A RAPID REFERENCE GUIDE FOR THE IDENTIFICATION AND SAMPLING AT-SEA OF MARINE FISHES CAPTURED DURING COMMERCIAL FISHING ACTIVITIES.

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by

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Abstract

This largely visual guide is intended to serve as a rapid reference for fisheries observers and other staff working aboard commercial fishing vessels in the southern Gulf of St. Lawrence (NAFO Division 4T). It provides pictures and key morphological traits to aid in the identification of fish species most commonly encountered by staff in the field during commercial fishing activities. While it is not intended to replace more detailed taxonomic keys and descriptions, it should provide a practical guide that can be used at sea, where conditions prevent staff from referring to the more detailed sources. The guide also provides a summary description with photographs of the procedures employed to sample marine fishes at-sea.

RÉSUMÉ

Le présent guide abondamment illustré se veut un document de référence rapide pour les observateurs des pêches et d'autres membres du personnel travaillant à bord des bateaux de pêche commerciale dans le Sud du golfe du Saint-Laurent (division 4T de l'OPANO). Il a pour but de faciliter l'identification des espèces de poisson les plus communément observées par le personnel travaillant sur le terrain pendant les sorties de pêche commerciale grâce aux photos et aux principaux caractères morphologiques fournis. Bien qu'il ne soit pas destiné à remplacer les clés et les descriptions taxonomiques plus détaillées, ce guide pratique devrait se révéler utile pour le travail en mer, où les conditions ne sont pas propices à une consultation de sources documentaires plus exhaustives. On y retrouve également une description sommaire, photos à l'appui, des techniques d'échantillonnage de poissons en mer.

INTRODUCTION

Observers working aboard commercial fishing vessels may encounter a diversity of marine species as part of their work. The quantification of catch or bycatch amounts requires the proper identification, sorting and weighing of each species encountered. While it is preferable that observers rely on detailed taxonomic descriptions such as those contained in Scott and Scott (1988) and Collette and Klein-MacPhee (2002) to properly identify fish species, this is not always practical aboard commercial fishing vessels. Difficult working conditions resulting from, among other things, large catches, pressures to sort catches rapidly and inclement weather, means that observers often have limited opportunities to consult these detailed guides during their work. The present document is therefore intended to provide a rapid reference, that once laminated, can be used at sea to identify the more common fish species encountered during commercial fishing activities in the southern Gulf of St. Lawrence (Northwest Atlantic Fisheries Organisation division 4T). It is not intended however to supplant the use of a proper taxonomic key for rarer species or for less experienced staff. The descriptions provided herein were obtained principally from Scott and Scott (1988), Collette and Klein-MacPhee (2002), Sulak (1989), Nozères and Bérubé (2003), or based on the experience of staff at DFO Gulf Fisheries Centre in Moncton, NB.

The report is divided into two sections. In the first, pictures and descriptions of key morphological characteristics used to distinguish southern Gulf of St. Lawrence fish species are presented. The second section provides a summary description along with

pictures of the procedures involved in sampling marine fish for body length, sex determination and otolith extraction. The descriptions provided herein are meant to complement but not supplant those provided in the more detailed at-sea observer training manual.

ACKNOWLEDGEMENTS

The authors would like to thank Don Flescher, Eric Parent, Tom Hurlbut and Rod Morin for providing some of the photographs for this report, as well as Dr. Mark Hanson and Luc Savoie for their valuable input and detailed review.

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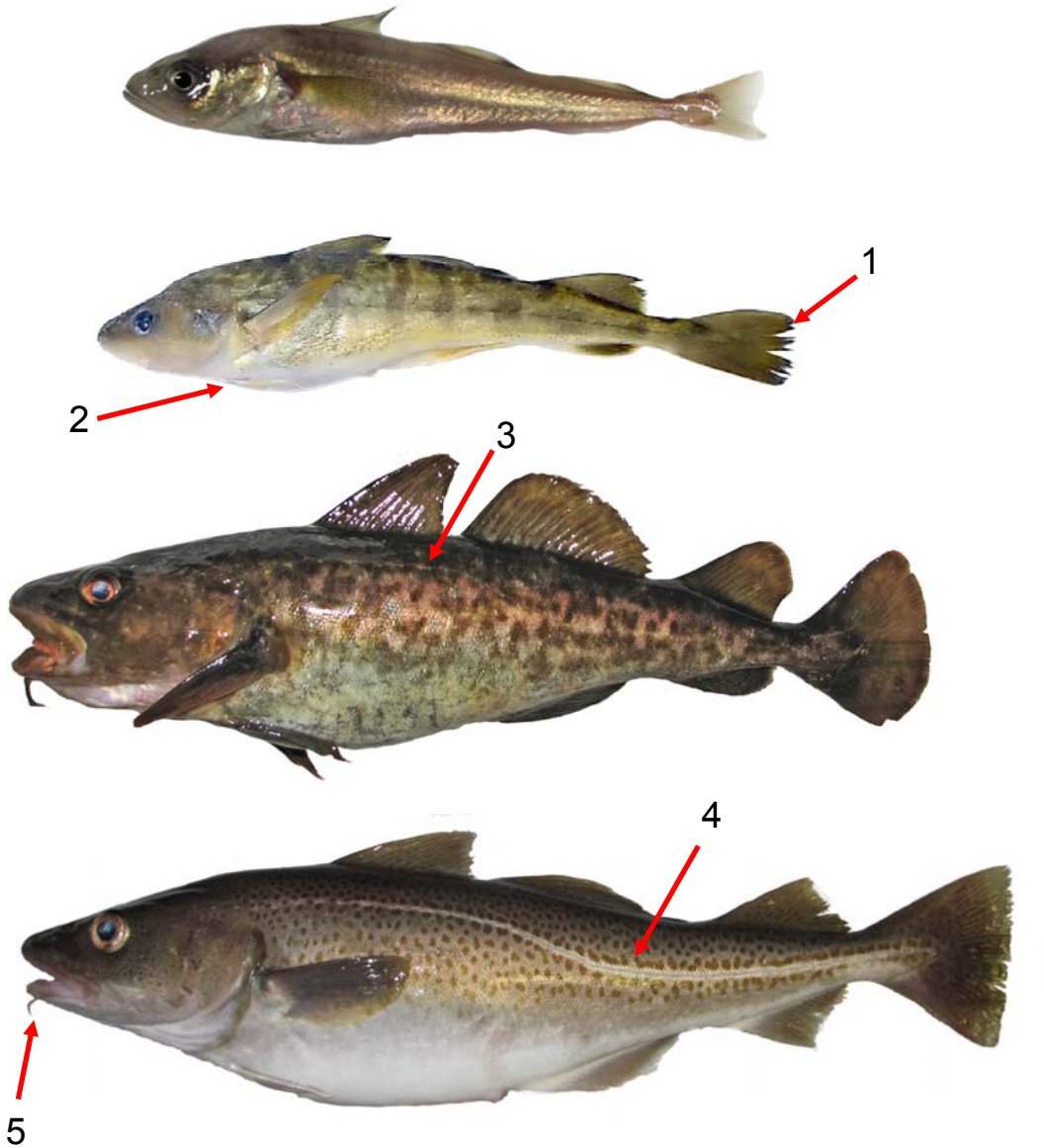
SECTION I:

Marine fish species commonly encountered during commercial fishing activities in the southern Gulf of St. Lawrence

Gadidae



Arctic Cod (***Boreogadus saida)***

- Very small barbel
- Slender small body
- Lower jaw projects beyond upper jaw
- Somewhat forked caudal fin
- Colour silver to bronze, no spots

Atlantic Tomcod (***Microgadus tomcod)***

1. Caudal fin rounded
2. Long second pelvic fin ray
- Colour; olive-brown mottling on back side, belly greyish to yellowish white

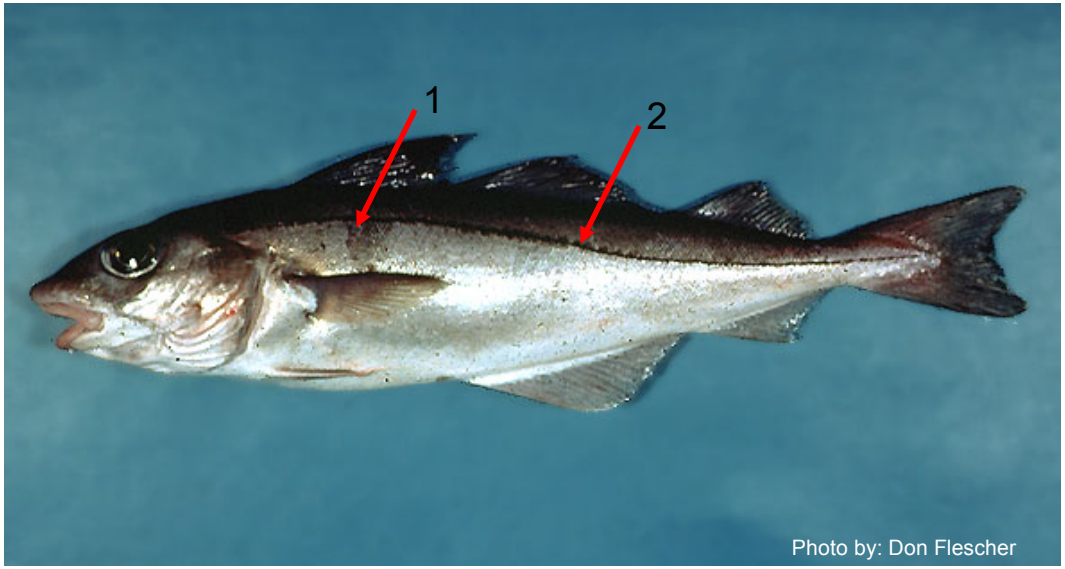
Greenland Cod (***Gadus ogac)***

3. Lateral line dark in colour
- Body stout or stocky
- Colour variable, generally bottle-green to brownish. Marbling on the sides

Atlantic Cod (***Gadus morhua)***

4. Lateral line evident (white)
5. Large barbel on lower jaw
- Triangular tail fin
- Colour; brownish green, dark spots

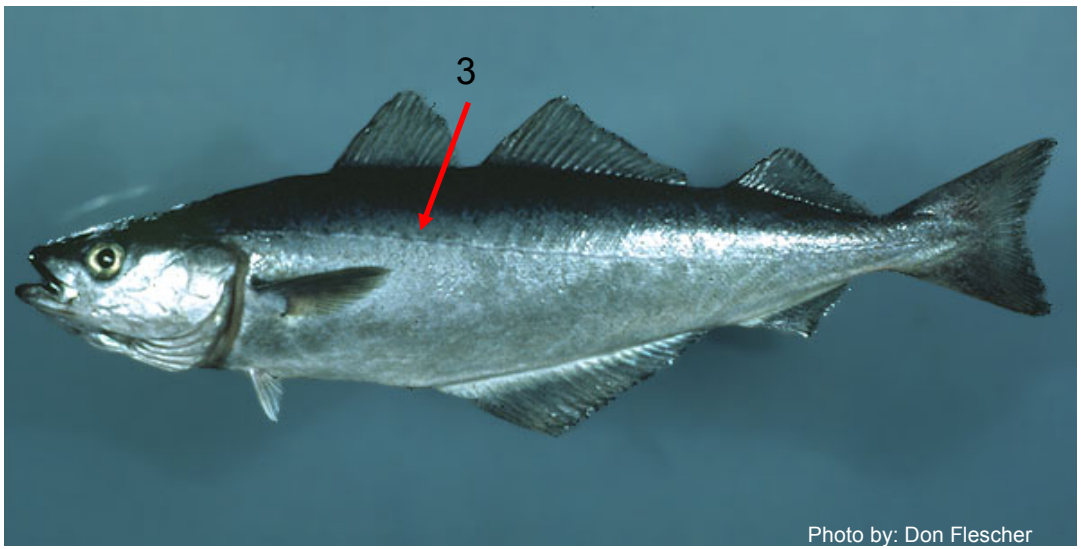
Gadidae (continued)



Haddock (Melanogrammus *aeglefinus*)

1. Distinct black spot above each pectoral fin
2. Lateral line black and distinct

- Colour dark purplish grey on the back paling to silvery grey below the lateral line

