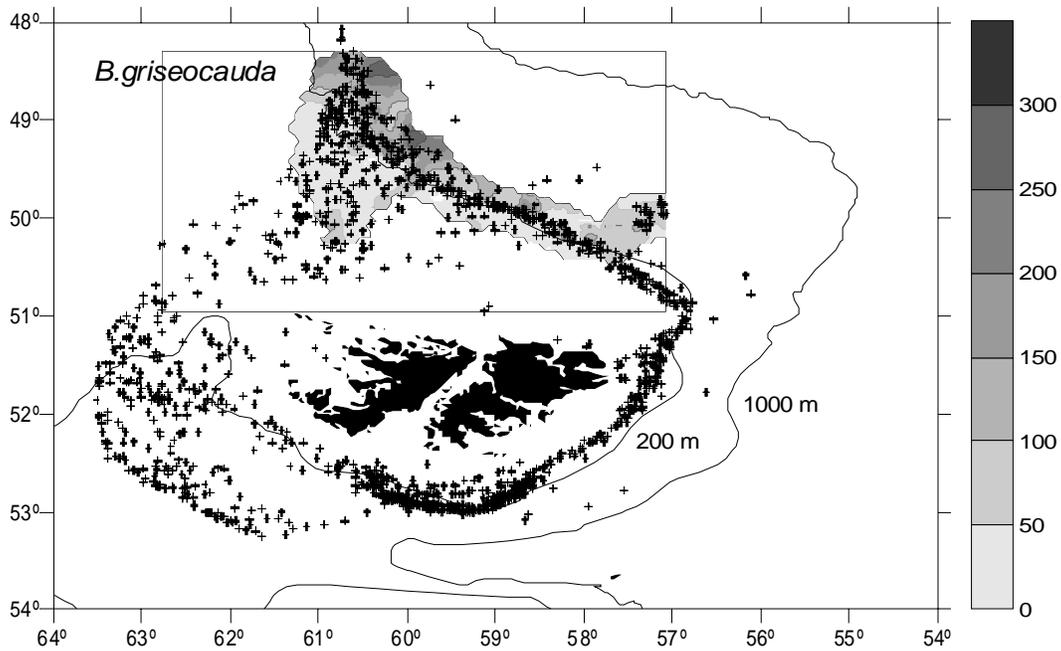
**RGR *Bathyraja griseocauda* (Plate XIX-XX)**

Common name: Grey-tailed skate

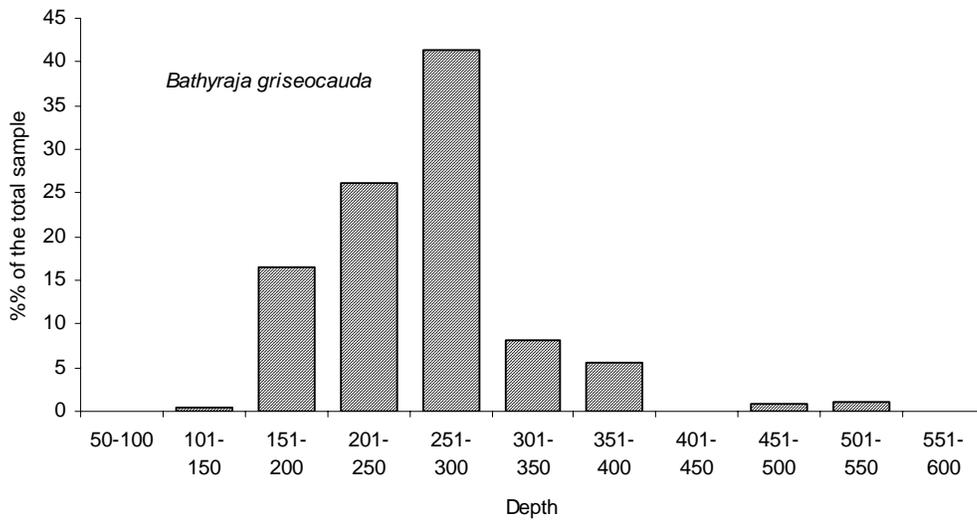
Disk is almost rhomboidal. Rostrum is soft and blunt. Dorsal side is uniformly grey, with indistinct dark spots and a dark stripe along the vertebrae. Dorsal surface of the disk evenly set with small spinules that give the skin a 'sand-paper'-like feel. Ventral surface of the disk is yellowish-white. Tail is robust and set with small spinules. In adults, these are flanked by a white lateral fold. Ventral side of the tail is heavily spotted with brown or grey blotches and has 18-20 median thorns. No orbital, interspiracular, scapular, or interdorsal thorns on the dorsal side of the disk or the tail. Anus is situated between the rostrum and tip of the tail. Females attain 130 cm DW, while males have a maximum disk width of 114 cm DW. Alar thorns of males are arranged in 21-24 radial rows, with 5 to 7 thorns per row. Teeth are conical and sharp. Juveniles are similar in appearance to adults. Their dorsal side is dark grey and set densely with spinules and grey blotches can be found on the ventral side of the tail at a disk width about 15 cm.

*Bathyraja griseocauda* is found in waters varying from 106 to 523 m, but is most abundant between 200 and 300 m (Figures 47, 48). It is one of the most commercially important ray species found in Falkland Islands waters. Most of the commercial catch consists of animals that range from 20 to 65 cm DW. Larger rays (more than 100cm DW) are caught in deeper waters (between 400 and 500 m), where they are found with juveniles of 10-20 cm DW (Figure 49).

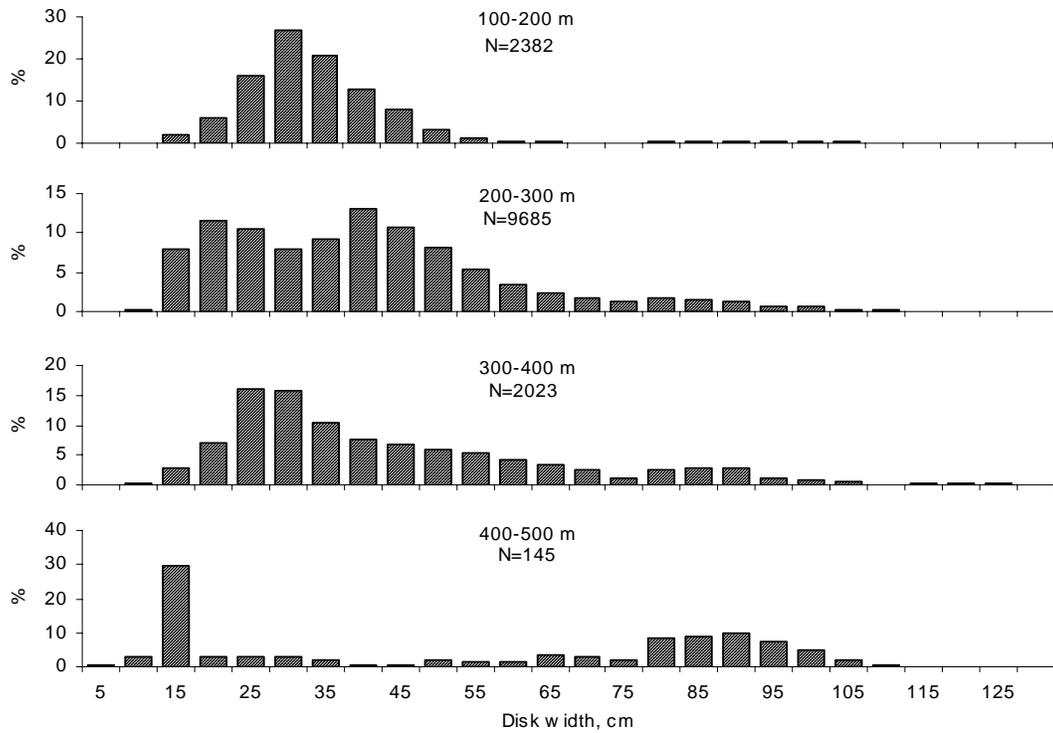
Small individuals prey upon benthic amphipods and isopods, such as *Serolis* spp. In larger animals, the food spectrum becomes rather diverse, but it normally includes squid, whelks and isopods, as well as fish.



**Figure 47** Map of the Falkland Islands showing the distribution of *Bathyraja griseocauda* caught by the commercial sector (CPUEs of the specialised fleet, kg/hr are shaded) and on scientific research cruises since August 1992.



**Figure 48** Bathymetric distribution of *Bathyraja griseocauda* caught in Falkland Islands waters since August 1992 by the commercial sector and on scientific research cruises.



**Figure 49** Length-frequency distributions of *Bathyraja griseocauda* caught in Falkland Islands waters since August 1992 by the commercial sector and during scientific research cruises from 4 different depths of water.

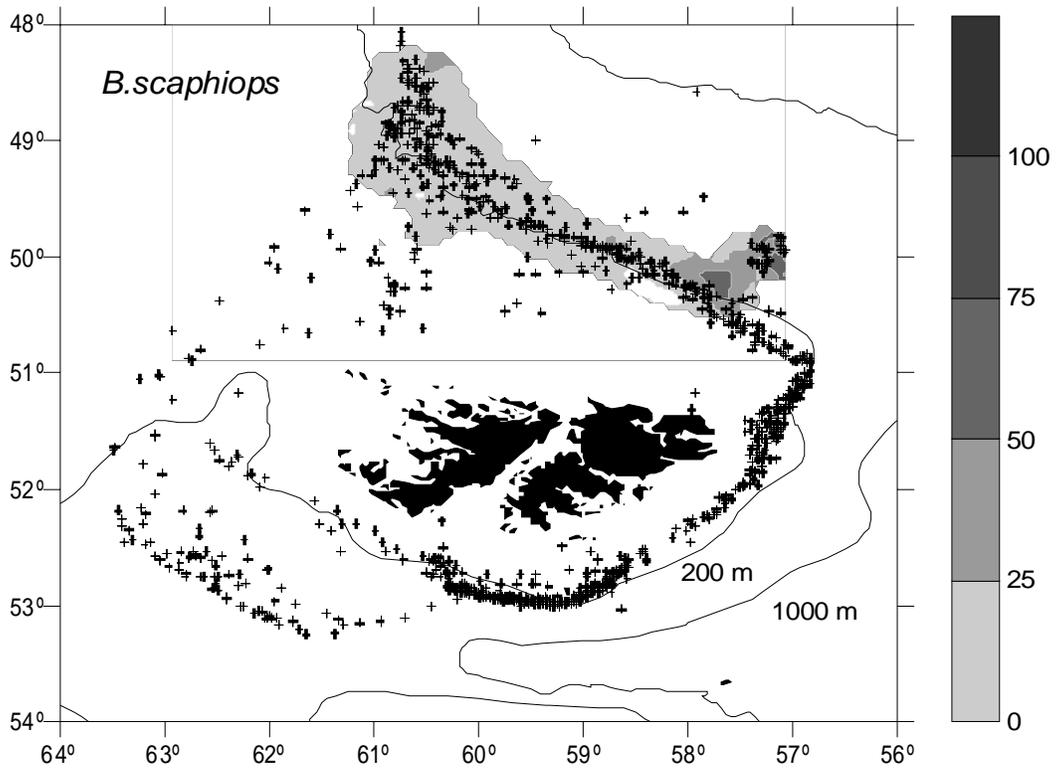
**RSC *Bathyraja scaphiops* (Plate XXI-XXII)**

Common name: Glassy-nose ray.

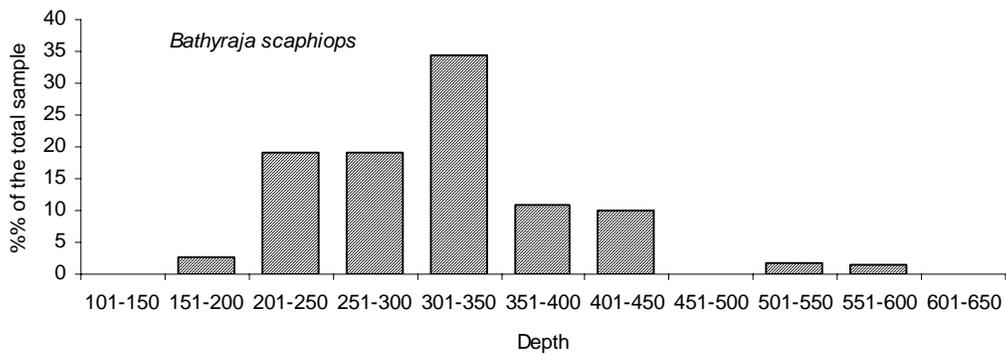
Rostrum is soft, long and acutely pointed into protruding nose. In adults, the rostrum looks like a glassy semitransparent triangle, visible from both sides of the disk. The rostrum is less pronounced in juveniles (DW less than 15 cm) and similar in shape to *B. brachyurops*. Dorsal side of the disk varies from pale-grey to brownish, and it is common to find indistinct dark blotches and a pair of larger, light-coloured ocelli on the base of the pectoral fins. Juveniles are usually dark brown. Ventral side of the disk is white in the centre, but changes to pale-purple towards the periphery. Underside of the tail is white, and it may have a few indistinct spots in the anterior half. Dorsal side of the disk is smooth, except for some tiny spinules, which occur along the median row, tail and anterior edges of the disk.

No orbital, spiracular or scapular thorns. The number of thorns in the median row changes considerably during growth. In juveniles (DW less than 14 cm), the median row extends from behind the head to the first dorsal fin and typically consists of about 45 thorns. Thorns on the tail are large; those on the trunk gradually decrease in size until only tiny spinules are found in the anterior part of the tail. In individuals greater than 17cm DW, there are no thorns on the trunk and the median row remains on the tail only. It typically consists of 16 to 24 thorns. One interdorsal thorn is found in juveniles but it is often lost in adults. Teeth are conical and sharp. Females (75 cm DW) attain a larger size than males (66 cm DW). The alar thorns of males are arranged in 20-24 radial rows; with 2 to 4 thorns per row. Male claspers are slender and rod-like, with slightly enlarged glands.