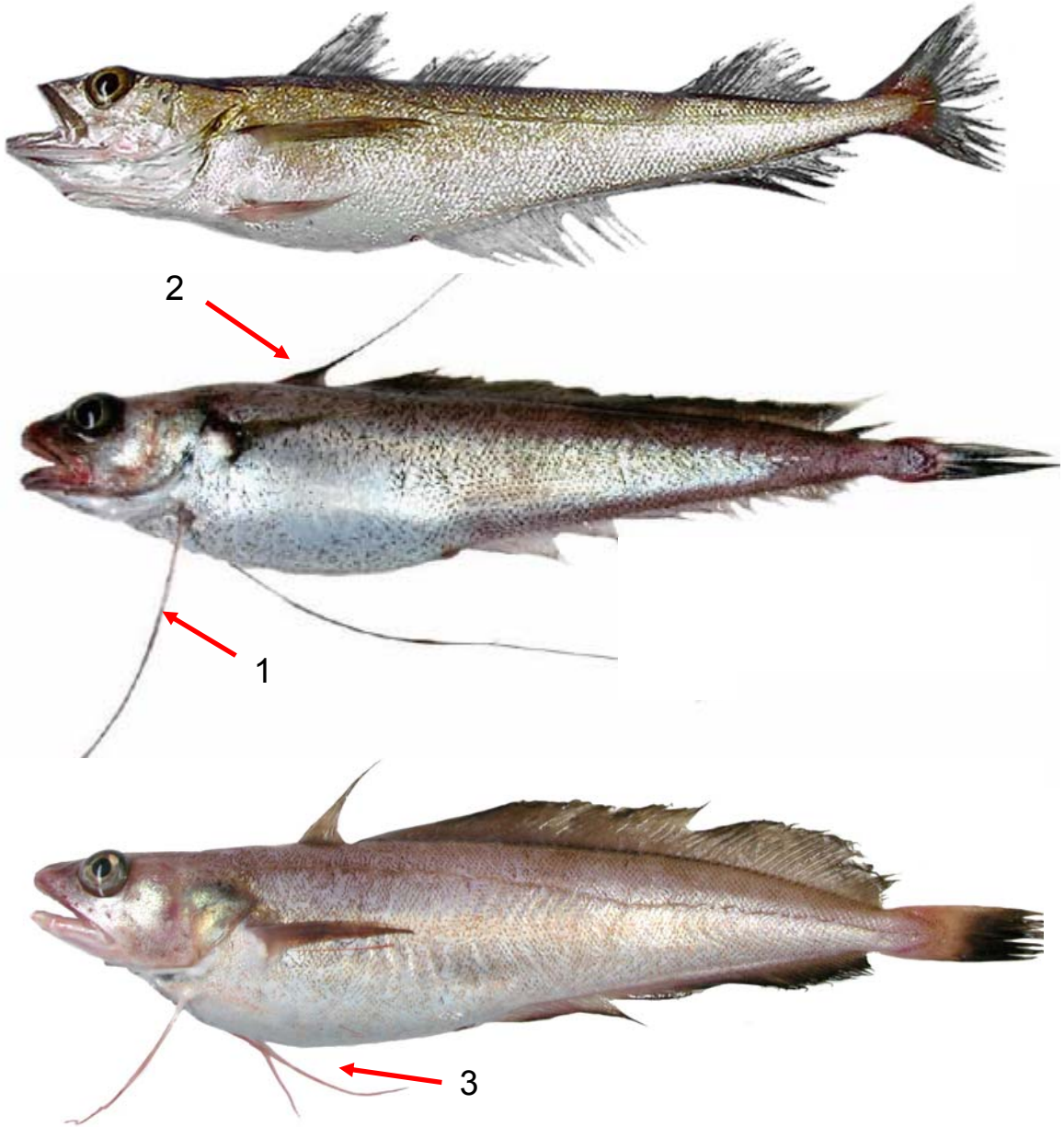


Pollock (Pollachius virens)

3. Lateral line distinct; not noticeably arched, light in colour

- Body fusiform, elongate (i.e.. streamlined)
- Body brownish green above, smoky grey to silvery grey on belly, no spots
- Projecting lower jaw

Merlucciidae and Phycidae*



Silver Hake (***Merluccius bilinearis***)

- Large eye
- Lower jaw projecting beyond upper jaw, teeth prominent
- No chin barbel
- Triangular tail
- Colour silvery and iridescent

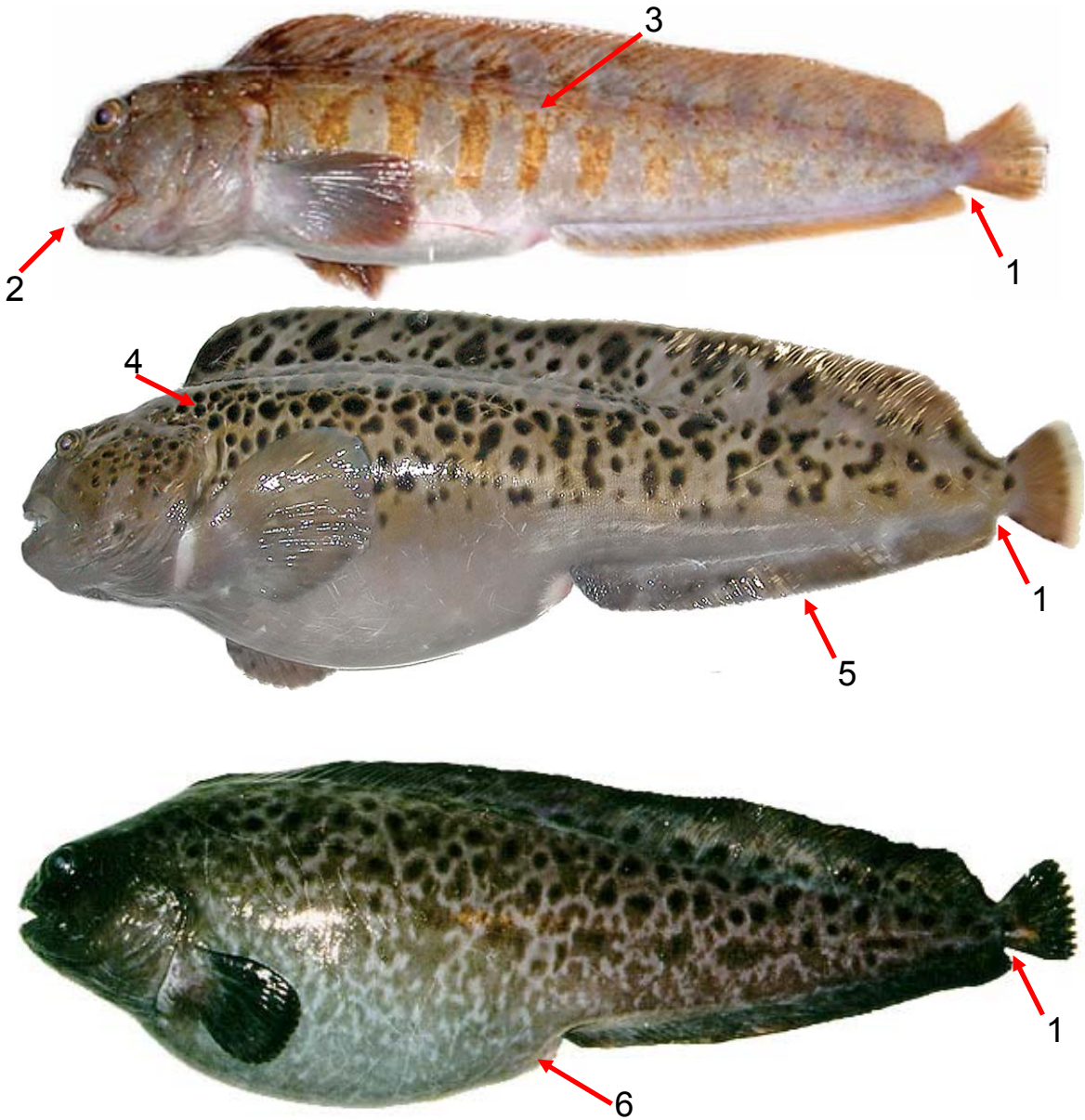
*** Longfin Hake** (***Phycis chesteri***)

1. Long pelvic fin filaments
2. One long dorsal filament
- Rounded caudal fin
- Body elongate, belly slightly rotund
- Colour dorsally is olive while belly is silvery-white

*** White Hake** (***Urophycis tenius***)

3. Filament of pelvic fins considerably shorter than those of longfin hake
- Body elongate, belly rotund
- Colour varies from muddy to purple-brown dorsally, to bronze-gold on the sides; belly yellowish-white to pinkish

Anarhichadidae



All wolffish (Catfish)

1. Caudal fin distinct from the dorsal and anal fin

Atlantic Wolffish (Striped) (*Anarhichas lupus*)

2. Large canine teeth
3. 10 or more irregular bands on body
- large head relative to its body when viewed from the side
- Most common of the wolffish in the southern Gulf

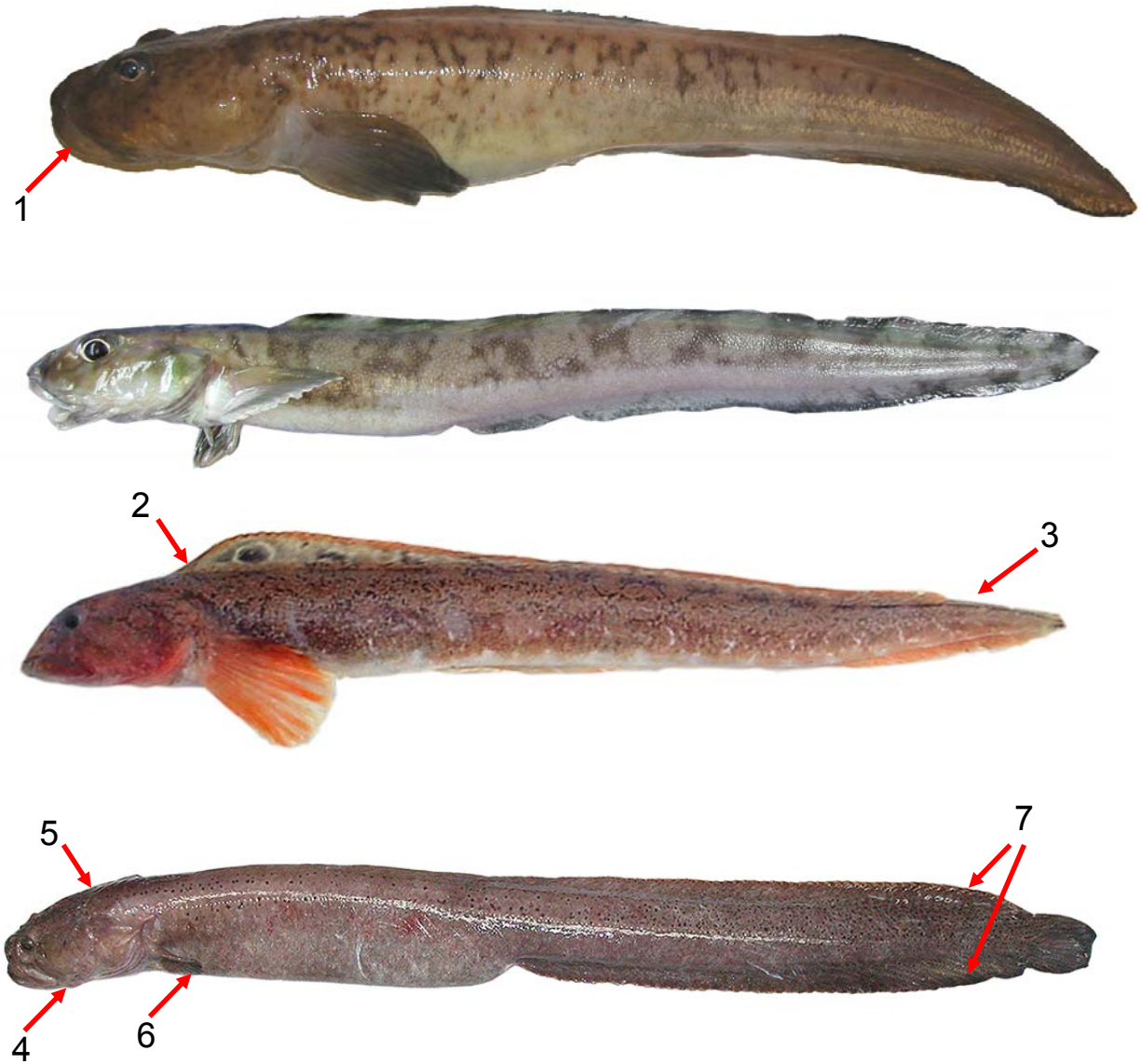
Spotted Wolffish (*Anarhichas lupus*)

4. Dark spots on body and head
5. Anal fin half length of dorsal
- Large canine teeth
- Large head relative to its body when viewed from the side

Northern Wolffish (Broadhead) (*Anarhichas minor*)

6. Deep-bodied at the abdomen
- Body usually uniform in colour; rarely with dark blotches (though never on the head)
- Flesh feels like jelly to the touch

Demersal (large)



Laval's (Newfoundland) Eelpout (*Lycodes lavalaei*)

1. Lips thick & floppy (hooded)
   - Head blunt and spade-shaped
   - Colour yellowish to cream

Vahl's Eelpout (*Lycodes vahlii*)

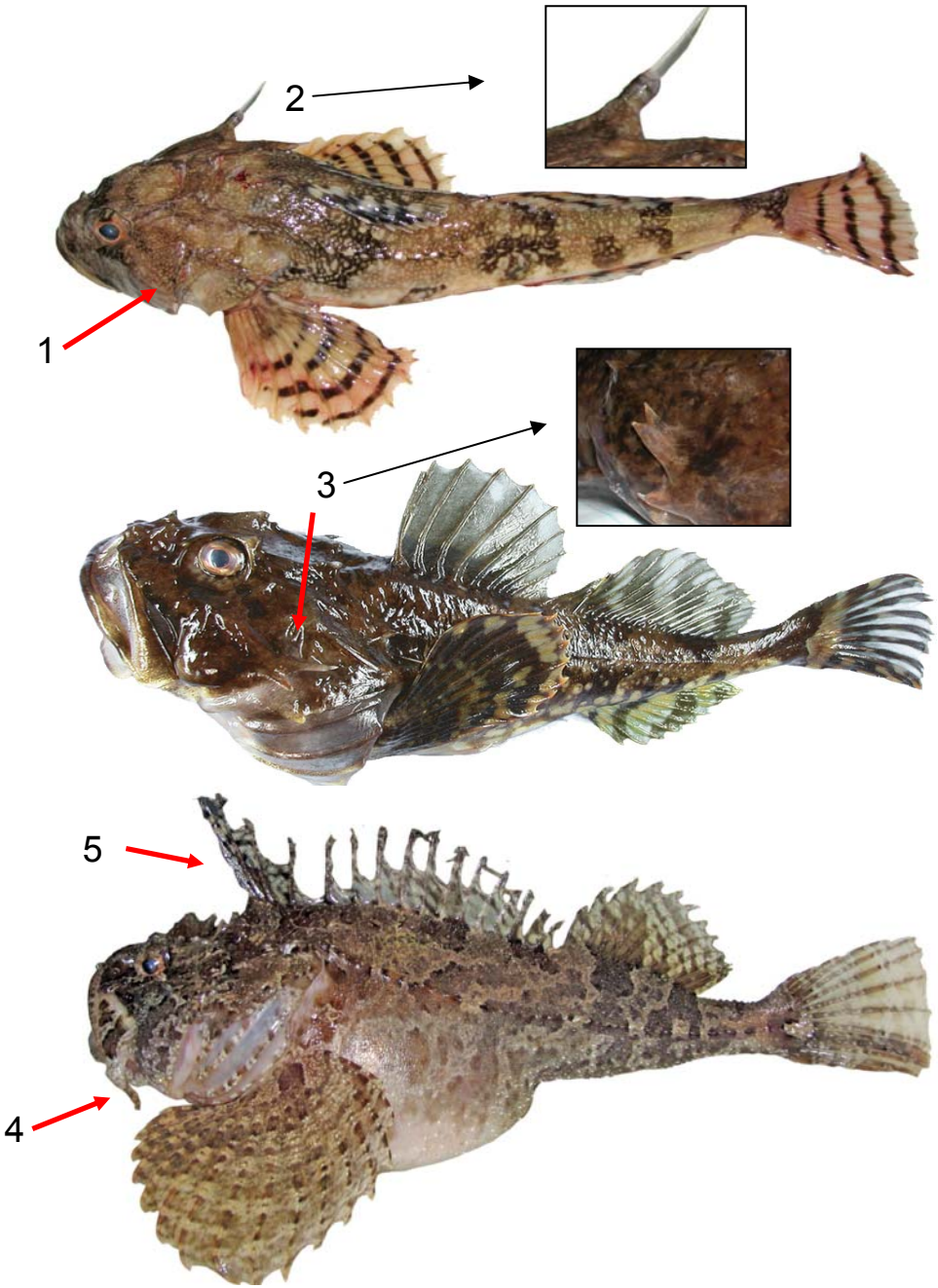
- Lips not floppy/hooded
- Head pointed
- Colour purplish (bluish)