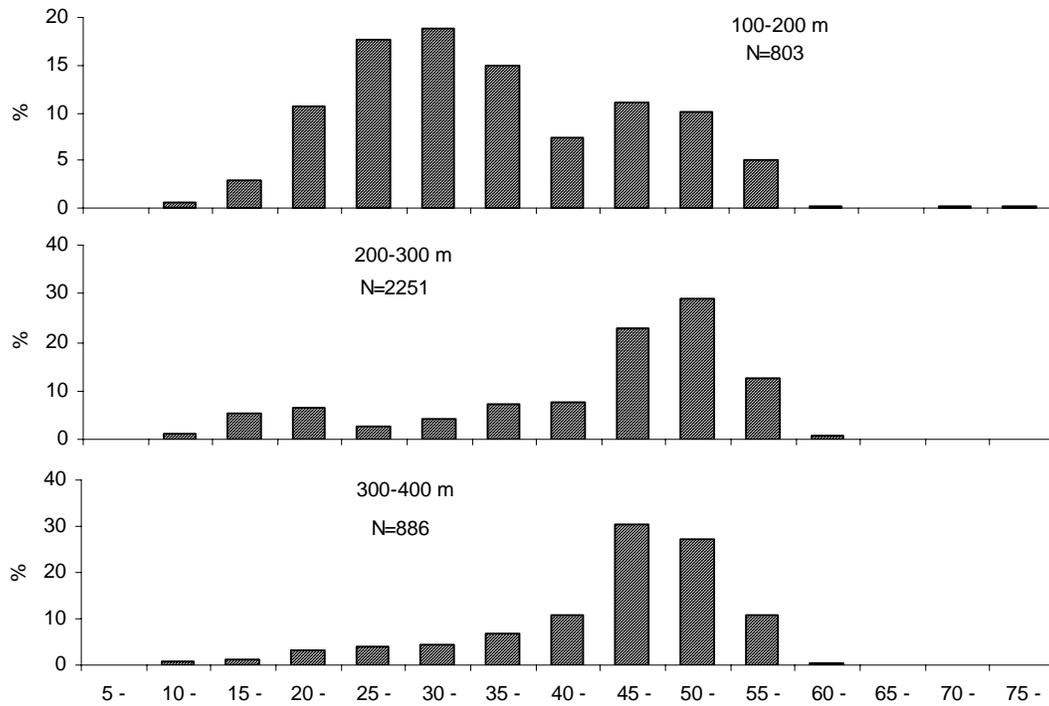
*Bathyraja scaphiops* occurs over the entire Falkland shelf (Figure 50). It is found between 102 and 925 m, but it is most abundant between 250 and 300 m (Figure 51), particularly on the north-east part of this shelf (Figure 50). This is an important commercial species. Because small rays (20-35 cm DW) inhabit mostly shallow waters (less than 200 m), which is outside of the main fishery grounds, most of the animals taken by the commercial sector range from 40 to 55 cm DW (Figure 52). Juveniles (up to 25cm DW) feed on small crustaceans, but as they increase in size they soon develop into an active predator, feeding on fish, especially *P. ramsayi* and Myctophidae.



**Figure 50** Map of the Falkland Islands showing the distribution of *Bathyraja scaphiops* caught by the commercial sector (CPUEs of the specialised fleet, kg/hr are shaded) and on scientific research cruises since August 1992.



**Figure 51** Bathymetric distribution of *Bathyraja scaphiops* caught in Falkland Islands waters since August 1992 by the commercial sector and on scientific research cruises.



**Figure 52** Length-frequency distributions of *Bathyraja scaphiops* caught in Falkland Islands waters since August 1992 by the commercial sector and during scientific research cruises from 3 different depths of water.

**RSH** *Bathyraja schroederi* (Plate XXIII)

No common name

Rostrum is soft and blunt. Disc rhomboid, with outer corners rounded. Dorsal side is uniform pale greyish-brown with no blotches or stripes. Ventral surface, including lips, gill slits and anal region are completely dark. Upper side of the disk is smooth. This species has no preorbital, postorbital or superspiracular thorns or thorns in the nuchal region. The thorns in the median row are exclusive to the tail; they are small, rounded and are often missing. No flanking rows of thorns present. Tail is long, thin and whip-like. Dorsal fins are not confluent, and a large interdorsal thorn separates them.

Alar thorns of males are arranged in about 20 radial rows, with 3-5 thorns per row. Male claspers are long and slender (about 30% of the disk width). The tips of the claspers are enlarged.

This is a deep water species that is very rare. Up till now only one individual has been caught in Falkland Islands waters. This individual was captured near 53°13-53°07 S, 56°59-56°45 W at a depth of between 1850 and 1950 m.

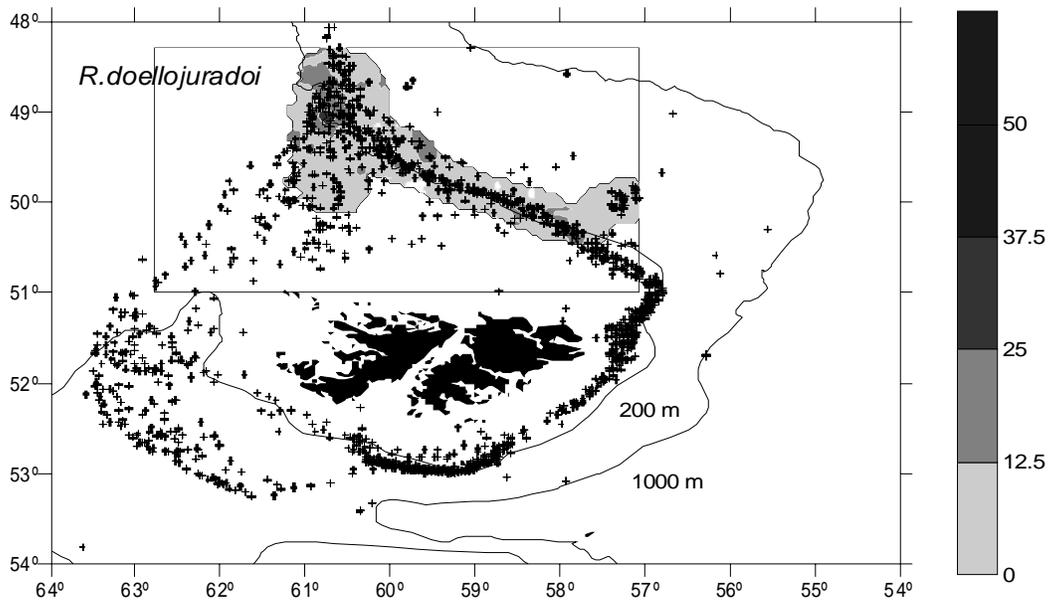
**RDO** *Raja doellojuradoi* (Plate XXIV-XXVI)