Ocean Pout (*Zoarces americanus*)

2. Dorsal fin begins before pectoral fin
3. Dorsal fin composed of soft rays except for short section with spines before the tail
   - Presence of large teeth
   - Thick lips
   - Colour variable; muddy yellow to reddish brown with grey or olive green blotches
   - Pectoral fins often reddish or orange

Wrymouth (**Cryptacanthodes maculatus**)

4. Very large oblique mouth
5. Large flat head; short relative to body length; snout very blunt
6. Small pectoral fins
7. Dorsal and anal fins confluent with caudal



Cottidae (large)

Longhorn Sculpin (*Myoxocephalus octodecemspinosus)*

- ➢ Body elongate and slender, tapering towards the tail
1. 3 preopercular spines, upper one is at least 4 times longer than the one below it
2. Head spines sharp and naked at the tip
- ➢ Colour usually dark olive and greenish yellow
- ➢ Fins pale with dark crossbands

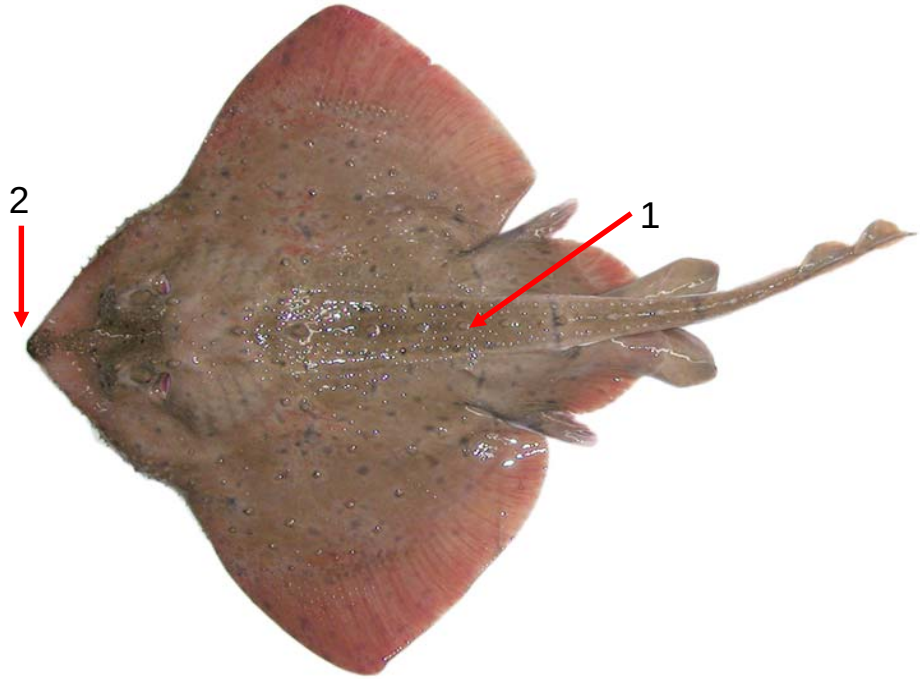
Shorthorn Sculpin (*Myoxocephalus scorpius)*

- ➢ Large head and mouth
3. Robust preopercular spine is less than twice as long as the one below it and doesn't reach more than half of the edge of the gill cover
- ➢ Colour variable; dark greenish brown above
- ➢ Fins brown, greenish or yellow spotted and barred
- ➢ Yellow spots common on belly

Sea Raven (*Hemitripterus americanus)*

4. Fleshy tabs on the head and lower jaw
5. Irregular first dorsal fin, and the first two or three spines longer than those further back
- ➢ Colour reddish-brown; belly is yellowish
- ➢ Specimens captured at sea are often bloated with water when brought to the surface

Rajidae



Thorny Skate (*Amblyraja radiata)*

1. Large thorn-like spines present along the median line and the tail; single row
2. Anterior angle of the snout is obtuse (i.e.. not overly pointy)