Common name: Starry Ray

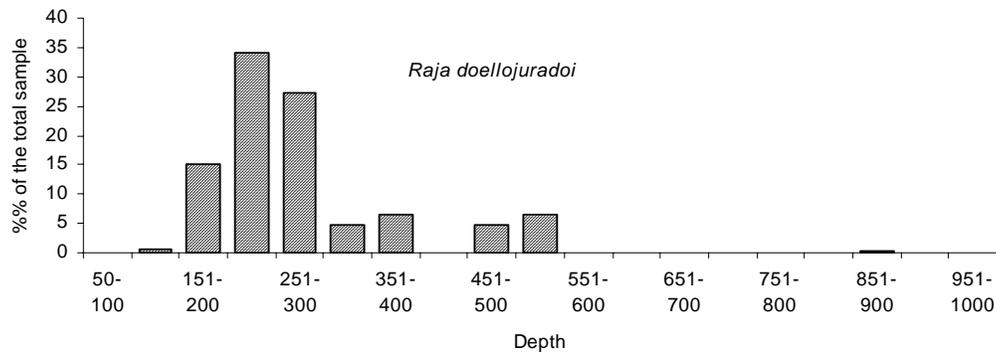
Rostrum is hard and stout in adults. Anterior margin of disk in adult males is deeply concave. Dorsal side of the disk is pale-grey (ash-grey), with the occasional dark spots. Sometimes a pair of larger round spots can be located at the base of pectoral fins. Ventral side is white, but changes to a bluish colour toward the periphery. Dorsal side of the disk is set with spinules and thorns of different size and is coarse. Small, star-like thorns and spinules are sparsely set near the centre, becoming denser towards the anterior margin of disk and between the eyes. Two robust orbital thorns next to each eye and a few spinules can be found between them on occasion. One large, stout interspiracular thorn. One small interdorsal thorn and three scapular thorns that are arranged in a triangle on each shoulder. Three median thorns can be found in the nuchal region; two very large ones separated by one small one. 14-18 large thorns in the median row on the tail, which are flanked by two lateral rows of smaller thorns that spread anteriorly to the nuchal region. All thorns of this species are striated by longitudinal ribs that radiate from the thorn apex and form a starry pattern at its base (the common name of this species derived from these 'starry' thorns on its back). Anus is midway between the rostrum and the tip of the tail. Alar thorns in males are arranged in 19-20 radial rows, with 2-3 thorns per row. The claspers are about 1/3 of the disk width and rather wide (width-to-length ratio is close to 1 to 6). The tips of these claspers are not enlarged. In juveniles, the disk shape is almost rhomboidal while the rostrum is hard, but not pointed. Dorsal side of the disk is grey, with dark spots of different sizes. On occasions, two larger spots can be seen at the greatest disk width. Ventral side is white and clean. Numerous thorns of different sizes cover the dorsal side of the disk. The largest thorns are in the median row. Towards the disk periphery, the thorns gradually reduce in size until they transform into sharp spinules. Thorns in median row on the tail and those in nuchal region are only divided by a small gap. Lateral rows of thorn in the proximal half of the tail, but they decrease in size towards the anterior part of the disk until they transform into rows of spinules that reach the shoulders. Males attain 47 cm DW, while females reach 44 cm DW.

*Raja doellojuradoi* occurs on the shelf and slope between 104-967 m (Figure 53), but it is most abundant between 200 and 300 m (Figure 54) in the northern part. This is a small species of minor commercial importance. Most of the animals caught in the commercial catches are between 15 and 35 cm (Figure 55).

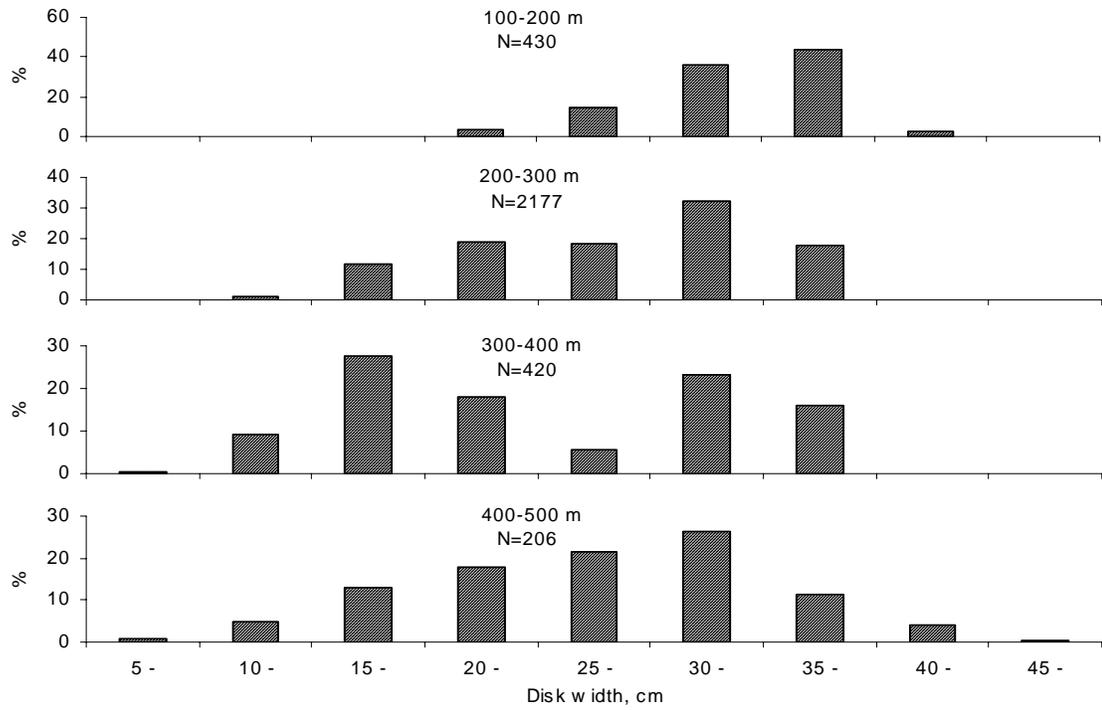
This species feeds mostly on euphausiids and amphipods in early stages, shifting to isopods and polychaetes, as well as fish and other larger benthic prey as they near adulthood.



**Figure 53** Map of the Falkland Islands showing the distribution of *Raja (Amblyraja) doellojuradoi* caught by the commercial sector (CPUEs of the specialised fleet, kg/hr are shaded) and on scientific research cruises since August 1992



**Figure 54** Bathymetric distribution of *Raja (Amblyraja) doellojuradoi* caught in Falkland Islands waters since August 1992 by the commercial sector and on scientific research cruises.



**Figure 55** Length-frequency distributions of *Raja (Amblyraja) doellojuradoi* caught in Falkland Islands waters since August 1992 by the commercial sector and during scientific research cruises from 3 different depths of water.

**RGE *Raja georgiana* (Plate XXVII-XXVIII)**

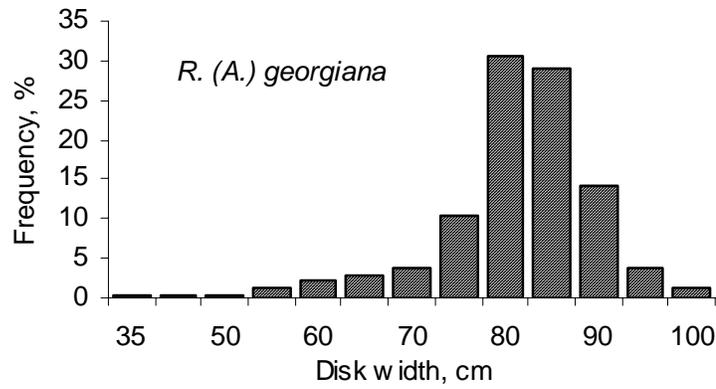
Common name: Antarctic Skate

Rostrum is short, hard and stout. The shape of the disk is roughly sub-rhombic, with outer corners sharply angled. Dorsal side of the disk is brown with large dark brown blotches while the ventral surface varies from pale with dark edges to entirely dark (except for the gill slits, branchial region, lips, edges, and rostrum, which remain pale). Occasionally, white patchy stripes can be seen on the pectoral and pelvic fins. Upper side of the disk is very rough with scattered, very coarse spinules. Midline of the body and sides of tail of larger specimens may also be set with rows of thornlets. One pair of preorbital, postorbital and superspiracular thorns and the three scapular thorns on each shoulder are arranged in a triangle. 20 to 28 (usually 24-25) large thorns in the median row, of which 14-18 are on the tail only. Median row is flanked by two lateral rows of smaller thorns, which spread anteriorly to the nuchal region.

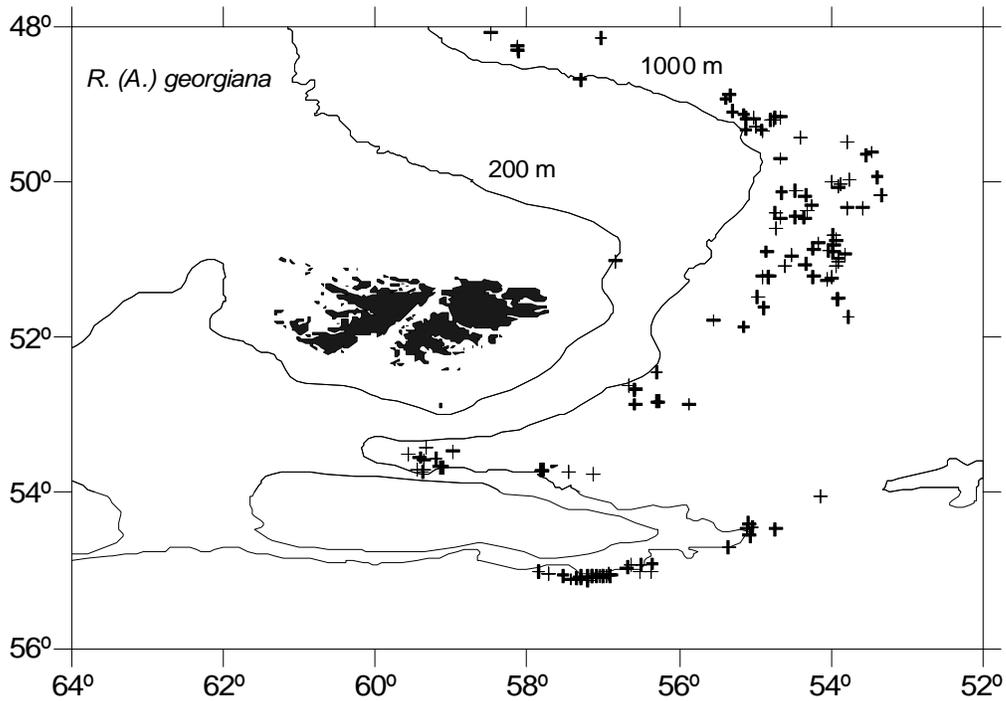
Mouth is very wide, with 37-42 tooth rows in upper jaw (occasionally less). Lateral folds can be found along the entire length of tail, originating as keels at pelvic axils and terminating a short distance before tail tip. Underside of the disk, pelvic fins and the tail is often completely smooth, but some specimens may have a narrow strip of spinules medially on snout tip. Dorsal thorns are very large, with a ribbed basal plate. Occasionally, there is a small interdorsal thorn. Claspers of males are short and wide with slightly enlarged glans. Females attain 100 cm DW, while males reach a disk width of 95 cm.

*Raja (A.) georgiana* is one of the most abundant deep water rays around the Falkland Islands and is taken as a by-catch in the longline fishery. Most animals caught in the commercial catches are between 80 and 90 cm (Figure 56) and are caught mostly deeper of 1,500 m to the east of the Falkland Islands and the Burdwood bank (Figures 57, 58).

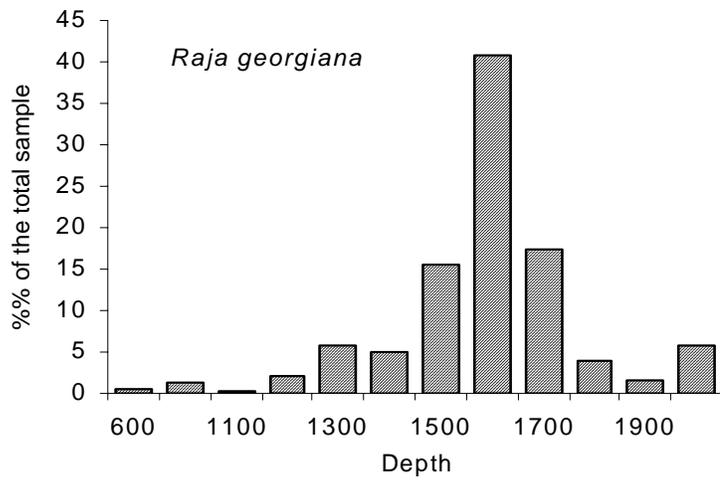
The species feeds on a gadoid fish *Antimora rostrata*, deep-water crayfish *Thymops birsteini*, shrimps, crabs and squids.



**Figure 56** Length-frequency distribution of *Raja (A.) georgiana* caught in Falkland Islands waters since October 1997 by the commercial sector and during scientific research cruises.



**Figure 57** Map of the Falkland Islands showing the distribution of *Raja (A.) georgiana* caught by the commercial sector and on scientific research cruises since October 1997.



**Figure 58** Bathymetric distribution of *Raja. (A.) georgiana* caught in Falkland Islands waters since October 1997 by the commercial sector and on scientific research cruises.