- Colour of upper surface is brown, occasionally spotted with darker brown

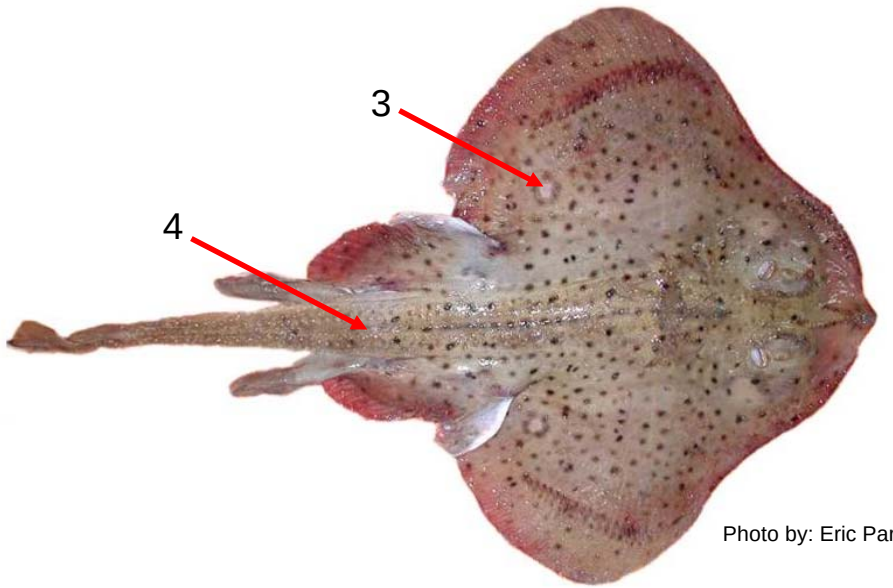


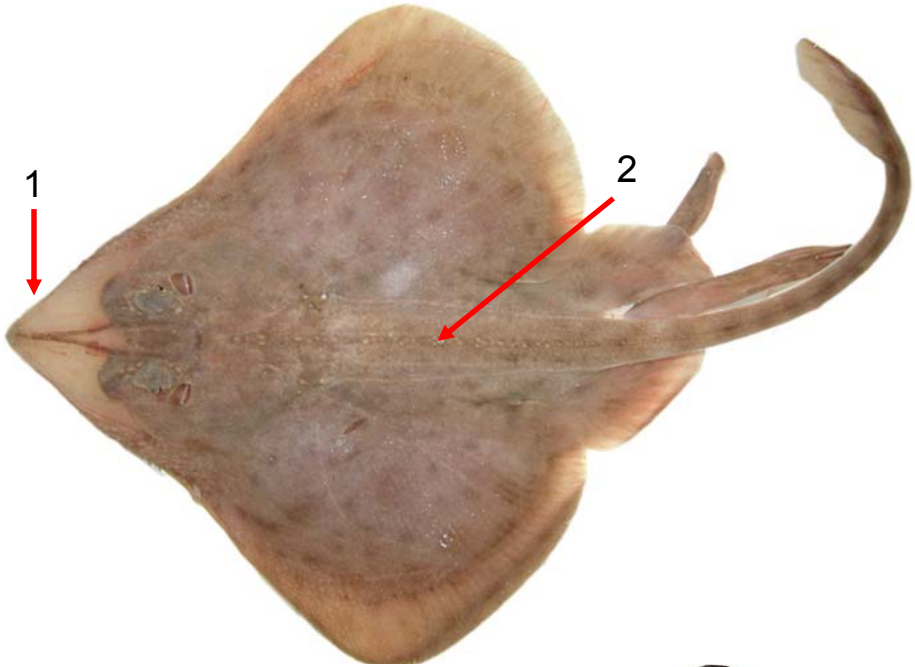
Photo by: Eric Parent

Winter Skate (*Leucoraja ocellata)*

3. 1 to 4 eye rings apparent posterior
4. 2 or 3 irregular rows of spines along the median line and the tail

- Snout rounded
- Colour of upper surface is light brown with a number of dark spots

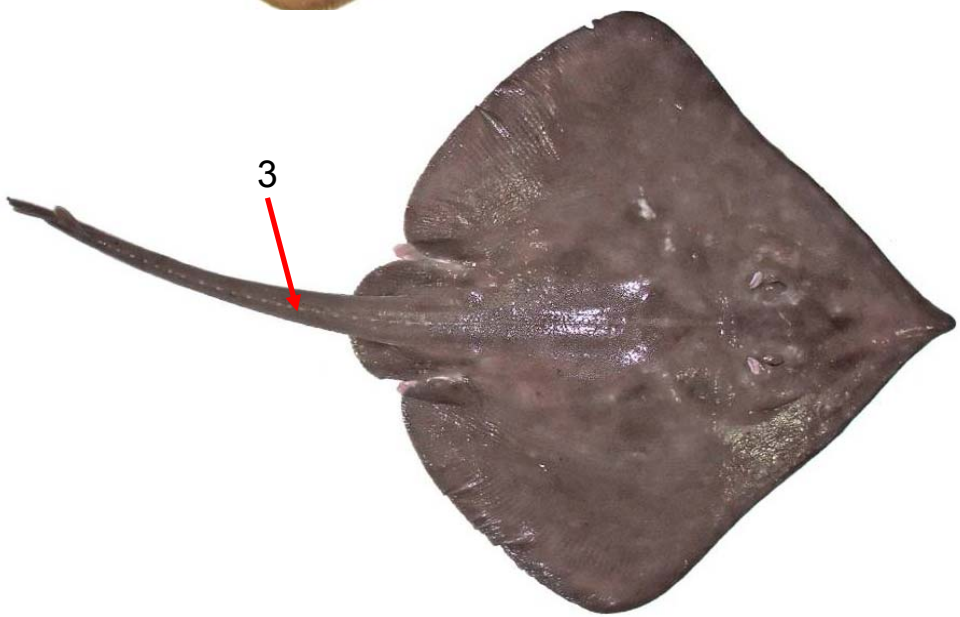
Rajidae (continued)



Smooth Skate (***Malacoraja senta)***

1. Snout pointed and often clear
2. Small thorns on the length of the tail; eroded in adults

- Upper surface is pale brown with irregular smooth areas on shoulder and upper pelvis
- Generally occurs in deeper waters in the southern Gulf of St. Lawrence.



Spinytail Skate (***Bathyraja spinicauda)***

3. Single row of large thorns along the midline of the tail, beginning slightly in front of the pelvic fins

- Snout pointed
- Upper surface is uniformly grey to pale brown
- Rare in the southern Gulf of St. Lawrence

Pleuronectiformes

(Large mouthed)

Atlantic Halibut (***Hippoglossus hippoglossus)***

1. Jawbone extending to below middle of eye and beyond
2. Arched lateral line above pectoral fin
3. Caudal fin slightly forked, not rounded

- Colour; greenish-brown on the eye side
- Grey-white on the blind side
- Teeth well developed

Greenland Halibut / Turbot (***Reinhardtius hippoglossoides)***

- Large teeth
- Lateral line almost straight
- Caudal fin slightly forked, not rounded
- Colour; greyish-brown to almost black
- The blind side is white in juveniles but grey in adults

American Plaice (***Hippoglossoides platessoides)***

- Caudal fin rounded
- Lateral line almost straight
- Body is reddish-brown, blind side white
- Mouth large, jawbone extending to below middle of eye

Pleuronectiformes

(Small mouthed)

Witch Flounder (***Glyptocephalus cynoglossus)***

1. Jawbone extending at most to front of eye
2. Straight lateral line
3. Rounded tail

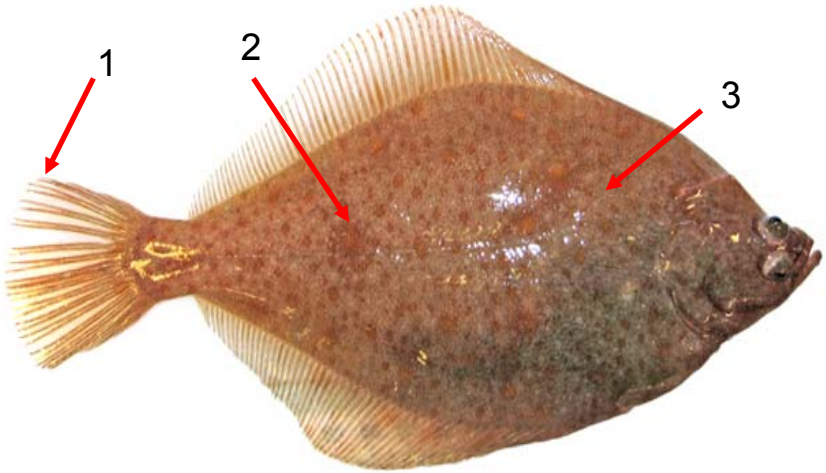
- Slippery skin (slimy)
- Body very thin
- Colour brownish-grey
- Blind side greyish white

Winter Flounder (***Pseudopleuronectes americanus)***

- Body relatively thick
- Small mouth, jawbone extending at most to front of eye
- Region between eyes covered with scales (rough to the touch)
- Reddish-brown to dark brown, sometimes almost black with blotches on the eye side of the body
- Lateral line almost straight

Pleuronectiformes

(Small mouthed) - continued



Yellowtail Flounder (***Limanda ferruginea)***

1. Rounded tail
2. Irregular rusty spots present
3. Arched lateral line

- On the blind side, the caudal fin and margins of dorsal and anal fins are yellow

Windowpane (***Scopthalmus aquosus)***

- Body nearly rounded, almost translucent
- Eyes and pigment on the left side
- Colour vary from greenish-olive to light brown
- Small irregular brown spots present
- Arched lateral line

Pelagic and Anadromous species

Mackerel (***Scomber scombrus)***

- Colour is blue and silver with dark stripes along the back
1. Small finlets near the tail
- Forked tail
- Flesh is firm to the touch

Herring (***Clupea harengus)***

- Body long and slender
- Greenish-blue along the back, silvery along the abdomen and sides
- Deep forked tail

Alewife (***Alosa pseudoharengus)***

- Head large
2. Dark spot just behind the gill cover
- Abdomen has a sharp edge or saw belly (in contrast to herring, the belly feels very jagged or rough when stroked from the tail to the snout)

Smelt (**Osmerus mordax)**

3. Very small rounded adipose fin
- Deep bodied about mid-length
- Large scales
- In contrast to capelin, small teeth are much more prominent

Capelin (***Mallotus villosus)***

- More slender than smelt
- Adipose with long base
- Silvery sides below the lateral line

Miscellaneous species

Photo by: Eric Parent

Spiny Dogfish (*Squalus acanthias)*

1. Caudal fin asymmetrical, large upper lobe
- Colour slate grey; presence of small white spots on either side above the pectoral fins to the pelvic
- Pointed nose
- Two dorsal fins, each preceded by a sharp heavy spine
- Male dogfish can reach lengths of 100 cm while females can measure up to 120cm. Spiny dogfish smaller than 60cm are rarely found in Canadian Atlantic waters

Black Dogfish (Centroscyllium fabricii)

1. Caudal fin asymmetrical, large upper lobe
- Black to grey body
- Two dorsal fins, each preceded by a sharp heavy spine
- Large green eyes
- Black dogfish are generally smaller than 70cm

Miscellaneous species

(continued)

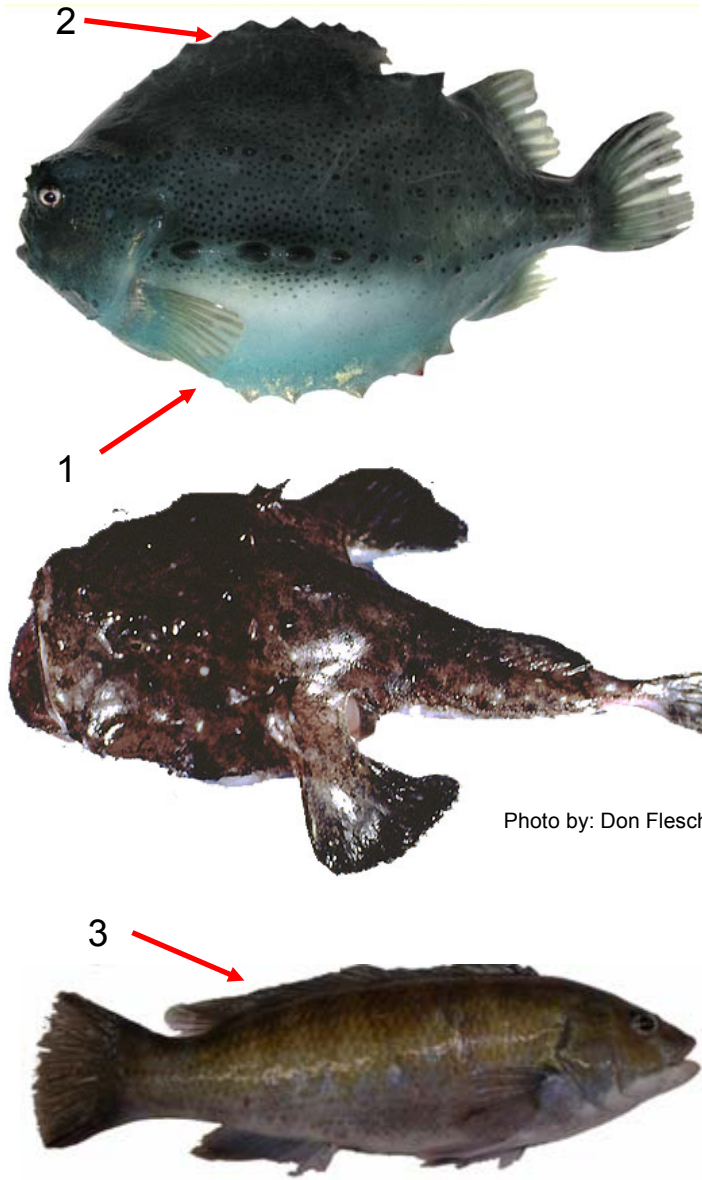


Photo by: Don Flescher

Lumpfish (***Cyclopterus lumpus***)

- Body stout and thick
1. Presence of ventral sucking disc
- Tubercle covered body
2. Dorsal crest
- Colour green-blue to grey-brown, mature males have pink-red bellies

Monkfish (***Lophius americanus***)

- Body dorsally flattened, tapering to a small cylindrical tail
- Very wide mouth
- Broom shaped tail

Cunner (***Tautogolabrus adspersus***)

- Head pointed
- Body oblong, moderately compressed
3. Continuous dorsal fin
- Caudal fin heavy, rounded
- Colour mottled with brown, reddish, blue, dull olive green

SECTION II

At-sea sampling of marine fishes during commercial fishing activities in the southern Gulf of St. Lawrence

Demersal roundfish sampling procedure

1.

1. Fish measurement

Using an offset measuring board, the fish is laid flat, snout abutted against the headpiece. The first number (cm) visible after the tail is recorded.

2.

2. Otolith extraction (incision)

Holding the fish by the eye sockets, a 45 degree angle cut is made beginning slightly behind the eyes and cutting as far as the edge of the operculum (gill cover).

3.

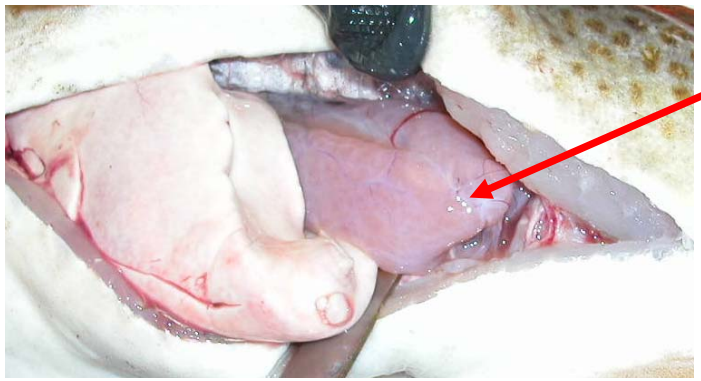
3. Otolith extraction (removal)

The otoliths are exposed behind the brain by pulling the snout towards the belly. Otoliths are removed using tweezers.