**RFL *Raja (Dipturus) chilensis* (Plate XXIX – XXXI)**

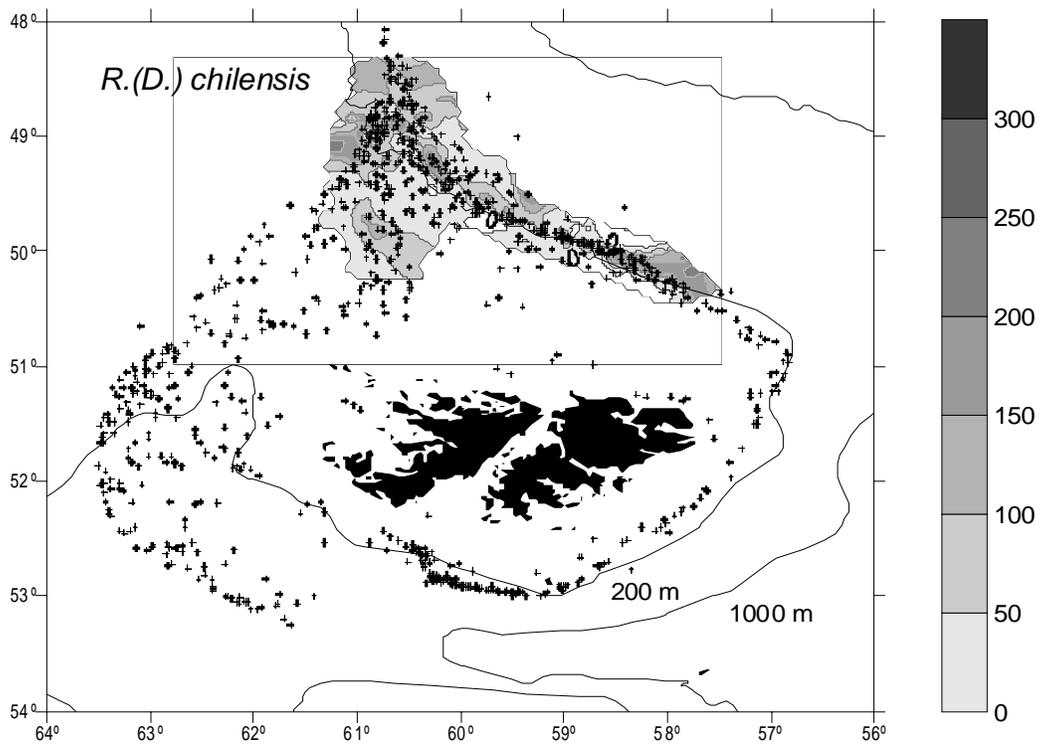
Common name: Yellow-nose Skate

Rostrum is hard, long and acutely pointed. Dorsal side of the disk is brown or greenish brown, and often has dark blotches and stripes that resembles a “camouflage” pattern. Most individuals have large dark ocelli at the base of pectoral fins. Median row consists of 1-3 thorns in the nuchal region and 15-20 thorns on the tail. These thorns are not aligned in a regular pattern. Thorns on the tail are arranged in either 3 or 5 rows: one median with 1 or 2 lateral rows on either side. This species has 3 to 5 orbital thorn and 1 or 2 interdorsal thorns. Dorsal side of the disk is smooth, except for a few small white thorns scattered irregularly over the pectoral fins, trunk, head and the shoulders. Dorsal side of the rostrum is set densely with small thornlets and occasionally has two rows of larger thorns. In the posterior part of the rostrum, the spinules are set into two lateral stripes while in the anterior part they merge into a wide single strip, which reaches the rostrum apex. Small spinules run along the anterior margins of fins.

All thorns on the dorsal side are narrow, spike-like, and distinctly curved towards the posterior. Ventral side of the disk is pinkish-grey, with numerous mucous pores that are distinctly marked as black dots and streaks. Ventral side of the rostrum is coarse, and set densely with very fine spinules and occasionally a few thorns. Rare small thorns may also occur on the ventral side of branchial region, abdomen and the base of pectoral fins. Teeth are sharp, conical or spike-shaped.

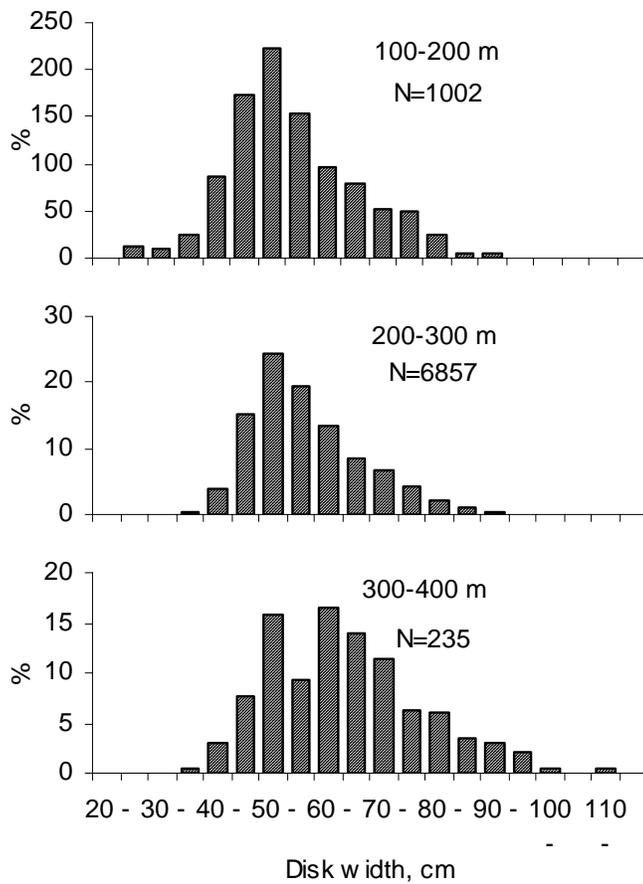
Females attain 120 cm DW, while males reach a maximum disk width of 97 cm. Alar thorns in males are arranged in 7-9 radial rows, with 2-3 thorns per row. Claspers in mature males are stout and very long, often extending beyond the first dorsal fin. Clasper glands are slightly enlarged and elongated, and are more than 1/3 of the clasper length.

*Raja (Dipturus) chilensis* occurs over the entire Falkland shelf, particularly in the northern part (Figure 59). Although this species is found in waters that range from 105 to 342 m, it is most abundant between 250 and 300m (Figure 60). This is a very important commercial species. The few individuals caught in waters deeper than 300 m tend to be much larger than 45-65 cm DW, which is the size range that predominates in commercial catches (Figure 61). Females represent over 83% of the commercial catch. No juveniles have ever been caught in the Falkland waters, suggesting it migrates to these waters on a seasonal basis.



**Figure 59** Map of the Falkland Islands showing the distribution of *Raja (Dipturus) chilensis* caught by the commercial sector (CPUEs of the specialised fleet, kg/hr are shaded) and on scientific research cruises since August 1992.

**Figure 60** Bathymetric distribution of *Raja (Dipturus) chilensis* caught in Falkland Islands waters since August 1992 by the commercial sector and on scientific research cruises.



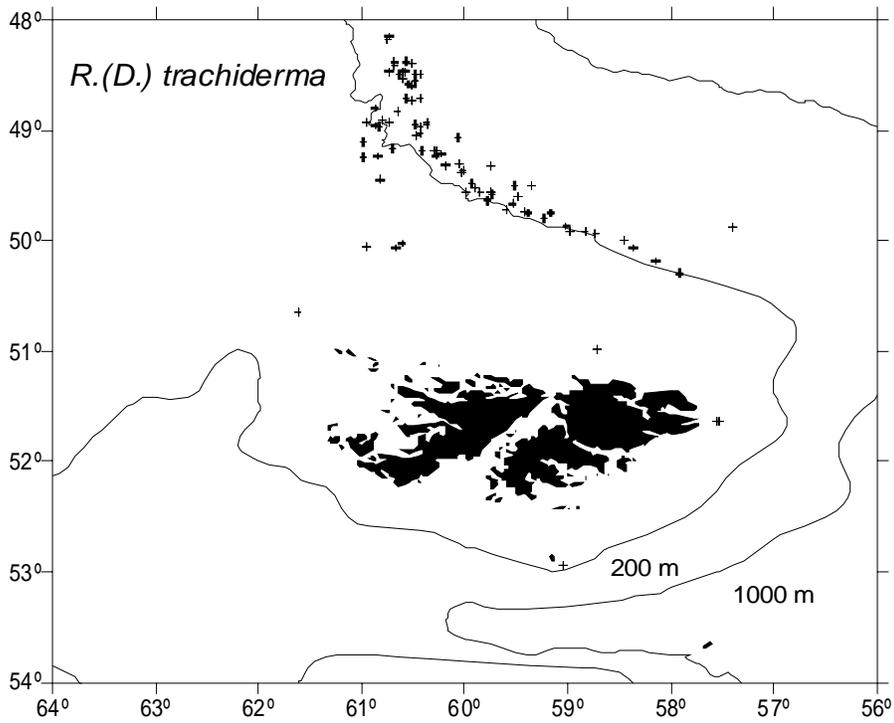
**Figure 61** Length-frequency distributions of *Raja (Dipturus) chilensis* caught in Falkland Islands waters since August 1992 by the commercial sector and during scientific research cruises from 3 different depths of water.

**RTR** *Raja trachyderma* (Plate XXXII-XXXIII)

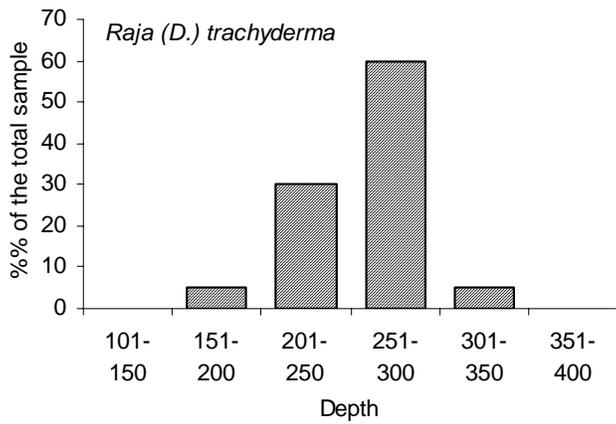
Common name: Large black skate

Rostrum is hard, long and acutely pointed. Disk is uniformly dark-grey or almost black on both the dorsal and ventral sides, with the former somewhat darker than the latter. Aside from the mucus pores which are black, there is no pattern on the dorsal surface. Body proportions, skin textures and thorn arrangements of this species change markedly during growth. Animals with a disk width of less than 40 cm have a rough rostrum on both sides, but the remainder of the disk is smooth and slimy. The tail is thin and whip-like in these small individuals. There are 11-25 thorns in the median row, which starts behind the posterior margin of the disk. Numerous small spinules start to develop in animals between 40 and 80cm DW, first on the head and trunk, then on the pectoral fins. This results in the disk feeling coarse on both sides. On the tail, two lateral rows of thorns appear on either side of the median row, while the tail gets wider and more muscular in these medium sized animals. In individuals with a disk width greater than 100 cm, numerous coarse spinules uniformly cover both sides of the head, trunk and pectoral fins. Only the belly remains smooth and slimy in these large animals. The number of longitudinal rows of thorns on the tail also increases in adults. There can be up to 3 such rows in males (1 median and 2 lateral) and 5 in females (1 median, 2 lateral and 2 irregular marginal rows). Median row of adults has between 15-30 thorns. The arrangement of orbital thorns also changes with growth. Small animals with a disk width less than 40 cm typically have 2 large stout thorns and 4-6 smaller needle-like thorns, whereas adults typically have only 3-5 needle-like thorns and scars of the large ones. The spiracular thorn is arranged in the same line as the orbital thorns. Occasionally, there are 1-2 small thornlets spaced between the larger orbital thorns. No other thorns are found on the disk. Teeth are sharp, conical and are arranged in 36-44 parallel rows in both the upper and lower jaws. Females attain 125 cm DW, while males only reach a disk width of 93 cm. Claspers in mature males are stout and long, reaching the first dorsal fin on the tail.

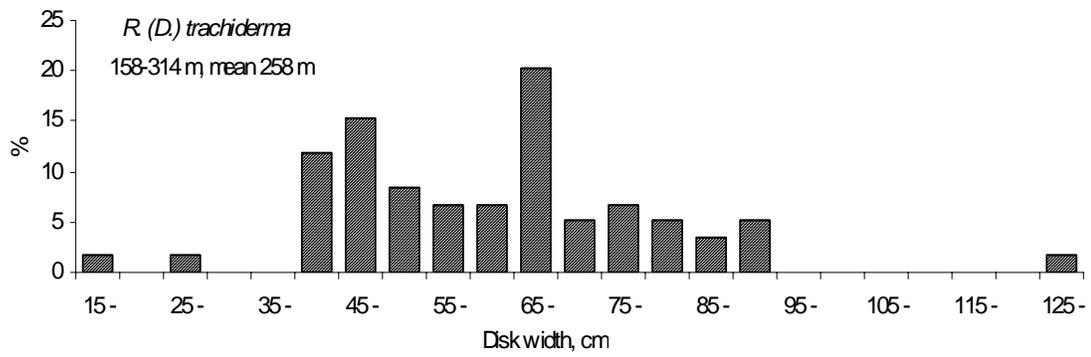
*Raja (Dipturus) trachyderma* is mostly found on the northern Falkland Islands shelf (Figure 62). While it can be found in waters between 158 and 314 m, it is most common between 250 and 300 m (Figure 63). This is a rare species of minor commercial importance. Most of the animals caught by the commercial fishery are between 40 and 80 cm DW (Figure 64).



**Figure 62** Map of the Falkland Islands showing the distribution of *Raja (Dipturus) trachyderma* caught by the commercial sector and on scientific research cruises since November 1996.



**Figure 63** Bathymetric distribution of *Raja (Dipturus) trachyderma* caught in Falkland Islands waters since November 1996 by the commercial sector and on scientific research cruises.



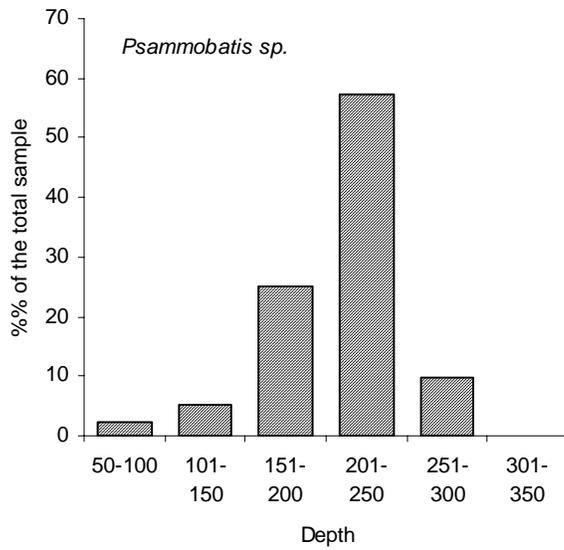
**Figure 64** Length-frequency distribution of *Raja (Dipturus) trachyderma* caught in Falkland Islands waters since November 1996 by the commercial sector and during scientific research cruises.