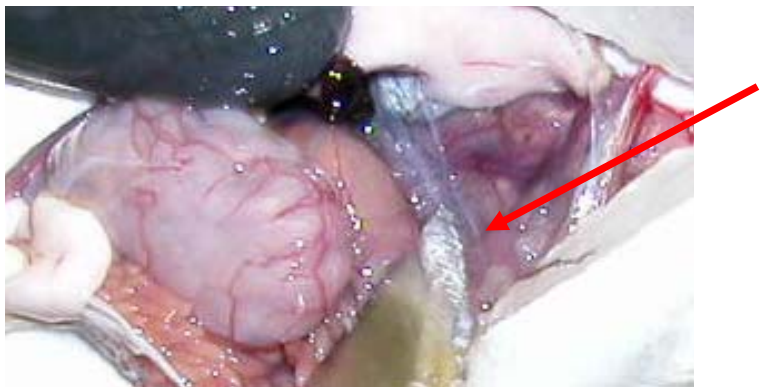
Demersal roundfish sex determination

1.

2.



3.



1. Incision

An incision is made in the belly from just after the pectoral fins, to just before the anus, exposing the gut cavity and gonads.

2. Female ovaries

The two ovaries are cylindrical, tapering at their ends. The colour is generally pinkish to orange and eggs may be visible.

3. Male testes

Appear as a ribbon-like coiled tube, pinkish in colour in immature fish and orange to milky-white in mature fish.

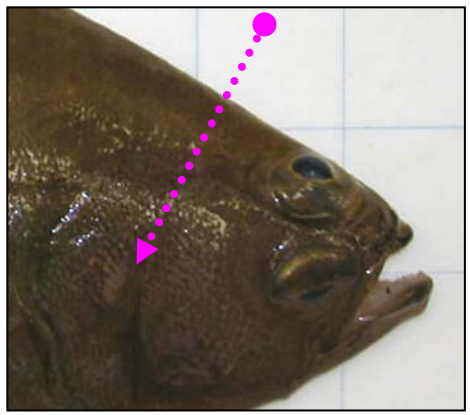
Flatfish sampling procedures

1.

1. Fish measurement

Using an offset measuring board, the fish is laid flat, snout abutted against the headpiece. The first number (cm) visible after the tail is recorded.

2.



2. Otolith extraction (incision)

With the fish lying flat on the measuring board, a 90 degree cut is made mid-way between the eye and the edge of the operculum (gill cover).

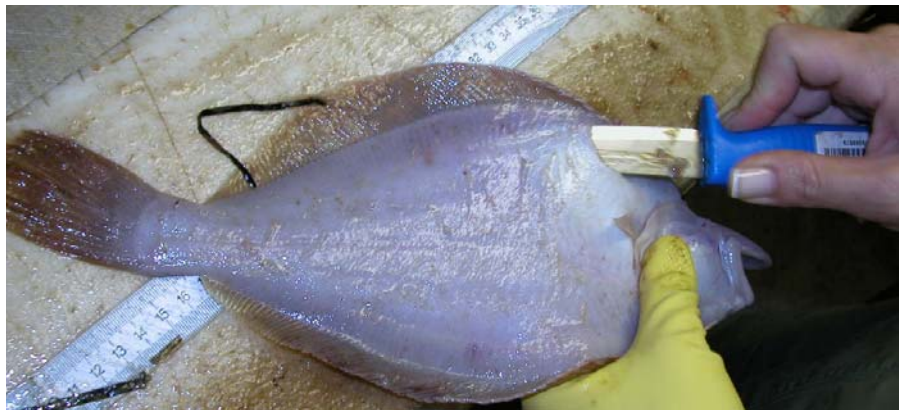
3.

3. Otolith extraction (removal)

When the angle of the cut is done correctly and by bending the snout of the fish, one otolith should be visible; the other can be located just underneath by probing using tweezers.

Flatfish sex determination

1.



1. Insert the tip of the knife in the gut cavity on the blind side of the fish

2.

2. Cutting away from you, an incision down about half the fishes body length is made, exposing the gonad

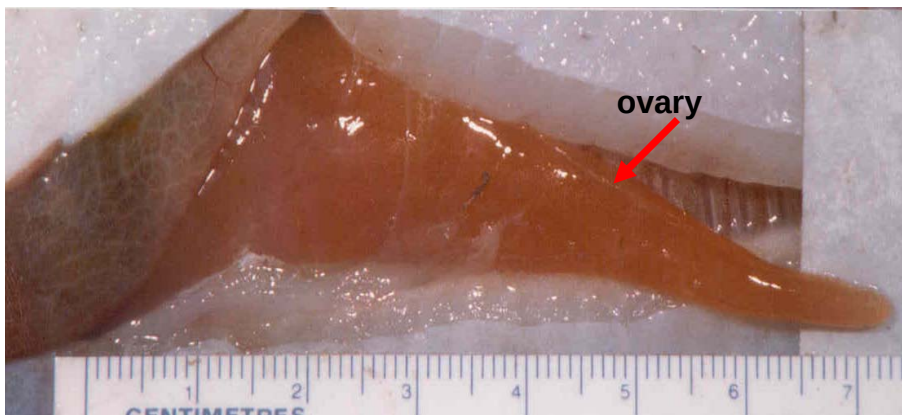
Flatfish sex determination

Females

- Ovaries are conical, with round edges
- Colour clear in immature individuals, but varying from pinkish to orange in mature fish
- Eggs may be visible

Immature

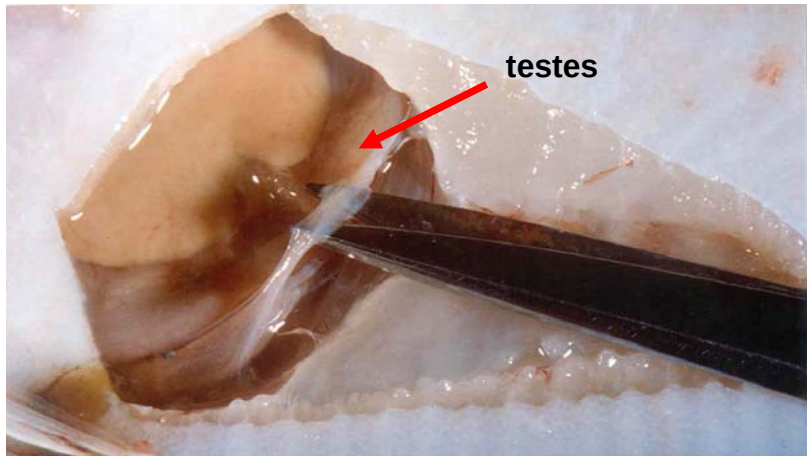
Mature



Males

- Testes generally triangular in shape with sharp edges; do not extend far towards the tail
- Colour clear in immature individuals, and white in mature fish

Immature



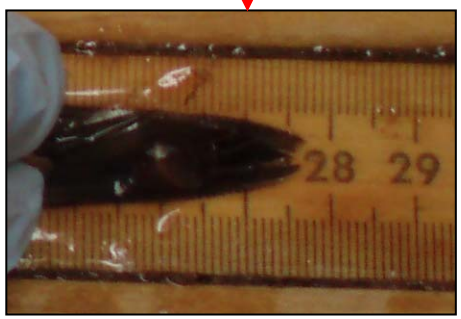
Mature

Herring length measurement

1.

1. Herring are measured on a non-offset measuring board, with the snout abutting gently the headboard.

2.



2. Measurements are made by pinching the two lobes of the caudal fin and rounding down the length reading to the nearest 0.5 cm interval
(e.g., 27.7 → 27.5 in this case).