**RPX *Psammobatis* spp. (Plate XXXIV-XXXVIII)**

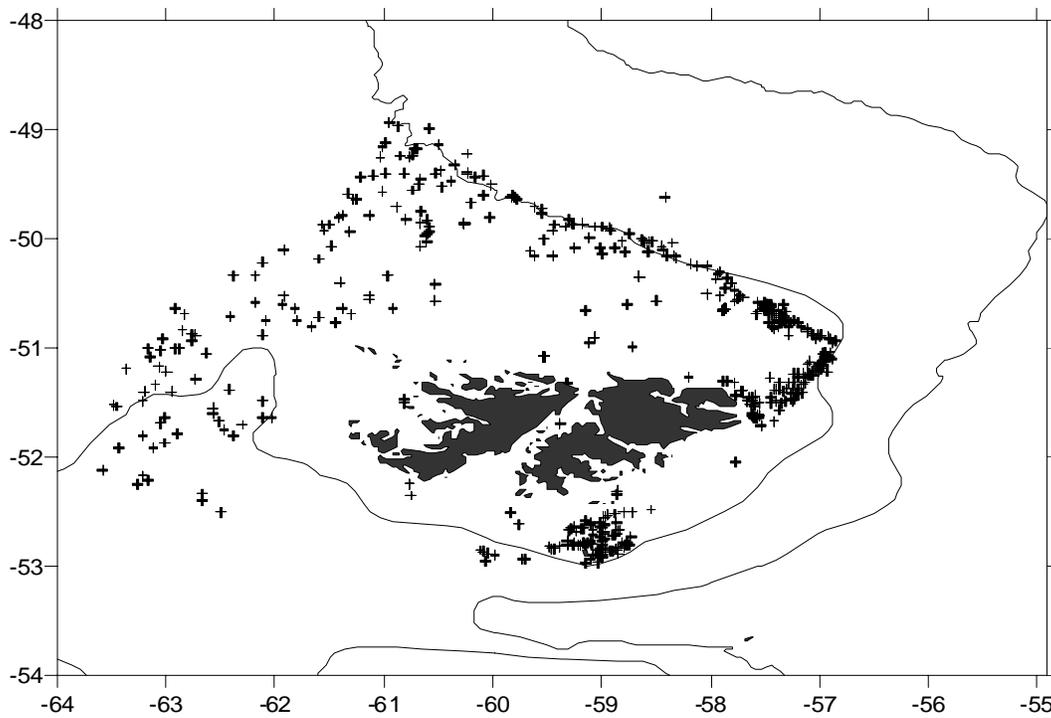
Common name: 'starry heart-shaped skate'.

Disk is wide and heart-shaped. Rostrum is soft and blunt, with a tiny attenuated appendage. Dorsal side of the disk is sandish-grey and covered in small white dots, which resemble a 'star-sky' pattern. Aside from the white dots, there may also be some dark spots of irregular shape on this side of the disk. The ventral side is pale in colour, with a dark semi-transparent rostrum. Three types of *Psammobatis* are caught in the commercial fishery; one type has bright white spots on its dorsal side ('starry'); another is uniformly grey ('grey'), while the third type is dark grey with dark spots ('dark'). Morphologically, these three types are almost identical. All three types have between 3 to 8 orbital thorns or none. When orbital thorns are present, they are arranged in one of two ways: they form a single row along dorsal side of each eye or they are found both on the anterior and posterior side of the eyes. Up to 5 interspiracular thorns and typically 4-6 median thorns in the nuchal region and 3-4 thorns on each scapula. Median row of thorns starts from the base of the tail and usually consists of 34-40 irregularly arranged thorns. These thorns are most irregular in the posterior region, where they also gradually decrease in size. Two lateral rows of thorns run alongside the median one, spreading anteriorly to the nuchal region. Dorsal fins are confluent and there are no interdorsal thorns. Alar thorns in males are arranged in 20-24 radial rows, with 2 to 3 thorns per row. Anterior dorsal surface of disk is densely set with fine spinules, while the skin in the central region of disk is smooth. Claspers are conical and gradually taper toward the tips. Tips are not enlarged. The length of claspers is about 30% of the disk width; while the width of claspers near their tips is about 0.1 of their length. In juveniles, the disk is nearly round and set densely with fine spinules. Juveniles have no orbital, spiracular, nuchal thorns or lateral rows of thorns but they do have between 25-30 thorns in median row on the tail only. Thorns in the median row of very small individuals gradually transform into irregular spinules toward the posterior end of tail. Because the thorns on the disk easily tear off and leave no scars, the actual number of thorns (orbital, spiracular and nuchal) may be less than mentioned above. Males are larger and attain a disk width of 38 cm DW, compared to only 30 cm DW for females. 'Starry' males have straight rod-like claspers, while the tips of claspers of 'grey' males are slightly curved toward the tail.

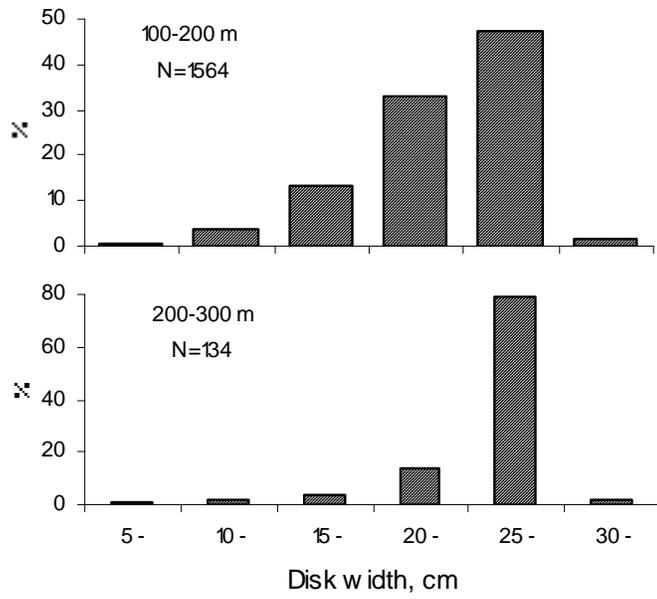
All three types of *Psammobatis* spp. occur between 35 and 280 m, but are most abundant between 150 and 250 m (Figure 65). They are a small, shallow-water (Figure 66) species of low abundance and minor commercial importance. Most of animals taken by the commercial sector vary between 20-30 cm DW (Figure 67), with the largest animals found in deeper waters.



**Figure 65** Bathymetric distribution of *Psammobatis sp.* caught in Falkland Islands waters since June 1999 by the commercial sector and on scientific research cruises.



**Figure 66** Map of the Falkland Islands showing the distribution of *Psammobatis sp.* caught by the commercial sector and on scientific research cruises since June 1999.



**Figure 67** Length-frequency distribution of *Psammobatis* spp. caught in Falkland Islands waters since June 1999 by the commercial sector and during research cruises from 2 different depths of water.